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# Specific Heat Capacity Thermal Function of the Cyanoacrylate Fingerprint Development Process

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## Abstract

The use of cyanoacrylate, or superglue, fuming to develop latent fingerprints on non-porous evidence has been utilized by forensic investigators since the early 1980's when Ed German, a U.S. Army investigator, discovered his Japanese counterparts using the technique. Since then the application methodologies have expanded from vacuum chambers, torches with sublimation tips and rapid dispersion devices of the cyanoacrylate vapor, all moving us forward with the focus of increased of sensitivity of fingerprint development. In an attempt to comprehend and improve the polymerization process of cyanoacrylate fuming, we embarked on an avenue of research that focused on temperature and humidity variations of both the environment in which the fuming occurs and also temperature variations were used on the actual evidence itself in an attempt to understand and optimize the development of latent fingerprints utilizing cyanoacrylate.

Our premise was that the temperature of the substrate material during the fuming event, combined with the relative humidity is crucial in obtaining the best possible fingerprint development, and that the specific heat capacity and thermal conductivity of the evidence substrate material would guide the temperature parameters of the polymerization process involved with cyanoacrylate fuming. The numerous tests that we have performed on various non-porous materials commonly found at crime scenes utilizing diverse temperature and relative humidity parameters have proven this assertion correct.

On identical materials with deposited latent fingerprints developed simultaneously but at different substrate temperatures, we have been able to show that there is a substantial increase in polymerization which is easily observed visually and supported by measurable weight increases when the evidence is cooled to a temperature relative to the substrate's specific heat capacity. The weight variations as shown in the data files serve as support to the visualization properties which is the main concern of latent fingerprint examiners. We have shown that we can increase the polymerization on the fingerprint ridge site by cooling the temperature of the substrate in a correlative manner to its known specific heat capacity.

## Table of Contents

**Executive Summary**

The use of cyanoacrylate, or superglue, fuming to develop latent fingerprints on non-porous evidence has been utilized by forensic investigators since the early 1980's when Ed German, a U.S. Army investigator, discovered his Japanese counterparts using the technique. Since then the application methodologies have expanded from vacuum chambers, torches with sublimation tips and rapid dispersion devices of the cyanoacrylate vapor, all moving us forward with the focus of increased of sensitivity of fingerprint development. In an attempt to comprehend and improve the polymerization process of cyanoacrylate fuming, we embarked on an avenue of research that we felt was the best route to understand and optimize the development of latent fingerprints utilizing cyanoacrylate.

Our premise was that the temperature of the substrate material during the fuming event, combined with the relative humidity is crucial in obtaining the best possible fingerprint development, and that the specific heat capacity and thermal conductivity of the substrate material would guide the temperature parameters of the polymerization process involved with cyanoacrylate fuming. The numerous tests that we have performed on various non-porous materials with diverse temperature and relative humidity parameters have shown that this assertion correct. On identical materials with deposited latent fingerprints developed simultaneously but at different substrate temperatures, we have been able to show that there is a substantial enhancement in polymerization easily distinguished visually and by a significant difference in weight increase when the evidence is cooled to a temperature relative to the substrate's specific heat capacity.

The most common belief is that there is a chemical reaction between the fingerprint materials residue and the cyanoacrylate vapor, that the latent print contains a receptor site that seeds the polymerization of cyanoacrylate. However, phenomena like "inverted prints" are left unexplained.

A better understanding of the ways in which cyanoacrylate interacts with latent prints is needed to allow for the development of techniques to optimize development environments, to help identify critical variables, and to establish new protocols for the pre and post processing of evidence. Our preliminary findings suggested that different materials should be processed at different temperatures and that the optimum temperature and cyanoacrylate-polymerization may differ based upon the heat conductivity of the evidence type. Also cooling the evidence may increase polymerization of the cyanoacrylate.

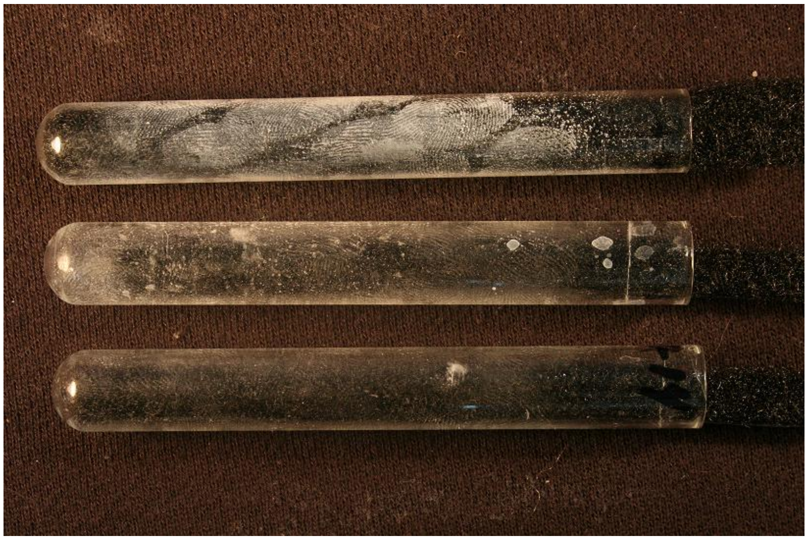
**Heat Transfer in the Perspective of Cyanoacrylate as it Relates to Specific Heat Capacity**

Specific heat capacity and thermal conductivity are the two main factors that influence the rate of loss of heat from the surface of the object that receives precipitated cyanoacrylate on its surface. In order to understand the behavior of the specific heat and the thermal conductivity of the object, and its influence on the accumulation of the cyanoacrylate, we have decided to experiment with a series of observations. We will relate the specific heat capacity of different objects of the cyanoacrylate precipitation on the surface of variable evidence types. In order to understand the influence of specific heat capacity function as it relates to fingerprint development and cyanoacrylate, we will try to observe the temperature variations of the exothermic monomer to polymer polymerization process as well as the specific heat capacity of varying evidence types such as glass, aluminum, copper, steel, and polyethylene. We expect to see an increased polymerization by controlled variations and reduction of temperatures that follow the thermal conductivity of common materials and we expect to see the temperature of the evidence surface and environments provide the verification of this phenomenon. Since the monomer-polymer conversion appears to have exothermic function we anticipate an increased sensitivity of fingerprint development by lowering the temperature of the evidence.

During our analysis we have developed well over four thousand and fifty (4,050) fingerprints in controlled environments. We have tested over 1350 glass tubes, specimen slides, and various metals including 300 copper strips, 200 steel/zinc washers, 300 aluminum strips, along with 200 polyethylene zip lock bags in a controlled and systematic manner. The items were numbered and weighed utilizing a scientific digital scale sensitive to one-one thousandth of a gram. Each sample was weighed twice by separate research assistants. Fingerprints from the same individual were then deposited on the materials and hung on a rack secured with alligator clips in groups of 25. These materials were periodically re-weighed after the prints were deposited and we found that the deposition of the fingerprints themselves did not increase the weight to a measurable amount. We have built redundancy in quantity for statistical analysis.

The materials were then placed in two groups of 25 into a refrigerated environment and allowed to cool to a pre-determined but differing temperature. The temperatures of the evidence groups were verified using a digital, infrared thermometer and then simultaneously placed together into either a 6 or 12 cubic foot fuming chamber with a known temperature and relative humidity. The two groups of identical materials with noted temperature differences were subjected to simultaneous controlled cyanoacrylate fuming. Visual differences in the latent fingerprint development were dramatic, and the average amount of weight increase attributed to the polymerization process produced the quantitative data to support and verify our hypothesis. There are substantial variations in the fingerprint development that can be visually observed and the visual quality correlates with the numerical data. Underdeveloped fingerprints weighed considerably less than those that appear optimized.

The test materials represented in the photographs used in this report were chosen based on their optimal visual representation of this phenomenon and are typical of the test results although some test materials varied.



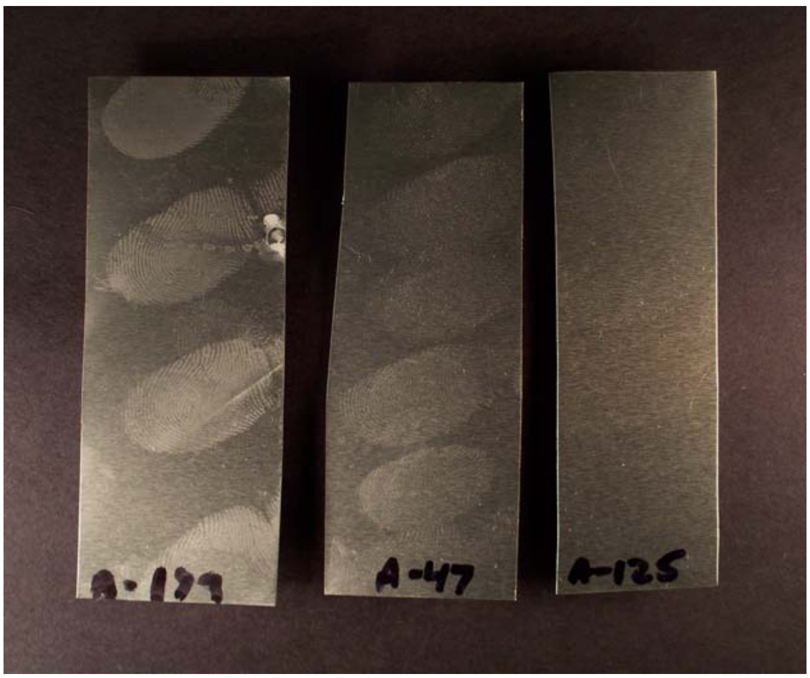
The top test tube is at 40 degrees Fahrenheit, the middle test tube is at 46 degrees Fahrenheit and the bottom test tube is at 74 degrees Fahrenheit. These examples were reproduced numerous times. All of the above test tubes were subjected to CN fuming in the same environment at the same time, and the only difference was the temperature of the item.

We continued our investigation into the specific heat capacity function with temperature, relative humidity, and environmental constraints on aluminum, a steel-zinc alloy, and copper and have verified the specific heat capacity function of the cyanoacrylate deposition process. The most optimized results and their temperature parameters are defined through our statistics, weight of the deposited polymer and visual inspection of each item.

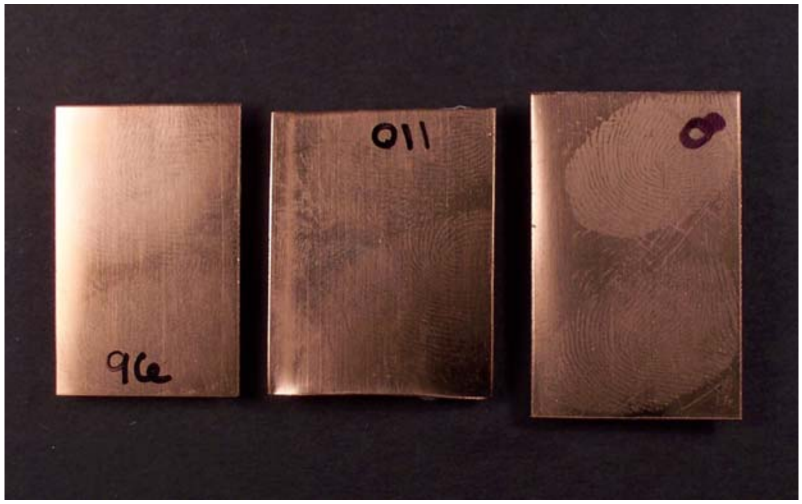

Steel/Zinc alloy temperatures from left to right; 68° F, 65° F, 64° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature variable on deposition.

A comparison of differing materials was conducted between glass, (which can be considered a relative insulator) as opposed to aluminum, steel, copper, and polyethylene. The weights and visual clarity of the polymerized fingerprints have given us the answer and as expected a larger deposition occurs when optimized environmental constraints are placed on the evidence. These continued tests have verified that mass and specific heat capacity functions need to be a strong consideration when processing non-porous evidence.

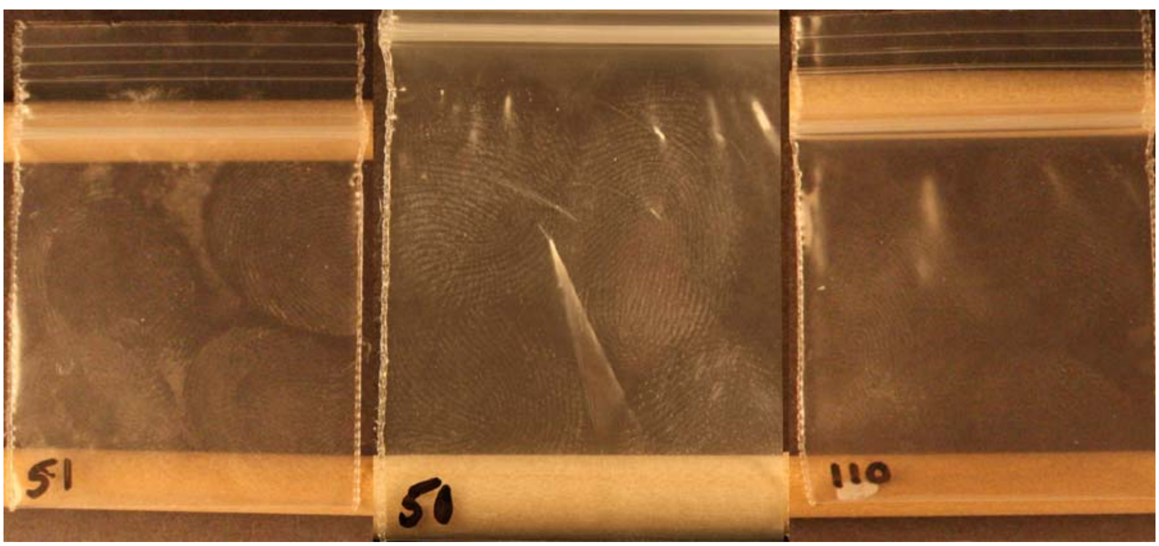
Additionally we have observed that a higher temperature environment seems to inhibit polymerization and the colder environment seems to give us consistent over-development of the polymer. Through this effort we believe that we can make recommendations to isolate the temperature optimization of both evidence temperature and environmental constraints specific to various materials.




Aluminum sheet temperatures from left to right; 55° F, 69° F, 65° F, simultaneously processed with cyanoacrylate fuming showing effects of subtle temperature variables on deposition.



Copper sheet temperatures from left to right; 69° F, 71° F, 68° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature variable on deposition.




Polyethylene bags temperatures from left to right; Bag # 51, 59° F, Bag # 50,  51° F, Bag # 110,  63° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature variable on deposition.

It was observed that when cyanoacrylate vapors come in contact with cold surfaces increased polymerization occurred. But why that happens and whether or not that can be exploited to improve fingerprint evidence processing is the question these experiments were designed to answer.

The process of fingerprinting with cyanoacrylate fumes involves two functions, polymerization and condensation. Water is known to initiate vinyl polymerization in cyanoacrylate monomers forming solid polycyanoacrylate. However, the polycyanoacrylate resin formed by reacting ethylcyanoacrylate is easily volatized at temperatures below 200° F, not that much hotter than the temperatures used to volatize the cyanoacrylate monomer itself.

When put in context of fingerprinting applications, this has negative implications for the efficacy of the fingerprinting process. Because the polycyanoacrylate volatilizes at similar temperatures as the cyanoacrylate monomer, if the sample being fingerprinted is as hot as the chamber fingerprint development will be retarded. As stated above, the process involves heating the monomer into a vapor, the hot vapor then impacts the moisture or other chemical initiators in the fingerprint and polymerizes. However, before the reaction can begin the cyanoacrylate must condense. One can debate whether the cyanoacrylate monomer, in vapor form, can also attach to the forming polymer, but as most examiners will note, the deposited cyanoacrylate take time to become a hard “fixed” polymer. We therefore proceed with the assumption that the vapors condense on to surfaces then polymerize into polycyanoacrylate.

In its simplest terms condensation occurs when vapor molecules impact a cooler surface and give off enough heat energy to undergo a phase transition. Though this process, the vapor cools to a liquid and the surface warms. How much heat a surface can absorb is related to its specific heat capacity, its thermal conductivity and the temperature difference between the vapor and the surface.

Specific heat governs how much energy it takes to increase the internal temperature of the substance. The higher the specific heat, the more energy it can absorb before going up in temperature.

Thermal conductivity governs how fast heat energy can be transferred to neighboring molecules. The higher the thermal conductivity, the quicker heat can be dissipated. Temperature difference is also important. The rate of thermal transfer is greater when the distance between temperatures is greater. However, as with any vapor, phase change back to a liquid (or solid) from the vapor state requires a decrease in internal energy. Simply put the vapor must give off heat and cool down. One mechanism to cool down is condensation on colder surfaces.

But, which mechanism dominates improving condensations? Multiple experiments were run with different materials. For these discussions we will focus on Aluminum, Glass and Copper. Published values differ but typical specific heats for these three materials are Aluminum (specific heat = .90, thermal conductivity = 150), Glass (specific heat = .84, thermal conductivity = 1.1) and Copper (specific heat = .39, thermal conductivity = 350).

Focusing first on Aluminum and Copper. Depending on their purity aluminum has approximately a 2.3 times greater specific heat than copper. Therefore it can and must absorb more than twice as much heat as the copper to effect the same change in its internal energy as copper. Therefore, if change in internal energy dominates the condensation of cyanoacrylate we would expect to see greater cyanoacrylate deposition on aluminum than we do on copper under similar temperature conditions.

If however, we look at thermal conductivity, we see that Aluminum has half or less of the thermal conductivity capability of copper. Therefore if heat conduction is the dominant mechanism we would expect to see greater cyanoacrylate deposition on copper than aluminum under similar temperature conditions.

Twenty sets of trials of at least ten samples each were run at a variety of ambient air temperature, sample temperature an ambient humidity. Observational data suggests that the colder the sample the better the deposition. However, due, in part, to the variable nature of fingerprints, a direct sample to sample correlation does not yield practically reliable results.

Individual samples within any sample group varied, on average, as much as .004g. It is therefore possible to find within each group samples higher or lower than samples in other groups. It was decided therefore to take each group as a whole and look at the mean polycyanoacrylate deposition.

This analysis yielded more consistent results. In the case of the copper, although individual samples were has high as 0.008g and as low as no detectable deposition, all but one of the sample groups averaged an increase in the mass after fuming of 0.001 to 0.002 grams with a total average deposition of .0015[1] grams of polycyanoacrylate.

The aluminum samples likewise yielded a tighter range when taken as a group rather than as single samples. Although the range of recorded values ranged from 0.010 grams to no

[1] Note that the proper significant figures would read as .002g, but due to the magnitude of the range, the extra digit was left to variation.

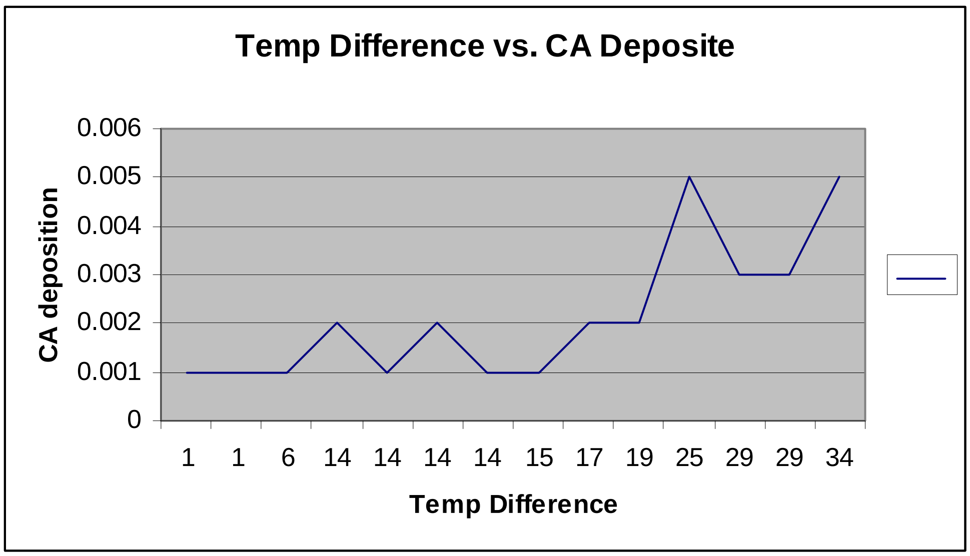
detectable deposition as a group, each sample averaged 0.002 to 0.003 grams. The average deposition of all the aluminum samples was .0026 grams.

Taking all of the samples within each metal we get a trend where the deposition on aluminum is approximately 1.5 to 1.7 times the amount as was obtained on copper. This supports the conclusion that the increase in heat on the surface of the impacted material is the dominant mechanism and substances with higher specific heat capacity will allow for a greater deposition of polycyanoacrylate under identical conditions.

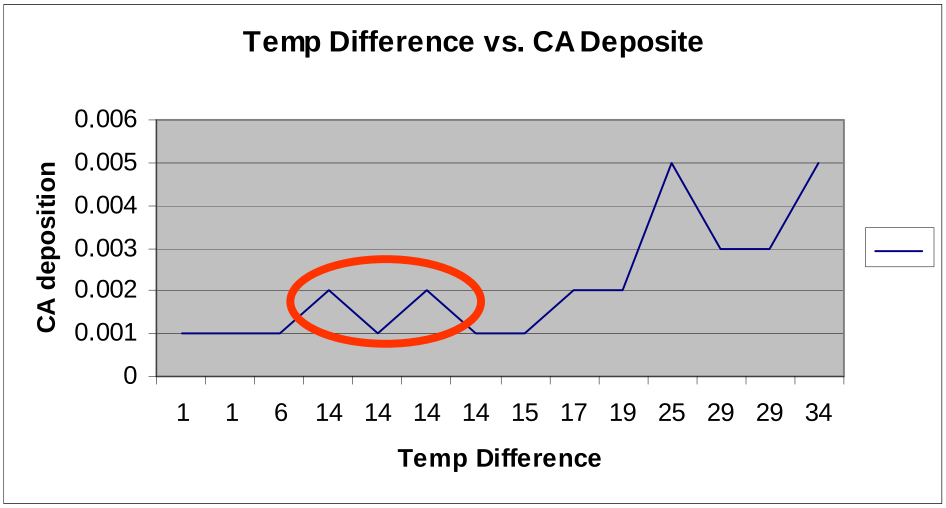
This data also supports the observations that colder samples will show increased deposition in the same time. Thermodynamically, the greater the heat difference between to states the more rapid heat exchange will occur. In context of finger printing this means that the colder the sample is relative to the ambient vapor the faster cyanoacrylate deposition will occur.

Moving now to the glass samples, several hundred fingerprints were also collected on glass test tubes. Taken as a whole, the trend is similar to the aluminum results and in line with a correlation between an increase of polycyanoacrylate development and specific heat.  Reported specific heat values for glass differ depending of type and temper. But on average, the specific heat is slightly less than aluminum but of a similar magnitude. And, if we take the average polycyanoacrylate deposition on the large test tubes we see that the average is just slightly more than .002g; a little bit less than was averaged for aluminum. The glass samples also show a general trending toward greater CA deposition as the temperature difference increases. As with the previous samples, if we focus on the individual samples, there is a lot of sample to sample variation. And individually, any particular sample may show greater or lesser deposition of polycyanoacrylate than any particular sample of a different temperature group.

However, if one compares the average polycyanoacrylate formation for each temperature group, a trend emerges. As the difference between the ambient temperature and the sample temperature increases, more polycyanoacrylate is formed on the sample.



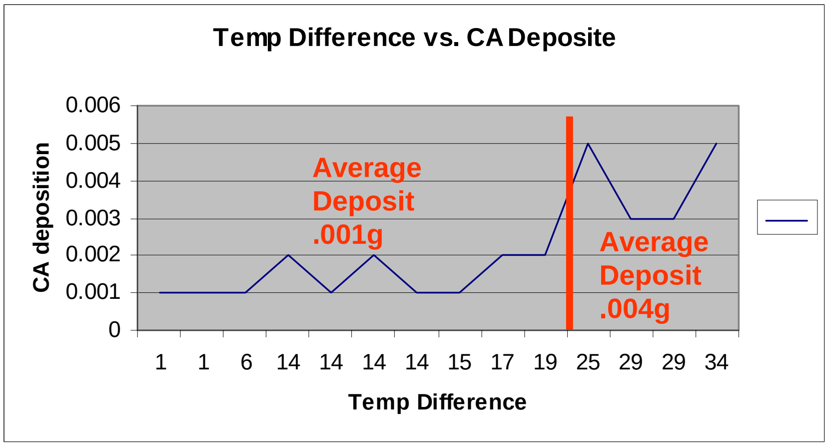

The chart above includes samples were the temperature difference was the same but for which the polycyanoacrylate build up varied. This is an artifact of the variability of the test conditions.




The three points circled in red represent three sample groups all run at the same ambient and sample temperatures. As can be seen, the average varies in a range of .001g, but that range is consistently below the deposition at the higher temperature differences (above 20°F).

These data separate into two groups, low deposition (.002g or less) and high deposition (.003g or more) with a transition between these groups around 20°F. When the temperature difference is less than 20°F, the average polycyanoactrylate deposition is .0014g[2]. When the temperature difference is greater than 20°F the polycyanoacrylate deposition is .004g. Above the 20°F temperature variation mark, the average polycyanoacrylate buildup is 2.8X greater than below.

[2] Please note that the authors have deliberately exceeded the significant figures here because to report a .001 would substantially mislead the apparent variance in the ranges




These conclusions should not be taken to excess. The polymerization reaction is exothermic. Overcooling the sample will retard the reaction rate. However, no negative effect was seen in a range of 25°F between the ambient vapor and the sample with a bottom limit of 48°F for the sample temperature. The specific variation between sample temperature and chamber temperature which yields the best results for increasing polycyanoacylate deposition is going to be determined specific heat of the material. Therefore dissimilar evidence types should be priced seperately under conditions specific to them.

The data do not show any particular benefit from chamber humidity under the condition of the experiments possibly owing to the freshness of the finger prints.

No particular value was seen in exceeding a 25°F difference. And, for practical reasons one does not want the sample to become too cold. The ambient temperature needs to be warm enough for the cyanoacrylate to remain in sufficiently concentrated vapor to be practical and the sample cannot be so cold as to retard polymerization of the cyanoacrylate monomer.

For the past year our research has focused on the specific heat capacity, temperature and relative humidity functions in regards to fingerprint development in enclosed chambers using cyanoacrylate fuming. In our initial hypothesis and first set of tests we identified, clearly, a temperature function that expanded the sensitivity of the of the fingerprint development process with cyanoacrylate. The research results of these temperature and relative humidity tests have driven the research design.

What we have isolated is that the relationship of chamber environment to the evidence surface temperature is more a component in the polymerization process than was understood up to this point. Additionally relative humidity and temperature play a key role in fingerprint development optimization, and this dew point /temperature condensation effect moves along a linear scale dependant on material type.

Our research suggests that a dominant mechanism of fingerprint development with cyanoacrylate is condensation with variables in the process based on material type and the physics and specific heat capacity of the actual evidence type. It is our belief that chemical reactivity is potentially influenced by temperature variations in the development of cyanoacrylate on fingerprints. Specifically the cyanoacrylate vapor condenses on the print or the substrate at differing rates depending on the heat-conductivity of the print and the heat-conductivity of the substrate. The factors affecting condensation are well known: Vapor concentration, ambient temperature, substrate temperature, and substrate heat-conductivity. Condensation has a warming affect on the substrate, and as such, the specific heat capacity of the substrate plays a role in the development of prints. The substrate may act as a heat-sink allowing continued condensation, or if the heat conductivity of the substrate is greater than the heat conductivity of the print material then an inverted print may develop. The exothermic ceiling of the polymerization process can be somewhat enhanced by lowering the surface temperature of the evidence.

This has important implications. Other condensing polymers may interact with fingerprints at different temperature ranges and there may exist processes to amplify the differences between the heat-conductivity of the print and the heat conductivity of the substrate. We have explored a few strategies involving the manipulation of the temperature of the substrates and the environment which may change evidence processing from this point forward. To optimize fingerprint development , at the very least it is our opinion that non-porous evidence of differing substrate materials should be separated from each other and processed in groups based on the specific heat capacity inherent to their material type. Also, a lower temperature should be considered for the evidence surface during processing in chambers.

The temperature ranges should be adjusted based on evidence material type. The dew point function will need to move along a linear form based on material type. There were substantial differences in the various developed fingerprints due to temperature and relative humidity ranges. The weight increases noted by our statistics can also be visually observed instantly. With the proper environmental constraints we consistently developed clear and well defined fingerprints with a higher degree of development than normal circumstances at ambient temperatures. This relationship between material type temperature and relative humidity appears to be the important function in optimizing the cyanoacrylate fuming process for a very sensitive fingerprint development system. Environmental chambers for future cyanoacrylate processing should have refrigeration capability, and humidity control, and latent examiners, or evidence processing technicians should familiarize themselves with this phenomenon.

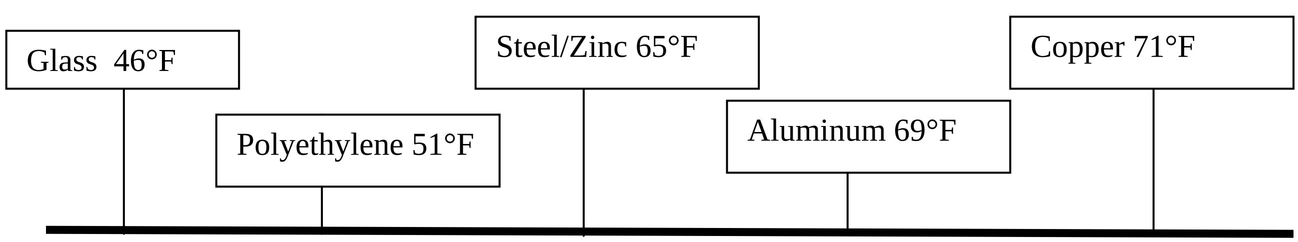
Optimization Temperature Recommendation;

Glass evidence results have shown that the evidence should be lowered to a temperature of 46°F fumed with the cyanoacrylate in a chamber at 80°F with a relative humidity of 48%. We have arrived at the 46°F temperature and the 80°F chamber environment along with a controlled 48% humidity as the optimum environment for glass evidence fingerprint development. The averaged weight increase of our statistics and visual clarity of the fingerprints suggest that for the glass test materials, a 46° F substrate temperature, 48% relative humidity in the chamber (near dew point), and an 80°F chamber environment are definite improvements and have produced a 280% increase by weight of polymerized cyanoacrylate very cleanly and clearly deposited on the fingerprint ridge sites with minimal or no background deposits of cyanoacrylate over the glass test materials.

It is also apparent that the temperature in the fuming environment appears to have an effect on the polymerization process in that lowering the chamber temperature to 65°F with 46% relative humidity inhibited polymerization of the cyanoacrylate on some test materials while inversely having the evidence temperature cooled to 40°F produced consistent over-development on the materials. The cyanoacrylate polymer adhered to the entire surface of these test materials with no distinct fingerprints developed. Additionally the test tubes and test materials that were close in temperature to the ambient temperature of the fuming chamber showed the least amount of polymerization. Test tubes processed with a significantly lower differential between temperature and relative humidity became over-developed. So, through this run of multiple tests with variable temperature parameters and relative humidity parameters we have found that three variables will need to be controlled: the actual environment in which the cyanoacrylate vapor is injected into needs to be controlled in both temperature and relative humidity, and the item of evidence surface should be cooled to a temperature relative to its specific heat capacity.

There is a thermal function in the polymerization process, in other words, as we have monomer converting to polymer, this function obviously provides an exothermic event, the ridge sites of the fingerprints are heating up during the polymerization process. By cooling the evidence surface we can increase the polymerization of fingerprints.

But it is more than just simply cooling the evidence to optimize the process and it has been known for many years that additional humidity injected into the environment assists in fingerprint development but through this research we are isolating the optimum parameters.




The above diagram represents the preferred temperature parameters that our research has statistically and visually indicated for optimizing cyanoacrylate fingerprint development for various materials. As expected, the optimum weights of polymerization as well as visual inspection confirmed that cyanoacrylate polymerization followed the specific heat capacity function based on the thermal conductivity of variable materials.

The implications for policy and future procedures and practices are simple and concise. It is our opinion that latent fingerprints on non-porous surfaces that are developed with cyanoacrylate fuming achieve a higher level of polymerization when the surface temperature of the evidence is lowered although overdevelopment can occur if the substrate is too cold. We have identified what we feel are the optimal temperatures to achieve the best results with cyanoacrylate fuming for several material types that are commonly found as evidence in criminal cases. It is a straightforward process of placing the material into a refrigerated environment and allowing it to reach a specified temperature prior to fuming with cyanoacrylate. The equipment needed can be as basic as a full size or apartment size consumers style refrigerator and an infrared thermometer.

Evidence processing laboratories may choose to follow these recommendations on future examinations and perhaps after further understanding reprocess evidence from major cases that had been cyanoacrylate fumed without producing useable, polymerized fingerprints.

## I. Introduction

### 1. Statement of problem

The most common belief is that there is a chemical reaction in the cyanoacrylate fuming process between the residue and the print, that the latent print contains a receptor site that seeds the polymerization of cyanoacrylate. However, phenomena like “inverted prints” are left unexplained.

A better understanding of the ways in which cyanoacrylate interacts with latent prints is needed to allow for the development of techniques to optimize development environments, to help identify critical variables, and to establish new protocols for the pre and post processing of evidence. Our preliminary findings suggested that different materials should be processed at different temperatures and that the optimum temperature and cyanoacrylate-polymerization may differ based upon the heat conductivity of the evidence type.

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## 3. Statement of hypothesis or rationale for the research

### Thermal Energy as it Relates to Condensation of Cyanoacrylate Polymer and Fingerprint Development. A discussion of the hypothesis based on the physics of the monomer to polymerization conversion process.

Energy in physics is defined as a physical quantity equal to the capacity to useful work. Work is done when an object is displaced by a force. Mathematically, work is equal to the force multiplied by the displacement in the direction of the force. Since energy is defined as the capacity to do work, numerically energy is equal to the work done. The unit of measurement of both energy and work is the same: Joule in SI Units, and BTU in US customary units.  When the rate of use or extraction of energy from any storage system is expressed in Joule/second, then it is called Power. In other words, power is the rate of work done. Its unit of measurement is Watt in SI Units.

The first law of thermodynamics states that energy can be neither created nor destroyed, but it can be changed from one form to another, and this is called as the conservation of energy. Energy is not a substance, but mechanical energy of a particular form. There are different forms of energy: (a) Heat (b) Gravitational Potential Energy (c) Kinetic energy (d) chemical energy (e) EM form of Energy (f) nuclear energy (Einstein's famous equation: $E= mc^2$) . As mentioned earlier, these energies can be changed from one form to another, but the total energy remains constant. In any given system the first law of thermodynamics can be mathematically expressed as:

$Q_H = U_2 - U_1 + W$

Where $Q_H$ = heat absorbed, kJ

$U_2 - U_1$ = internal energy (or thermal energy) of the system in states 1 and 2, kJ.

$W$ = work, kJ

Thermal energy can be stored in any substance in the form of heat. Temperature is a measure of kinetic energy of molecules, and latent of fusion or vaporization are potential energies associated with the different phases of the substance (e.g. solid, liquid, and gas) which is absorbed or released without a change in temperature. The specific heat of a substance is the quantity of heat required to increase a unit mass of the substance one degree. Specific heat is expressed in metric units as kcal/kg-K and in SI units as kJ/kg-K where K is Kelvin. Per degree change in Celsius is equal to Kelvin. One kilocalorie (kcal) is the amount of energy required to raise the temperature of one kilogram of water from 14.5 degree Celsius to 15.5 degree Celsius. In SI Units 4.186 kJ = 1 kcal. Mathematically, specific heat C can be related to mass of the substance (m), temperature change ($\Delta T$), and the total quantity of heat ($\Delta Q$) as follows:

$\Delta Q = m\ C\ \Delta T$

Specific heat capacity of a substance is sometime called a DNA code of the substance, i.e. every substance has a unique specific heat capacity, and it can be used to identify a substance. Specific heat capacities of different substances can be found in any standard Physics Book. Through observations of the monomer/polymer conversion process in cold environments in the field while working with the Alaska State Crime Lab we observed numerous times a rapid and increased rate of cyanoacrylate polymerization at colder temperatures. These early observations were the instigation of these base line tests we have conducted.

**Transfer of Energy (Thermal Energy)**

As mentioned earlier, energy can be transformed from one form to another, and it can also be transferred from one object to another. Particularly, heat / thermal energy can be transferred from one form or one substance to another form or substance in the following ways:

1. Conduction
2. Convection
3. Radiation

**Conduction**: Conduction is the transfer of heat or thermal energy through a substance by molecular diffusion due to a temperature gradient. Fourier's law provides an expression for calculating energy flow by conduction:

$dH/dt = -\alpha_{tc}\ A\ dT/dx$

where dH/dt = rate of change of thermal energy, kJ/s or kW

$\alpha_{tc}$ = coefficient of thermal conductivity, kJ/s.m.°C

A = surface area, $m^2$

dT/dx = change in temperature through a distance, °C /m

The negative indicates the direction of heat flow. The average values for thermal conductivity for some common materials are given in Table 2.

The Zeroth law of Thermodynamics states that the two objects are in thermal equilibrium when both of them have the same temperature. Thermal equilibrium here refers to the flow of heat from one object to the other.

**Convection**: Forced convective heat transfer is a the transfer of thermal energy by means of large scale fluid motion such as flowing river or aquifer or the wind blowing. The convective heat transfer between a fluid at a temperature, $T_f$, and a solid surface at a temperature, $T_s$, can be described by the following equation:

$dH/dt = -\alpha_{cht} A\ dT/dx$

where dH/dt = rate of change of thermal energy, kJ/s or kW

$\alpha_{cht}$ = coefficient of convective heat transfer, kJ/s.$m^2$.°C

A = surface area, $m^2$

dT = difference in temperature, °C

The negative indicates the direction of heat flow. The average values for the convective heat transfer coefficient.

**Radiation**: Unlike the conduction and convection method of heat transfer, the radiation method of heat transfer does not require any medium to transfer or release the heat from a substance. The radiated energy is transported in the form of electromagnetic waves. The radiation involves two processes: absorption, and emission. Every object in the universe absorbs energy in part or in full based on type of wave that strikes the surface of the object, surface are, and the absolute temperature of the object, and similarly, the emission also depends on these similar parameters. An object that radiates the maximum possible intensity for every frequency of EM Wave is called a blackbody. The term blackbody has no reference to the color of the body. λ (in meter) • T (in Kelvin) = 0.0029 can be used to compute the type of EM Wave an object emits at a given absolute temperature T. Human body at 37 ºC emits IR wave.

The change in internal energy due to the radiation heat transfer is the difference in energy absorbed and emitted, and it can be mathematically expressed as:

$$dH/dt = E_{abs} - E_{emitted} = A(\varepsilon\sigma T^4_{body} - \alpha\sigma T^4_{environ})$$

where dH/dt = rate of change of thermal energy, kJ/s or kW

$E_{abs}$ = h f in kJ (here h is Planck's constant, and f is the frequency of EM wave (photon) that is absorbed by the object.).

$f = c/\lambda$

σ = Stephen-Boltzmann constant = $5.67 \times 10^{-8}$ W / $m^2K^4$

A = surface area, $m^2$

$T_{body}$ and $T_{environ}$ = are absolute temperatures in Kelvin.

ε = emissibity (= 1 for blackbody), and

α = absorptivity

**Heat Transfer in the Perspective of Cyanoacrylate as it Relates to Specific Heat Capacity**

Specific heat capacity and thermal conductivity are the two main factors that influence the rate of loss of heat from the surface of the object that receives precipitated cyanoacrylate on its surface. In order to understand the behavior of the specific heat and the thermal conductivity of the object, and its influence on the accumulation of the cyanoacrylate, we have decided to experiment with a series of observations. We will relate the specific heat capacity of different objects of the cyanoacrylate precipitation on the surface of variable evidence types. In order to understand the influence of specific heat capacity function as it relates to fingerprint development and cyanoacrylate, we will try to observe the temperature variation of heat function of the exothermic monomer to polymer polymerization process as well as the specific heat capacity of varying evidence types such as glass, aluminum, copper, steel, and polyethylene. We expect to see an increased polymerization by controlled variations and reduction of temperatures that follow the thermal conductivity of common materials and we expect to see the temperature of the evidence surface and environments provide the verification of this phenomenon. Since the monomer-polymer conversion appears to be an exothermic function with a ceiling in the high 90 degree Fahrenheit realm we anticipate an increased sensitivity of fingerprint development by lowering the temperature of the evidence.

## II. Methods

During our analysis we have developed well over four thousand and fifty (4,050) fingerprints with controlled environments. We have tested over 1350 glass tubes, specimen slides, and various metals including 300 copper strips, 200 steel/zinc washers, 300 aluminum strips, along with 200 polyethylene zip lock bags in a controlled and systematic manner. The items were numbered and weighed utilizing a scientific digital scale sensitive to one-one thousandth of a gram. Fingerprints from the same individual were then deposited on the both sides of the test materials in sets of 50 with the same approximate area of fingerprint residue on each item. The tests were designed primarily to be qualitative with visual inspection as the key, and secondarily to ascertain if a measureable weight variation occurred due to distinct temperature differences in the substrate material during cyanoacrylate fuming..The test materials were then hung on racks secured with alligator clips in groups of 25. These materials were periodically re-weighed after the prints were deposited and we found that the deposition of the fingerprints themselves did not increase the weight to a measurable amount.

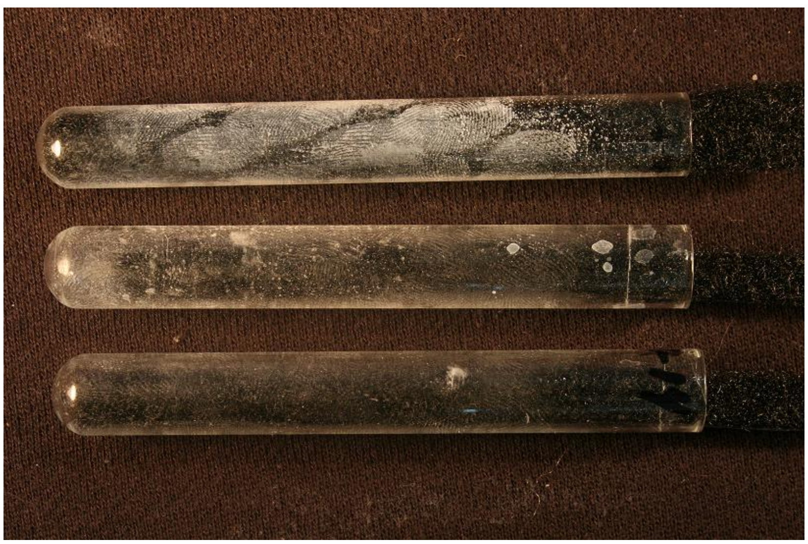
The materials were then placed in two groups of 25 into a refrigerated environment and allowed to cool to a pre-determined but differing temperature. The temperatures of the evidence groups were verified using a digital, infrared thermometer and then simultaneously placed into a either a 6 cubic foot fuming chamber or a 12 cubic foot chamber with a known temperature and relative humidity. The amount of cyanoacrylate and the length of the fuming event were increased for the larger chambers. Each type of item materials were fumed in the same chamber and exposed to the same amount of cyanoacrylate vapors for the same amount of time. The two groups of identical materials with noted temperature differences were subjected to simultaneous controlled cyanoacrylate fuming.

Steel wool strips impregnated with a measured amount of cyanoacrylate and inserted into a sublimation device attached to a hand-held butane torch were heated to provide this controlled and timed cyanoacrylate fuming event. The humidity and temperature of the fuming chamber was monitored, carefully measured, and recorded. During these events we tested a broad range of both temperature and relative humidity. During every event the cyanoacrylate was immediately introduced into the chamber to insure temperature stability of the test items and the materials were allowed ten minutes of exposure to the cyanoacrylate fumes. The items were then removed from the fuming chamber and the polymerization results were visually observed. The quantity of polymerization was measured by again weighing the testing material after the fuming event and comparing this weight to the pre-fuming weight. The testing material was weighed individually and the result of each test were grouped and averaged. By averaging the polymerization increases of the groups of 25, we were able to show that there were consistent positive correlations between a material's known specific heat capacity and the temperature parameters during fuming. The variables in cyanoacrylate fingerprint development as recorded by a digital micro-gram scale and verified by visual inspection are dramatic and suggest that evidence temperature, relative to specific heat capacity, is a substantial factor in the successful polymerization of latent fingerprints on non-porous materials.

## III. Results

### 1. Statement of results

The amount of weight increase due to the polymerization process produced the quantitative data to support and verify our hypothesis. There are also substantial variations in the fingerprint development that can be visually observed and the visual quality correlates with the numerical data. Underdeveloped fingerprints weighed considerably less than those that appear optimized.



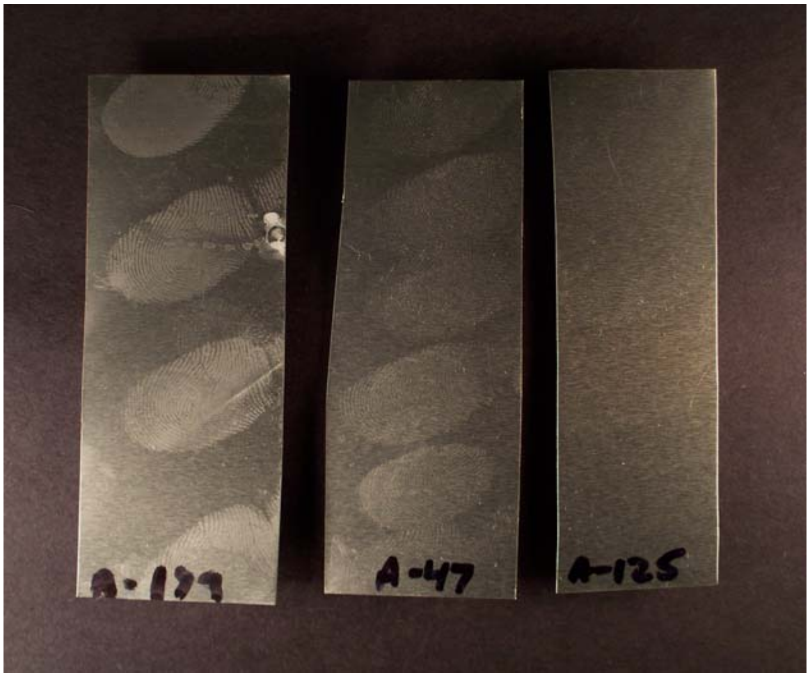
The top test tube is at 40 degrees Fahrenheit, the middle test tube is at 46 degrees Fahrenheit and the bottom test tube is at 74 degrees Fahrenheit. These examples were reproduced numerous times, all of the above test tubes were subjected to CN fuming in the same environment at the same time, and the only difference was the temperature of the item.

We continued our investigation into the specific heat capacity function with temperature, relative humidity, and environmental constraints on aluminum, a steel-zinc alloy, and copper. The most optimized results and their temperature parameters are defined through our statistics, weight of the deposited polymer and visual inspection of each item.

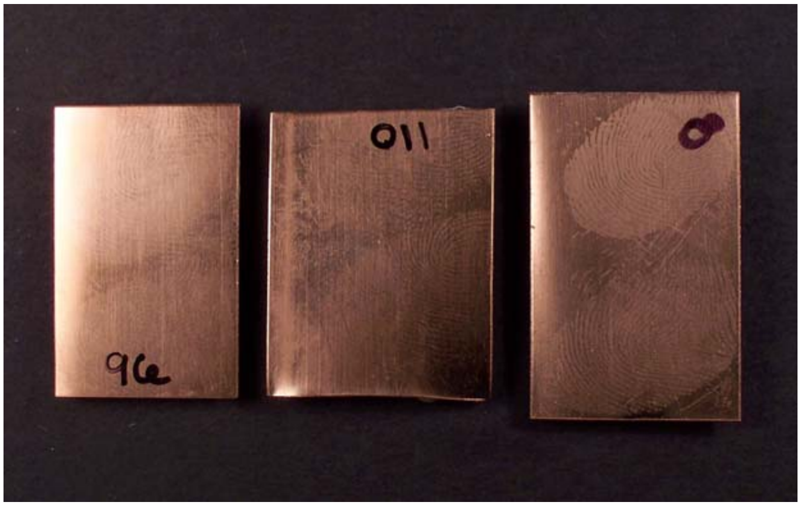
Steel/Zinc alloy temperatures from left to right; 68° F, 65° F, 64° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature variable on deposition.

A comparison of differing materials was conducted between glass, (which can be considered a relative insulator) as opposed to aluminum, steel, copper, and polyethylene. The weights and visual inspection of the polymerized fingerprints suggests that specific heat capacity functions need to be a strong consideration when processing non-porous evidence. <u>The temperature of the evidence, we feel is key to the optimization of fingerprint development and the temperature requirements for optimization differ based on material type.</u>

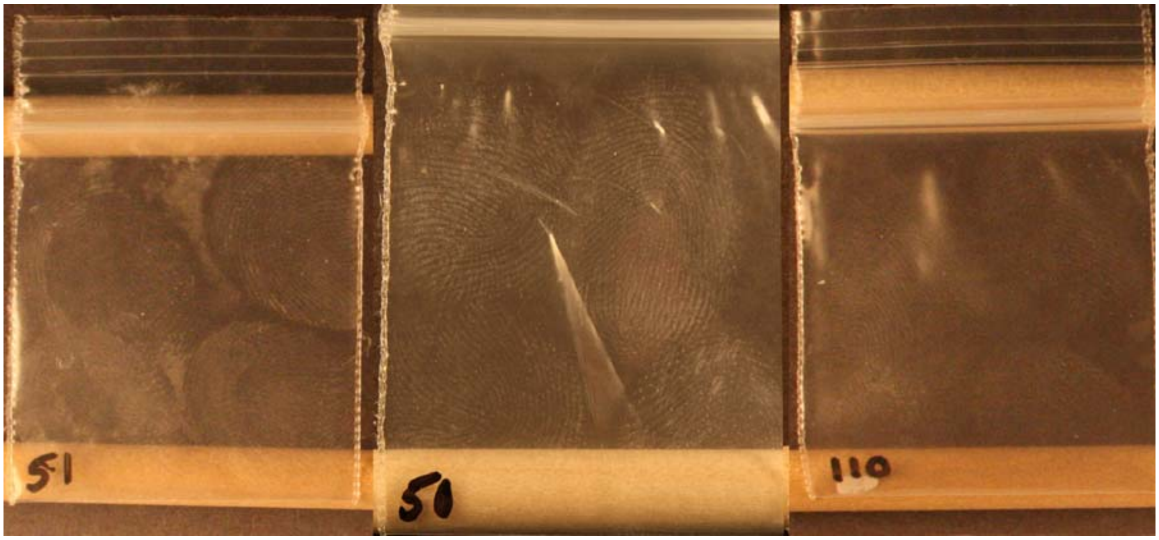
Additionally we have observed that a higher temperature environment seems to inhibit polymerization and the colder environment seems to give us consistent over-development of the polymer. Through this effort we believe that we can make recommendations to isolate the temperature optimization of both evidence temperature and environmental constraints specific to various materials.




Aluminum sheet temperatures from left to right; 55° F, 69° F, 65° F, simultaneously processed with cyanoacrylate fuming showing effects of subtle temperature variables on deposition.

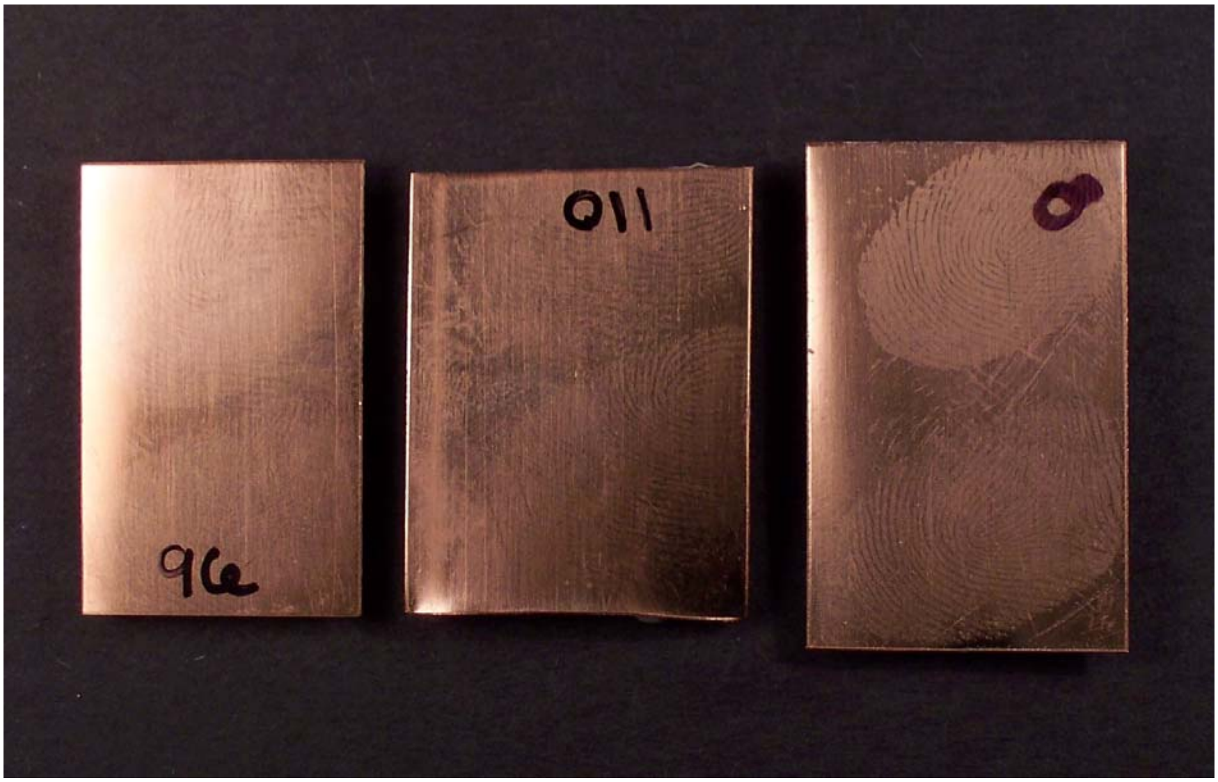


Copper sheet temperatures from left to right; 69° F, 71° F, 68° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature.




Polyethylene bags temperatures from left to right; 59° F, 51° F, 63° F, simultaneously processed with cyanoacrylate fuming showing effects of temperature variable on deposition.

## 1. Tables

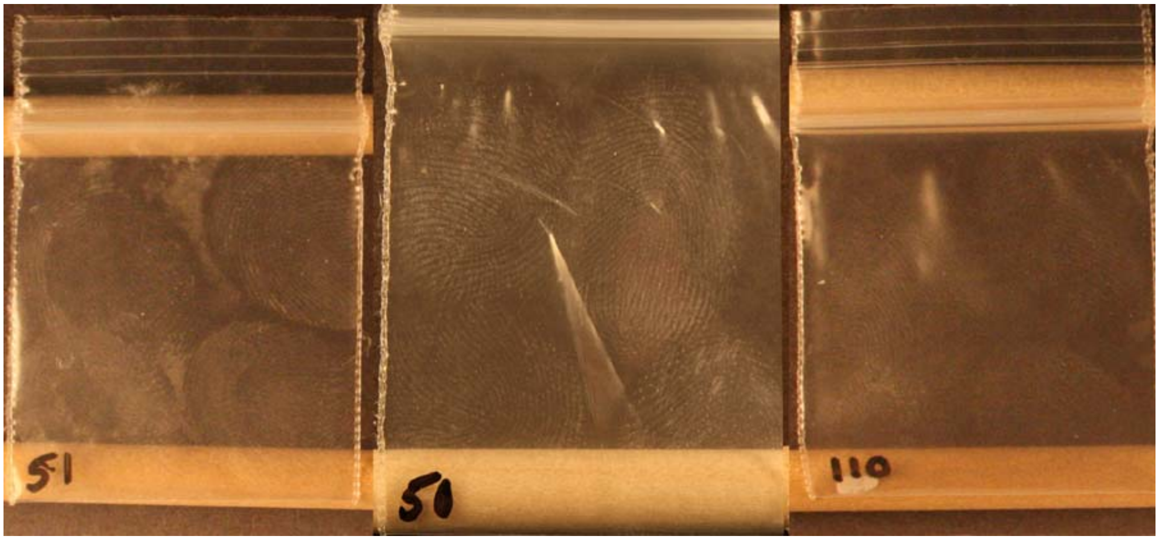



Copper Strips

| Item Number | Chamber Temp. | Relative Humidity | Item Temp. |
|---|---|---|---|
| #96 | 78° F | 72% | 69° F |
| #110 | 70° F | 72% | 71° F |
| #8 | 78° F | 76% | 68° F |

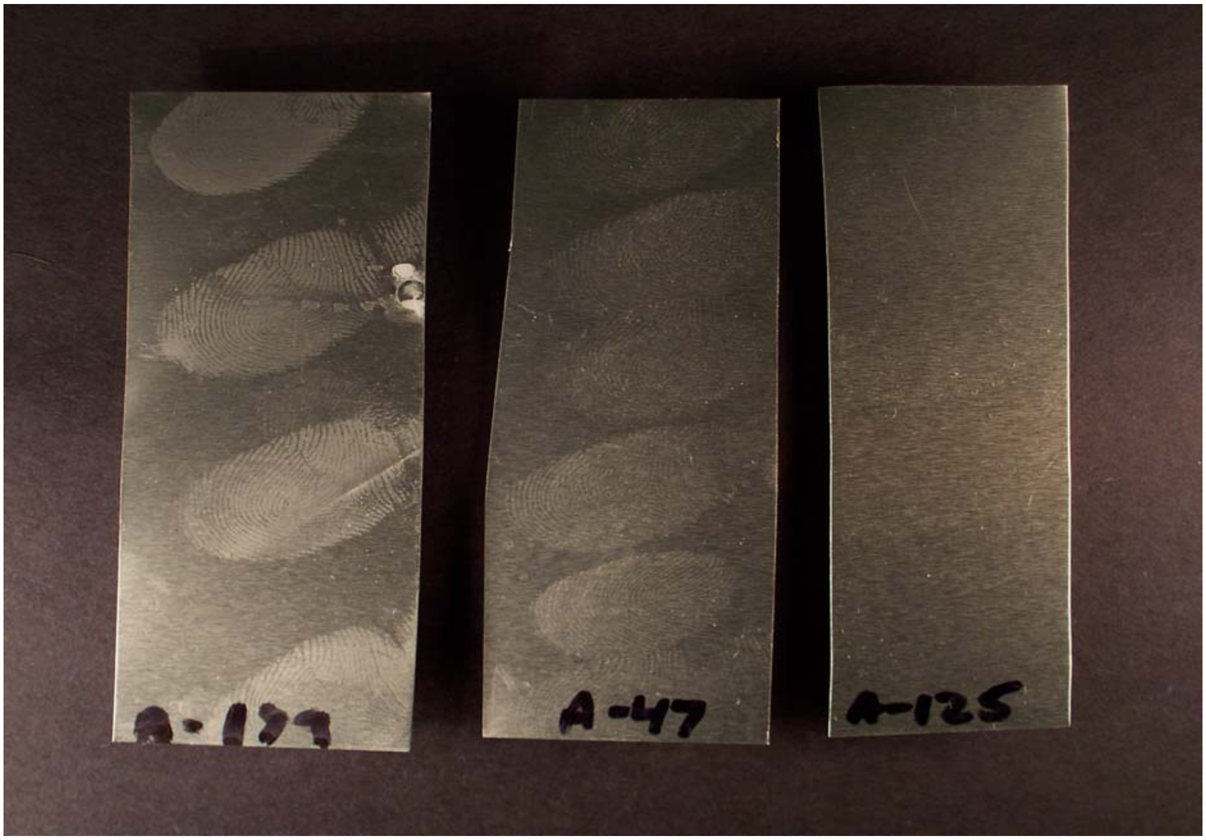

Steel/Zinc Alloy

| Item Number | Chamber Temp. | Relative Humidity | Item Temp. |
|---|---|---|---|
| #109 | 76° F | 59% | 68° F |
| #55 | 85° F | 59% | 65° F |
| #17 | 71° F | 63% | 64° F |



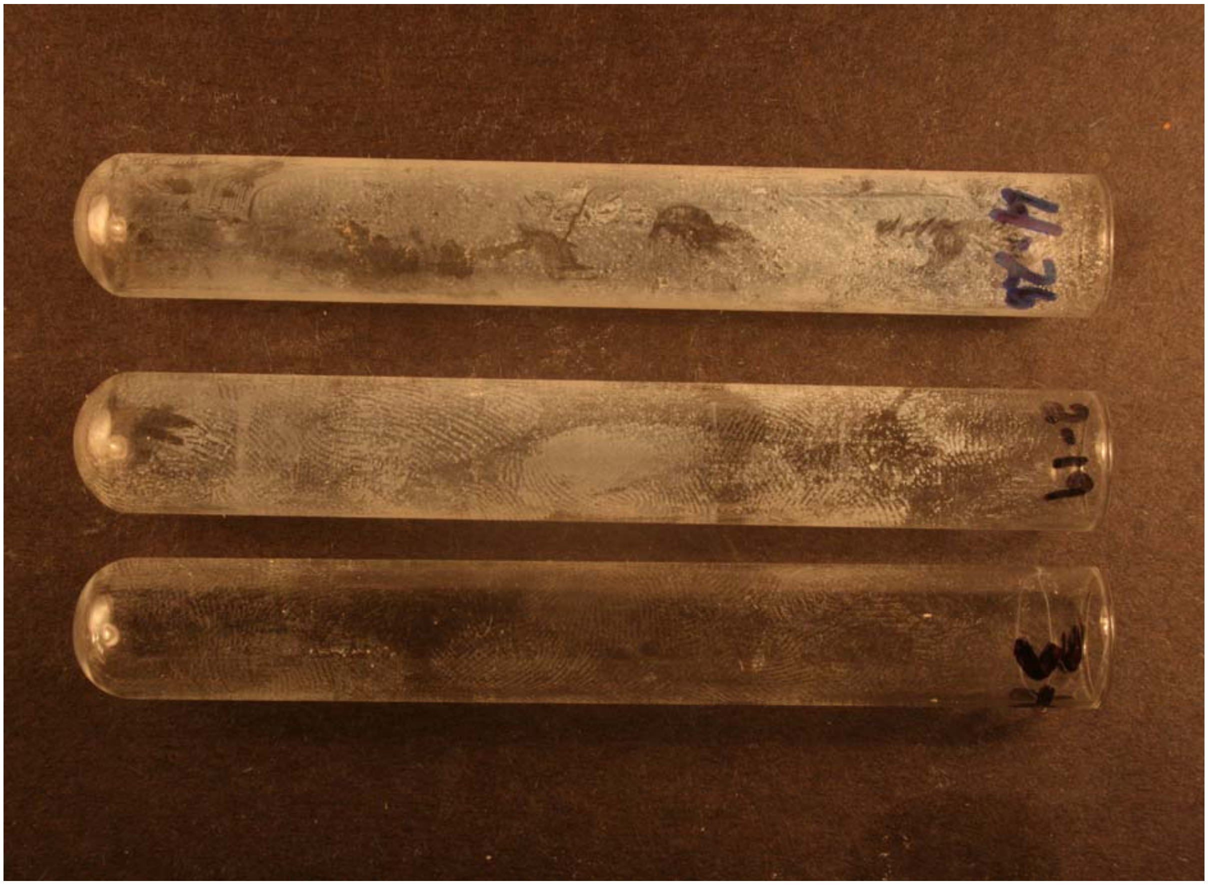

Polyethylene Bags

| Item Number | Chamber Temp. | Relative Humidity | Item Temp. |
|---|---|---|---|
| #51 | 60° F | 64% | 59° F |
| #50 | 51° F | 38% | 51° F |
| #110 | 63° F | 57% | 63° F |




Aluminum Strips

| Item Number | Chamber Temp. | Relative Humidity | Item Temp. |
|---|---|---|---|
| #179 | 73° F | 53% | 55° F |
| #47 | 75° F | 74% | 69° F |
| #125 | 78° F | 74% | 65° F |



Glass Tubes

| Item Number | Chamber Temp. | Relative Humidity | Item Temp. |
|---|---|---|---|
| # 4-26 | 65° F | 46% | 40° F |
| #3-19 | 75° F | 60% | 46° F |
| #3-28 | 75° F | 60% | 74° F |

**2.**

**3. Figures**

## IV. Conclusions

**1. Discussion of findings**

Over the last several months our research has focused on the specific heat capacity, temperature and relative humidity functions in regards to fingerprint development in enclosed chambers using cyanoacrylate fuming. In our initial hypothesis and first set of tests we identified, clearly, a temperature function that expanded the sensitivity of the of the fingerprint development process with cyanoacrylate. In the first set of tests using enclosed chambers with the glass evidence temperature at 48° F we observed a consistent increase in fingerprint development. The research results of these temperature and relative humidity tests have driven the research design.

What we have isolated is that the relationship of chamber environment to the evidence surface temperature is more a component in the polymerization process than was understood up to this point. Additionally relative humidity and temperature play a key role in fingerprint development optimization, and this dew point /temperature condensation effect moves along a linear scale dependant on material type.

Our research suggests that a dominant mechanism of fingerprint development with cyanoacrylate is condensation with variables in the process based on material type and the physics and specific heat capacity of the actual evidence type. <u>It is our belief that chemical reactivity is strongly influenced by environmental temperature and temperature of the evidence in the development of cyanoacrylate on fingerprints.</u> Specifically the cyanoacrylate vapor condenses on the print or the substrate at differing rates depending on the heat-conductivity of the print and the heat-conductivity of the substrate. The factors affecting condensation are well known: Vapor concentration, ambient temperature, substrate temperature, and substrate heat-conductivity. Condensation has a warming affect on the substrate, and as such, the specific heat capacity of the substrate plays a role in the development of prints. The substrate may act as a heat-sink allowing continued condensation, or if the heat conductivity of the substrate is greater than the heat conductivity of the print material then an inverted print may develop. The exothermic ceiling of the polymerization process may be expanded or improved by lowering the surface temperature of the evidence.

This has important implications. Other condensing polymers may interact with fingerprints at different temperature ranges and there may exist processes to amplify the differences between the heat-conductivity of the print and the heat conductivity of the substrate. We have explored a few strategies involving the manipulation of the temperature of the substrates and the environment which may change evidence processing from this point forward. At the very least it is our opinion that unlike evidence types should be separated from each other and processed in groups based on their specific heat capacity inherent to their material type. Also, a lower temperature should be considered for the evidence surface in preparation for the cyanoacrylate fuming.

Our most recent endeavors have shown that we have a polymerization effect which is temperature sensitive and variable materials behave differently. The cyanoacrylate dew point function of temperature and relative humidity will need to move along a linear form based on material type to optimize the process. There were substantial differences in the various temperature and relative humidity ranges that are quantified and the weight increases noted by our statistics can also be visually observed instantly. With the proper environmental constraints we consistently developed clear and well defined fingerprints with a higher degree of development than normal circumstances at ambient temperatures.

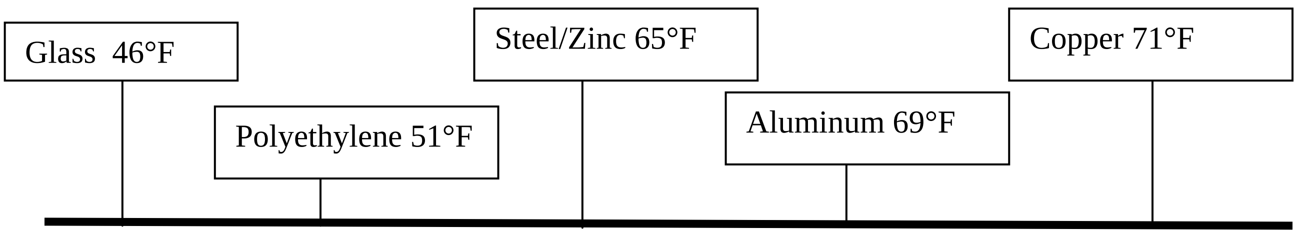
This relationship between material type temperature and relative humidity appears to be the important function in optimizing the cyanoacrylate fuming process for a very sensitive fingerprint development system. Environmental chambers for future cyanoacrylate processing should have refrigeration capability, and humidity control, and latent examiners, or evidence processing technicians should familiarize themselves with this phenomenon.

Glass evidence results have shown that the evidence should be lowered to a temperature of 46°F fumed with the cyanoacrylate in a chamber at 80°F with a relative humidity of 48%. We have arrived at the 46°F temperature and the 80°F chamber environment along with a controlled 48% humidity as the optimum environment for glass evidence fingerprint development.

The statistics and visual inspection have clearly identified with 46°F, 48% relative humidity near dew point, and an 80° chamber environment we have a 280% increase by weight of polymerized cyanoacrylate very cleanly and clearly deposited on the fingerprint ridge sites with minimal or no background deposits of cyanoacrylate over the glass test materials.

It is also apparent that the temperature in the fuming environment appears to have an effect on the polymerization process in that lowering the chamber temperature to 65°F with 46% relative humidity inhibited polymerization of the cyanoacrylate on test material while inversely having the evidence temperature cooled to 40°F produced consistent over- development on the materials. The cyanoacrylate polymer adhered to the entire surface of these test materials with no distinct fingerprints developed. Additionally the test tubes and test materials that were close in temperature to the ambient temperature of the fuming chamber showed the least amount of polymerization. Test tubes processed with a significantly lower differential between temperature and relative humidity became over-developed. So, through this run of multiple tests with variable temperature parameters and relative humidity parameters we have found that three functions will need to be controlled, that is the actual environment in which the cyanoacrylate vapor is injected into needs to be controlled with both temperature and relative humidity. Additionally the evidence surface temperature should be cooler then the ambient environment. Visual observation and statistical data suggest that at a minimum, there should be a 5° F difference between the evidence temperature and the chamber temperature and a 25° F differential between evidence and chamber temperature appears to further optimize the polymerization process.

There is a thermal function in the polymerization process, in other words, as we have monomer converting to polymer, this function obviously provides an exothermic event, the ridge sites of the fingerprints are heating up during the polymerization process. By cooling the evidence surface we increase the polymerization of fingerprints, but it is more than just simply cooling the evidence to optimize the process and it has been known for many years that additional humidity injected into the environment assists in fingerprint development but through this research we are isolating the optimum parameters. In our opinion "forced condensation" effect controlled by temperature and relative humidity during the cyanoacrylate fuming process, increases the deposition of both water molecules and cyanoacrylate hydration to the fingerprint ridge sites and this additional hydration provides additional receptor sites on the molecular level seeding the polymerization process. Additionally lower evidence temperature will allow for more fingerprint development.




The above diagram represents the preferred temperature parameters that our research has statistically and visually indicated for optimizing cyanoacrylate fingerprint development for various materials. As expected, the optimum weights of polymerization as well as visual inspection confirmed that cyanoacrylate polymerization followed the specific heat capacity function based on the thermal conductivity of variable materials.

### 2. Implications for policy and practice

The implications for policy and future procedures and practices are simple and concise. Latent fingerprints on non-porous surfaces that are developed with cyanoacrylate fuming achieve a higher level of polymerization when the surface temperature of the evidence is lowered although overdevelopment can occur if the substrate is too cold. We have identified what we feel are the optimal temperatures to achieve the best results with cyanoacrylate fuming for several material types that are commonly found as evidence in criminal cases. It is a straightforward process of placing the material into a refrigerated environment and allowing it to reach a specified temperature prior to fuming with cyanoacrylate. The equipment needed can be as basic as a full size or apartment size consumers style refrigerator and an infrared thermometer.

### 3. Implications for further research

Further research into other materials such as plastics and various metal alloys that were not included in this testing will be needed to narrow the temperature range specific to those materials but according to our findings the temperature curve will follow the thermal conductivity profiles of common materials. A more focused study into identifying a precise amount of relative humidity may result in increased sensitivity but our statistics show that a range of 46% to 72% relative humidity is safe and conducive to cyanoacrylate polymerization on latent fingerprints.

A new generation of cyanoacrylate fuming chambers that could be characterized as “environmental chambers” can be developed as an expansion of this research. This would consist of a self contained refrigeration unit and humidifier incorporated into a fuming chamber. The controls can be preset to a specific temperature and humidity level according to the material to be processed. Small fans should be utilized inside the chamber to insure adequate and complete circulation of the vapors , additionally any moisture remaining in the latent fingerprints cool due to the circulating air movement, further increasing potential gains in the polymerization process. We have built a chamber with temperature control and 450 nm LED’s along with an ultra-violet light source directed at the evidence being processed to improve detection and help prevent over-development when employing the recently released CN-Yellow, florescent cyanoacrylate.

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**The current literature has no references which discuss the evidence temperature and possible functions of this order, and our literature search is still ongoing.**

## VI. Dissemination of Research Findings

**It is our intention to take advice from the NIJ peer review process and implement recommended changes and prepare the final report towards publication in the Journal of Forensic Identification, Journal of Forensics Sciences, or Evidence Technology Magazine.**

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 2.013 | 2.013 | 0.000 |
| 2 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.368 | 1.368 | 0.000 |
| 3 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.422 | 1.423 | 0.001 |
| 4 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | | | |
| 5 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.963 | 1.965 | 0.002 |
| 6 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.462 | 1.462 | 0.000 |
| 7 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.319 | 1.323 | 0.004 |
| 8 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.606 | 1.606 | 0.000 |
| 9 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.571 | 1.575 | 0.004 |
| 10 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.434 | 1.435 | 0.000 |
| 11 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.460 | 1.461 | 0.001 |
| 12 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.507 | 1.508 | 0.001 |
| 13 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.591 | 1.596 | 0.005 |
| 14 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.675 | 1.682 | 0.007 |
| 15 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.691 | 1.693 | 0.002 |
| 16 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.609 | 1.610 | 0.001 |
| 17 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.556 | 1.560 | 0.004 |
| 18 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.636 | 1.637 | 0.001 |
| 19 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.771 | 1.773 | 0.002 |
| 20 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.433 | 1.434 | 0.001 |
| 21 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.792 | 1.795 | 0.003 |
| 22 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.581 | 1.582 | 0.001 |
| 23 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.753 | 1.756 | 0.003 |
| 24 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 1.557 | 1.560 | 0.003 |
| 25 | 81° | 72% | 69° | 4 drops | 2 min | 10 min | 2.062 | 2.062 | 0.000 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.381 | 1.385 | 0.004 |
| 27 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.537 | 1.537 | 0.000 |
| 28 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.472 | 1.473 | 0.001 |
| 29 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.437 | 1.444 | 0.007 |
| 30 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.518 | 1.519 | 0.001 |
| 31 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.333 | 1.334 | 0.001 |
| 32 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.891 | 1.891 | 0.000 |
| 33 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.297 | 1.301 | 0.004 |
| 34 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 2.083 | 2.083 | 0.000 |
| 35 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.508 | 1.512 | 0.004 |
| 36 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.599 | 1.599 | 0.000 |
| 37 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.446 | 1.456 | 0.010 |
| 38 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.686 | 1.689 | 0.003 |
| 39 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.158 | 1.160 | 0.002 |
| 40 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.861 | 1.862 | 0.001 |
| 41 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.668 | 1.669 | 0.001 |
| 42 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.653 | 1.656 | 0.003 |
| 43 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.563 | 1.566 | 0.003 |
| 44 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.323 | 1.325 | 0.002 |
| 45 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.464 | 1.465 | 0.001 |
| 46 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.528 | 1.532 | 0.004 |
| 47 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.459 | 1.461 | 0.002 |
| 48 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.658 | 1.662 | 0.004 |
| 49 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.317 | 1.321 | 0.004 |
| 50 | 78° | 74% | 69° | 4 drops | 2 min | 10 min | 1.510 | 1.512 | 0.002 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.002 |
| Mode: | 0.004 |

Aluminum 3

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.576 | 1.577 | 0.001 |
| 52 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.453 | 1.455 | 0.002 |
| 53 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.307 | 1.310 | 0.003 |
| 54 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.390 | 1.393 | 0.003 |
| 55 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.464 | 1.468 | 0.004 |
| 56 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.463 | 1.468 | 0.005 |
| 57 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.547 | 1.547 | 0.000 |
| 58 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.234 | 1.234 | 0.000 |
| 59 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.560 | 1.560 | 0.000 |
| 60 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.511 | 1.513 | 0.002 |
| 61 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.759 | 1.764 | 0.005 |
| 62 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.476 | 1.479 | 0.003 |
| 63 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.470 | 1.479 | 0.009 |
| 64 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.577 | 1.583 | 0.006 |
| 65 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.605 | 1.609 | 0.004 |
| 66 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.446 | 1.446 | 0.000 |
| 67 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.464 | 1.470 | 0.006 |
| 68 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.352 | 1.352 | 0.000 |
| 69 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.262 | 1.266 | 0.004 |
| 70 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.448 | 1.452 | 0.004 |
| 71 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.477 | 1.483 | 0.006 |
| 72 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.579 | 1.584 | 0.005 |
| 73 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.315 | 1.318 | 0.003 |
| 74 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.298 | 1.300 | 0.002 |
| 75 | 73° | 71% | 65° | 8 drops | 2 min | 10 min | 1.498 | 1.499 | 0.001 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.003 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.663 | 1.665 | 0.002 |
| 77 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.703 | 1.707 | 0.004 |
| 78 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.188 | 1.192 | 0.004 |
| 79 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.328 | 1.332 | 0.004 |
| 80 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.542 | 1.542 | 0.000 |
| 81 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.360 | 1.373 | 0.013 |
| 82 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.443 | 1.445 | 0.002 |
| 83 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.358 | 1.358 | 0.000 |
| 84 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.679 | 1.679 | 0.000 |
| 85 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.455 | 1.457 | 0.002 |
| 86 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.353 | 1.356 | 0.003 |
| 87 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.356 | 1.359 | 0.003 |
| 88 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.575 | 1.576 | 0.001 |
| 89 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.572 | 1.576 | 0.004 |
| 90 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.442 | 1.443 | 0.001 |
| 91 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.253 | 1.255 | 0.002 |
| 92 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.251 | 1.252 | 0.001 |
| 93 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.498 | 1.502 | 0.004 |
| 94 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.536 | 1.540 | 0.004 |
| 95 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.413 | 1.414 | 0.001 |
| 96 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.272 | 1.275 | 0.003 |
| 97 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.144 | 1.147 | 0.003 |
| 98 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.475 | 1.476 | 0.001 |
| 99 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.218 | 1.219 | 0.001 |
| 100 | 73° | 71% | 73° | 8 drops | 2 min | 10 min | 1.373 | 1.376 | 0.003 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.002 |
| Mode: | 0.004 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.483 | 1.483 | 0.000 |
| 102 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.302 | 1.305 | 0.003 |
| 103 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.358 | 1.358 | 0.000 |
| 104 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.519 | 1.522 | 0.003 |
| 105 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.548 | 1.546 | (-.002) |
| 106 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.373 | 1.373 | 0.000 |
| 107 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.519 | 1.520 | 0.001 |
| 108 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.661 | 1.661 | 0.000 |
| 109 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.435 | 1.437 | 0.002 |
| 110 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.311 | 1.312 | 0.001 |
| 111 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.422 | 1.422 | 0.000 |
| 112 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.545 | 1.546 | 0.001 |
| 113 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.488 | 1.485 | (-.003) |
| 114 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.690 | 1.694 | 0.004 |
| 115 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.535 | 1.536 | 0.001 |
| 116 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.778 | 1.778 | 0.000 |
| 117 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.520 | 1.522 | 0.002 |
| 118 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.463 | 1.461 | (-.002) |
| 119 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.661 | 1.664 | 0.003 |
| 120 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.562 | 1.565 | 0.003 |
| 121 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.645 | 1.644 | (-.001) |
| 122 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.644 | 1.646 | 0.002 |
| 123 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.541 | 1.543 | 0.002 |
| 124 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.512 | 1.515 | 0.003 |
| 125 | 78° | 74% | 65° | 8 drops | 2 min | 10 min | 1.293 | 1.291 | (-.002) |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 126 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.469 | 1.470 | 0.001 |
| 127 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.434 | 1.436 | 0.002 |
| 128 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.445 | 1.445 | 0.000 |
| 129 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.686 | 1.687 | 0.001 |
| 130 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.630 | 1.632 | 0.002 |
| 131 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.533 | 1.536 | 0.003 |
| 132 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.554 | 1.555 | 0.001 |
| 133 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.478 | 1.478 | 0.000 |
| 134 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.537 | 1.537 | 0.000 |
| 135 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.281 | 1.281 | 0.000 |
| 136 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.583 | 1.586 | 0.000 |
| 137 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.156 | 1.156 | 0.000 |
| 138 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.385 | 1.385 | 0.000 |
| 139 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.439 | 1.439 | 0.000 |
| 140 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.445 | 1.445 | 0.000 |
| 141 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.514 | 1.514 | 0.000 |
| 142 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.440 | 1.440 | 0.000 |
| 143 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.399 | 1.401 | 0.001 |
| 144 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.470 | 1.471 | 0.001 |
| 145 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.419 | 1.421 | 0.002 |
| 146 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.427 | 1.427 | 0.000 |
| 147 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.364 | 1.364 | 0.000 |
| 148 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.533 | 1.533 | 0.000 |
| 149 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.534 | 1.536 | 0.002 |
| 150 | 78° | 74% | 68° | 8 drops | 2 min | 10 min | 1.583 | 1.584 | 0.001 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.000 |
| Mode: | 0.000 |

Aluminum 7

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 151 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.424 | 1.424 | 0.000 |
| 152 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.323 | 1.323 | 0.000 |
| 153 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.354 | 1.355 | 0.001 |
| 154 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.401 | 1.401 | 0.000 |
| 154 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.706 | 1.706 | 0.000 |
| 156 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.202 | 1.202 | 0.000 |
| 157 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.569 | 1.569 | 0.000 |
| 158 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.134 | 1.134 | 0.000 |
| 159 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.822 | 1.823 | 0.001 |
| 160 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.366 | 1.366 | 0.000 |
| 161 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.284 | 1.285 | 0.001 |
| 162 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.255 | 1.255 | 0.000 |
| 163 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.436 | 1.436 | 0.000 |
| 164 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.650 | 1.651 | 0.001 |
| 165 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.308 | 1.309 | 0.001 |
| 166 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.224 | 1.225 | 0.001 |
| 167 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.174 | 1.176 | 0.002 |
| 168 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.318 | 1.318 | 0.000 |
| 169 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.519 | 1.519 | 0.000 |
| 170 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.520 | 1.520 | 0.000 |
| 171 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.493 | 1.493 | 0.000 |
| 172 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.443 | 1.443 | 0.000 |
| 173 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.443 | 1.444 | 0.001 |
| 174 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.324 | 1.325 | 0.001 |
| 175 | 49° | 52% | 51° | 8 drops | 2 min | 10 min | 1.616 | 1.616 | 0.000 |

| | |
|---|---|
| Mean: | 0.000 |
| Median: | 0.000 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.499 | 3.499 | 0.000 |
| 2 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.471 | 3.472 | 0.001 |
| 3 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.456 | 3.458 | 0.002 |
| 4 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.436 | 3.436 | 0.000 |
| 5 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.539 | 3.540 | 0.001 |
| 6 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.535 | 3.535 | 0.000 |
| 7 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.462 | 3.463 | 0.001 |
| 8 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.470 | 3.471 | 0.001 |
| 9 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.476 | 3.476 | 0.000 |
| 10 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.504 | 3.504 | 0.000 |
| 11 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.480 | 3.480 | 0.000 |
| 12 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.601 | 3.605 | 0.004 |
| 13 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.524 | 3.524 | 0.000 |
| 14 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.443 | 3.445 | 0.002 |
| 15 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.482 | 3.482 | 0.000 |
| 16 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.616 | 3.618 | 0.002 |
| 17 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.590 | 3.591 | 0.001 |
| 18 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.588 | 3.591 | 0.003 |
| 19 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.376 | 3.377 | 0.001 |
| 20 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.405 | 3.405 | 0.000 |
| 21 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.391 | 3.391 | 0.000 |
| 22 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.553 | 3.554 | 0.001 |
| 23 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.481 | 3.485 | 0.004 |
| 24 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.627 | 3.627 | 0.000 |
| 25 | 74° | 45% | 60° | 8 drops | 2 min | 5 min | 3.431 | 3.435 | 0.004 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.508 | 3.509 | 0.001 |
| 27 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.573 | 3.574 | 0.001 |
| 28 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.523 | 3.527 | 0.004 |
| 29 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.538 | 3.539 | 0.001 |
| 30 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.501 | 3.502 | 0.001 |
| 31 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.569 | 3.569 | 0.000 |
| 32 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.557 | 3.558 | 0.001 |
| 33 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.609 | 3.611 | 0.002 |
| 34 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.601 | 3.603 | 0.002 |
| 35 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.508 | 3.508 | 0.000 |
| 36 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.501 | 3.506 | 0.005 |
| 37 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.596 | 3.601 | 0.005 |
| 38 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.403 | 3.404 | 0.001 |
| 39 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.552 | 3.554 | 0.002 |
| 40 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.428 | 3.429 | 0.001 |
| 41 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.579 | 3.580 | 0.001 |
| 42 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.470 | 3.471 | 0.001 |
| 43 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.514 | 3.516 | 0.002 |
| 44 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.641 | 3.643 | 0.002 |
| 45 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.545 | 3.547 | 0.002 |
| 46 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.472 | 3.472 | 0.000 |
| 47 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.629 | 3.631 | 0.002 |
| 48 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.549 | 3.549 | 0.000 |
| 49 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.563 | 3.562 | 0.001 |
| 50 | 74° | 45% | 48° | 8 drops | 2 min | 5 min | 3.482 | 3.484 | 0.002 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.664 | 3.663 | 0.001 |
| 2 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.893 | 3.895 | 0.002 |
| 3 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.747 | 3.746 | (-.001) |
| 4 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.596 | 3.588 | (-.008) |
| 5 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.270 | 3.273 | 0.003 |
| 6 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.418 | 3.423 | 0.005 |
| 7 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.717 | 3.719 | 0.002 |
| 8 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.617 | 3.625 | 0.008 |
| 9 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.628 | | |
| 10 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.571 | 3.570 | (-.001) |
| 11 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.580 | 3.581 | 0.001 |
| 12 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.631 | 3.635 | 0.004 |
| 13 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.484 | 3.485 | 0.001 |
| 14 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.831 | 3.833 | 0.002 |
| 15 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 4.071 | 4.073 | 0.002 |
| 16 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.320 | 3.322 | 0.002 |
| 17 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.788 | 3.787 | (-.001) |
| 18 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.701 | 3.703 | 0.002 |
| 19 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.977 | 3.980 | 0.003 |
| 20 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.524 | 3.525 | 0.001 |
| 21 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.592 | 3.590 | (-.002) |
| 22 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.681 | 3.682 | 0.001 |
| 23 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.525 | 3.525 | 0.000 |
| 24 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.904 | 3.904 | 0.000 |
| 25 | 78° | 76% | 68° | 8 drops | 2 min | 10 min | 3.623 | 3.623 | 0.000 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.002 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.734 | 3.737 | 0.003 |
| 27 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.845 | 3.846 | 0.001 |
| 28 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.698 | 3.699 | 0.001 |
| 29 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.906 | 3.907 | 0.001 |
| 30 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.692 | 3.694 | 0.002 |
| 31 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.739 | 3.743 | 0.004 |
| 32 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.697 | 3.698 | 0.001 |
| 33 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.762 | 3.765 | 0.003 |
| 34 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.442 | 3.444 | 0.002 |
| 35 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.575 | 3.576 | 0.001 |
| 36 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.507 | 3.508 | 0.001 |
| 37 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.532 | 3.534 | 0.002 |
| 38 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.584 | 3.588 | 0.004 |
| 39 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.308 | 3.311 | 0.003 |
| 40 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.664 | 3.665 | 0.001 |
| 41 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.650 | 3.652 | 0.002 |
| 42 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.770 | 3.773 | 0.003 |
| 43 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.691 | 3.694 | 0.003 |
| 44 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.545 | 3.545 | 0.000 |
| 45 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.500 | 3.500 | 0.000 |
| 46 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.570 | 3.572 | 0.002 |
| 47 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.236 | 3.236 | 0.000 |
| 48 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.538 | 3.541 | 0.003 |
| 49 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.558 | 3.558 | 0.000 |
| 50 | 71° | 63% | 72° | 8 drops | 2 min | 10 min | 3.587 | 3.588 | 0.001 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.001 |

Copper Sheet 2-3

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 4.105 | 4.106 | 0.001 |
| 52 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.712 | 3.714 | 0.002 |
| 53 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.616 | 3.616 | 0.000 |
| 54 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.462 | 3.462 | 0.000 |
| 55 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.569 | 3.569 | 0.000 |
| 56 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.526 | 3.528 | 0.002 |
| 57 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.586 | 3.586 | 0.000 |
| 58 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 4.123 | 4.124 | 0.001 |
| 59 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.513 | 3.514 | 0.001 |
| 60 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.762 | 3.762 | 0.000 |
| 61 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.641 | 3.642 | 0.001 |
| 62 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.486 | 3.486 | 0.000 |
| 63 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.383 | 3.383 | 0.000 |
| 64 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.675 | 3.675 | 0.000 |
| 65 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.495 | 3.495 | 0.000 |
| 66 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.594 | 3.595 | 0.001 |
| 67 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.485 | 3.486 | 0.001 |
| 68 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.908 | 3.910 | 0.001 |
| 69 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.121 | 3.121 | 0.000 |
| 70 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.792 | 3.792 | 0.000 |
| 71 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.588 | 3.590 | 0.002 |
| 722 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.541 | 3.541 | 0.000 |
| 73 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.396 | 3.396 | 0.000 |
| 74 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.585 | 3.589 | 0.004 |
| 75 | 74° | 75% | 70° | 8 drops | 2 min | 10 min | 3.497 | 3.497 | 0.000 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.000 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.683 | 3.685 | 0.002 |
| 77 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.947 | 3.948 | 0.001 |
| 78 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 4.238 | 4.239 | 0.001 |
| 79 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.269 | 3.271 | 0.002 |
| 80 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.423 | 3.424 | 0.001 |
| 81 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.785 | 3.788 | 0.003 |
| 82 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.582 | 3.584 | 0.002 |
| 83 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.531 | 3.532 | 0.001 |
| 84 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.783 | 3.783 | 0.000 |
| 85 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.667 | 3.668 | 0.001 |
| 86 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.733 | 3.733 | 0.000 |
| 87 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 4.023 | 4.024 | 0.001 |
| 88 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.494 | 3.494 | 0.000 |
| 89 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.549 | 3.551 | 0.002 |
| 90 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.577 | 3.579 | 0.002 |
| 91 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.912 | 3.913 | 0.001 |
| 92 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.491 | 3.492 | 0.001 |
| 93 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.831 | 3.834 | 0.003 |
| 94 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.561 | 3.561 | 0.000 |
| 95 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.053 | 3.053 | 0.000 |
| 96 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.006 | 3.007 | 0.001 |
| 97 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.662 | 3.667 | 0.005 |
| 98 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.361 | 3.362 | 0.001 |
| 99 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.370 | 3.371 | 0.001 |
| 100 | 78° | 72% | 69° | 8 drops | 2 min | 10 min | 3.242 | 3.243 | 0.001 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.716 | 3.716 | 0.000 |
| 102 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.638 | 3.639 | 0.001 |
| 103 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.365 | 3.367 | 0.002 |
| 104 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.798 | 3.800 | 0.002 |
| 105 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.427 | 3.427 | 0.000 |
| 106 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.665 | 3.665 | 0.000 |
| 107 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.699 | 3.699 | 0.000 |
| 108 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.771 | 3.771 | 0.000 |
| 109 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.723 | 3.723 | 0.000 |
| 110 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.440 | 3.443 | 0.003 |
| 111 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 2.818 | 2.819 | 0.001 |
| 112 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.418 | 3.418 | 0.000 |
| 113 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.629 | 3.631 | 0.002 |
| 114 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.918 | 3.918 | 0.000 |
| 115 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.595 | 3.595 | 0.000 |
| 116 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.667 | 3.667 | 0.000 |
| 117 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.564 | 3.568 | 0.004 |
| 118 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.678 | 3.678 | 0.000 |
| 119 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.686 | 3.689 | 0.003 |
| 120 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.364 | 3.365 | 0.001 |
| 121 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.060 | 3.063 | 0.003 |
| 122 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.538 | 3.541 | 0.003 |
| 123 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.390 | 3.392 | 0.002 |
| 124 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 3.434 | 3.434 | 0.000 |
| 125 | 78° | 72% | 71° | 8 drops | 2 min | 10 min | 6.072 | 6.074 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

Copper 2-6

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 126 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.445 | 3.446 | 0.001 |
| 127 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.454 | 3.456 | 0.002 |
| 128 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.787 | 3.795 | 0.008 |
| 129 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.704 | 3.704 | 0.000 |
| 130 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.699 | 3.699 | 0.000 |
| 131 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.579 | 3.581 | 0.002 |
| 132 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.478 | 3.479 | 0.001 |
| 133 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.583 | 3.583 | 0.000 |
| 134 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.064 | 3.065 | 0.001 |
| 135 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.300 | 3.303 | 0.003 |
| 136 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.817 | 3.817 | 0.000 |
| 137 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.212 | 3.213 | 0.001 |
| 138 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.380 | 3.381 | 0.001 |
| 139 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.510 | 3.511 | 0.001 |
| 140 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.945 | 3.946 | 0.001 |
| 141 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.581 | 3.582 | 0.001 |
| 142 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.618 | 3.618 | 0.000 |
| 143 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.454 | 3.455 | 0.001 |
| 144 | 76° | 71% | 68° | 8 drops | 2 min | 10 min | 3.677 | 3.681 | 0.004 |
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|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.624 | 3.624 | 0.000 |
| 52 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.500 | 3.501 | 0.001 |
| 53 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.616 | 3.616 | 0.000 |
| 54 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.380 | 3.380 | 0.000 |
| 55 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.470 | 3.472 | 0.002 |
| 56 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.466 | 3.469 | 0.003 |
| 57 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.385 | 3.386 | 0.001 |
| 58 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.528 | 3.526 | (-.002) |
| 59 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.538 | 3.538 | 0.000 |
| 60 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.550 | 3.550 | 0.000 |
| 61 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.612 | 3.612 | 0.000 |
| 62 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.589 | 3.590 | 0.001 |
| 63 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.495 | 3.495 | 0.000 |
| 64 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.569 | 3.570 | 0.001 |
| 65 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.517 | 3.517 | 0.000 |
| 66 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.602 | 3.602 | 0.000 |
| 67 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.603 | 3.604 | 0.001 |
| 68 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.567 | 3.567 | 0.000 |
| 69 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.641 | 3.641 | 0.000 |
| 70 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.554 | 3.556 | 0.002 |
| 71 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.573 | 3.574 | 0.001 |
| 72 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.564 | 3.564 | 0.000 |
| 73 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.551 | 3.552 | 0.001 |
| 74 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.490 | 3.492 | 0.002 |
| 75 | 74° | 45% | 74° | 8 drops | 2 min | 5 min | 3.592 | 3.592 | 0.000 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.000 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.588 | 3.592 | 0.004 |
| 77 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.481 | 3.485 | 0.004 |
| 78 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.495 | 3.498 | 0.004 |
| 79 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.550 | 3.554 | 0.004 |
| 80 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.485 | 3.487 | 0.002 |
| 81 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.345 | 3.350 | 0.005 |
| 82 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.451 | 3.457 | 0.006 |
| 83 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.392 | 3.396 | 0.004 |
| 84 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.462 | 3.466 | 0.004 |
| 85 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.485 | 3.488 | 0.003 |
| 86 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.505 | 3.507 | 0.002 |
| 87 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.571 | 3.576 | 0.005 |
| 88 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.553 | 3.556 | 0.003 |
| 89 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.648 | 3.651 | 0.003 |
| 90 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.599 | 3.604 | 0.005 |
| 91 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.578 | 3.582 | 0.004 |
| 92 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.451 | 3.455 | 0.004 |
| 93 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.552 | 3.554 | 0.002 |
| 94 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.568 | 3.572 | 0.004 |
| 95 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.489 | 3.492 | 0.003 |
| 96 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.574 | 3.577 | 0.003 |
| 97 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.603 | 3.603 | 0.000 |
| 98 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.480 | 3.484 | 0.004 |
| 99 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.581 | 3.582 | 0.001 |
| 100 | 78° | 74% | 69° | 8 drops | 2 min | 5 min | 3.430 | 3.432 | 0.002 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.004 |
| Mode: | 0.004 |

Copper Sheet 5

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.377 | 3.377 | 0.000 |
| 102 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.571 | 3.574 | 0.003 |
| 103 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.502 | 3.505 | 0.003 |
| 104 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.566 | 3.568 | 0.002 |
| 105 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.444 | 3.447 | 0.003 |
| 106 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.554 | 3.555 | 0.001 |
| 107 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.629 | 3.631 | 0.002 |
| 108 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.529 | 3.533 | 0.004 |
| 109 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.620 | 3.621 | 0.001 |
| 110 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.562 | 3.567 | 0.005 |
| 111 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.486 | 3.487 | 0.001 |
| 112 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.578 | 3.580 | 0.002 |
| 113 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.296 | 3.298 | 0.002 |
| 114 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.618 | 3.622 | 0.004 |
| 115 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.550 | 3.551 | 0.001 |
| 116 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.599 | 3.603 | 0.004 |
| 117 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.595 | 3.597 | 0.002 |
| 118 | 74° | 71% | 74° | 8 drops | 2 min | 10 min | 3.481 | 3.482 | 0.001 |
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|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.002 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.557 | 11.559 | 0.002 |
| 52 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 12.085 | 12.087 | 0.002 |
| 53 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 10.930 | 10.933 | 0.003 |
| 54 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 10.858 | 10.860 | 0.002 |
| 55 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.618 | 11.619 | 0.001 |
| 56 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.820 | 11.822 | 0.002 |
| 57 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.592 | 11.594 | 0.002 |
| 58 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.419 | 11.419 | 0.000 |
| 59 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 12.854 | 12.854 | 0.000 |
| 60 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.142 | 11.141 | (-.001) |
| 61 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.960 | 11.962 | 0.002 |
| 62 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 12.646 | 12.646 | 0.000 |
| 63 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 12.695 | 12.696 | 0.001 |
| 64 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.537 | 11.536 | (-.001) |
| 65 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.329 | 11.330 | 0.001 |
| 66 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.957 | 11.958 | 0.001 |
| 67 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 12.125 | 12.128 | 0.003 |
| 68 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 13.004 | 13.004 | 0.000 |
| 69 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 10.976 | 10.979 | 0.003 |
| 70 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.430 | 11.431 | 0.001 |
| 71 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.198 | 11.201 | 0.003 |
| 72 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.670 | 11.672 | 0.002 |
| 73 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 11.948 | 11.948 | 0.000 |
| 74 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 13.298 | 13.299 | 0.001 |
| 75 | 74° | 71% | 72° | 8 drops | 2 min | 10 min | 10.572 | 10.572 | 0.000 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.002 |

Copper Tube 2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.881 | 11.885 | 0.004 |
| 77 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.267 | 12.272 | 0.005 |
| 78 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.797 | 11.798 | 0.001 |
| 79 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 10.757 | 10.757 | 0.000 |
| 80 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.864 | 11.866 | 0.002 |
| 81 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.682 | 11.683 | 0.001 |
| 82 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.017 | 12.017 | 0.000 |
| 83 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 13.294 | 13.294 | 0.000 |
| 84 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.495 | 11.496 | 0.001 |
| 85 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.433 | 11.434 | 0.001 |
| 86 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.580 | 12.581 | 0.001 |
| 87 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.689 | 11.692 | 0.003 |
| 88 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.573 | 11.577 | 0.004 |
| 89 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.137 | 12.141 | 0.004 |
| 90 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.503 | 11.506 | 0.003 |
| 91 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.496 | 11.499 | 0.003 |
| 92 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.774 | 11.776 | 0.002 |
| 93 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.641 | 12.641 | 0.000 |
| 94 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.707 | 12.713 | 0.006 |
| 95 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.310 | 11.315 | 0.005 |
| 96 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 13.489 | 13.490 | 0.001 |
| 97 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 10.507 | 10.506 | (-.001) |
| 98 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.343 | 11.343 | 0.000 |
| 99 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 11.619 | 11.621 | 0.002 |
| 100 | 74° | 71% | 68° | 8 drops | 2 min | 10 min | 12.861 | 12.865 | 0.004 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1-1 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.221 | 5.223 | 0.002 |
| 1-2 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.159 | 5.160 | 0.001 |
| 1-3 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.243 | 5.246 | 0.003 |
| 1-4 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.278 | 5.281 | 0.003 |
| 1-5 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.220 | 5.221 | 0.001 |
| 1-6 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.248 | 5.249 | 0.001 |
| 1-7 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.198 | 5.202 | 0.003 |
| 1-8 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.266 | 5.266 | 0.000 |
| 1-9 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.238 | 5.242 | 0.004 |
| 1-10 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.150 | 5.152 | 0.002 |
| 1-11 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.274 | 5.274 | 0.000 |
| 1-12 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.143 | 5.145 | 0.002 |
| 1-13 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.244 | 5.245 | 0.001 |
| 1-14 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.286 | 5.288 | 0.002 |
| 1-15 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.240 | 5.243 | 0.003 |
| 1-16 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.303 | 5.307 | 0.004 |
| 1-17 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.206 | 5.208 | 0.002 |
| 1-18 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.256 | 5.258 | 0.002 |
| 1-19 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.179 | 5.179 | 0.000 |
| 1-20 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.160 | 5.163 | 0.003 |
| 1-21 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.139 | 5.142 | 0.003 |
| 1-22 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.290 | 5.291 | 0.001 |
| 1-23 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.315 | 5.318 | 0.003 |
| 1-24 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.274 | 5.277 | 0.003 |
| 1-25 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.141 | 5.142 | 0.001 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.003 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1-26 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.211 | 5.211 | 0.000 |
| 1-27 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.315 | 5.315 | 0.000 |
| 1-28 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.174 | 5.175 | 0.001 |
| 1-29 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.208 | 5.208 | 0.000 |
| 1-30 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.263 | 5.263 | 0.000 |
| 1-31 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.233 | 5.235 | 0.002 |
| 1-32 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.245 | 5.246 | 0.001 |
| 1-33 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.214 | 5.214 | 0.000 |
| 1-34 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.194 | 5.195 | 0.001 |
| 1-35 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.176 | 5.176 | 0.000 |
| 1-36 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.199 | 5.199 | 0.000 |
| 1-37 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.219 | 5.219 | 0.000 |
| 1-38 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.259 | 5.259 | 0.000 |
| 1-39 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.289 | 5.192 | (-0.003) |
| 1-40 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.218 | 5.218 | 0.000 |
| 1-41 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.259 | 5.257 | (-0.002) |
| 1-42 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.181 | 5.181 | 0.000 |
| 1-43 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.222 | 5.226 | 0.004 |
| 1-44 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.189 | 5.190 | 0.001 |
| 1-45 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.305 | 5.305 | 0.000 |
| 1-46 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.292 | 5.294 | 0.002 |
| 1-47 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.206 | 5.206 | 0.000 |
| 1-48 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 4.979 | 4.983 | 0.004 |
| 1-49 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.172 | 5.174 | 0.002 |
| 1-50 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.164 | 5.166 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.000 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 2-1 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.171 | 5.176 | 0.005 |
| 2-2 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.222 | 5.226 | 0.006 |
| 2-3 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.199 | 5.206 | 0.007 |
| 2-4 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.273 | 5.278 | 0.005 |
| 2-5 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.210 | 5.215 | 0.005 |
| 2-6 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.189 | 5.195 | 0.006 |
| 2-7 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.150 | 5.155 | 0.005 |
| 2-8 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.180 | 5.184 | 0.004 |
| 2-9 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.253 | 5.259 | 0.006 |
| 2-10 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.209 | 5.215 | 0.006 |
| 2-11 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.245 | 5.250 | 0.005 |
| 2-12 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.197 | 5.202 | 0.005 |
| 2-13 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.232 | 5.245 | 0.013 |
| 2-14 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.224 | 5.229 | 0.005 |
| 2-15 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.178 | 5.183 | 0.005 |
| 2-16 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.269 | 5.275 | 0.006 |
| 2-17 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.235 | 5.243 | 0.008 |
| 2-18 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.220 | 5.223 | 0.003 |
| 2-19 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.131 | 5.144 | 0.013 |
| 2-20 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.115 | 5.117 | 0.002 |
| 2-21 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.158 | 5.159 | 0.001 |
| 2-22 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.208 | 5.209 | 0.001 |
| 2-23 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.249 | | |
| 2-24 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.136 | 5.136 | 0.000 |
| 2-25 | 80° | 48% | 46° | 8 drops | 2 min | 5 min | 5.203 | 5.215 | 0.012 |

| | |
|---|---|
| Mean: | 0.005 |
| Median: | 0.005 |
| Mode: | 0.005 |

Large Test Tubes 2-2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 2-26 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.247 | 5.250 | 0.003 |
| 2-27 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.238 | 5.240 | 0.002 |
| 2-28 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.194 | 5.194 | 0.000 |
| 2-29 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.228 | 5.234 | 0.006 |
| 2-30 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.195 | | |
| 2-31 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.149 | 5.151 | 0.002 |
| 2-32 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.239 | 5.243 | 0.004 |
| 2-33 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.308 | 5.309 | 0.001 |
| 2-34 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.140 | 5.153 | 0.003 |
| 2-35 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.175 | 5.181 | 0.006 |
| 2-36 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.182 | 5.186 | 0.004 |
| 2-37 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.131 | 5.132 | 0.001 |
| 2-38 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.221 | 5.223 | 0.002 |
| 2-39 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.194 | 5.198 | 0.004 |
| 2-40 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.232 | 5.235 | 0.003 |
| 2-41 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.251 | 5.256 | 0.004 |
| 2-42 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.189 | 5.191 | 0.002 |
| 2-43 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.195 | 5.197 | 0.002 |
| 2-44 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.141 | 5.146 | 0.005 |
| 2-45 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.201 | 5.199 | (-.002) |
| 2-46 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.223 | 5.225 | 0.002 |
| 2-47 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.263 | 5.268 | 0.005 |
| 2-48 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.256 | 5.261 | 0.005 |
| 2-49 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.249 | 5.250 | 0.001 |
| 2-50 | 80° | 48% | 85° | 8 drops | 2 min | 5 min | 5.198 | 5.201 | 0.003 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.003 |
| Mode: | 0.002 |

Large Test Tubes 3-1

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 3-1 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.178 | 5.178 | 0.000 |
| 3-2 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.131 | 5.132 | 0.001 |
| 3-3 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.143 | 5.142 | (-0.001) |
| 3-4 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.136 | 5.138 | 0.002 |
| 3-5 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.112 | 5.112 | 0.000 |
| 3-6 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.122 | 5.123 | 0.001 |
| 3-7 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.131 | 5.131 | 0.000 |
| 3-8 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.184 | 5.184 | 0.000 |
| 3-9 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.232 | 5.233 | 0.001 |
| 3-10 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.202 | 5.203 | 0.001 |
| 3-11 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.164 | 5.164 | 0.000 |
| 3-12 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.282 | 5.282 | 0.000 |
| 3-13 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.213 | 5.216 | 0.003 |
| 3-14 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.220 | 5.223 | 0.003 |
| 3-15 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.148 | 5.149 | 0.001 |
| 3-16 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.188 | 5.188 | 0.000 |
| 3-17 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.142 | 5.143 | 0.001 |
| 3-18 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.178 | 5.178 | 0.000 |
| 3-19 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.193 | 5.194 | 0.001 |
| 3-20 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.159 | 5.160 | 0.001 |
| 3-21 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.255 | 5.257 | 0.002 |
| 3-22 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.198 | 5.200 | 0.002 |
| 3-23 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.146 | 5.146 | 0.000 |
| 3-24 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.139 | 5.139 | 0.000 |
| 3-25 | 61° | 55% | 55° | 8 drops | 2 min | 5 min | 5.147 | 5.149 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

Large Test Tubes 3-1-2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 3-1 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.199 | 5.203 | 0.004 |
| 3-2 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.206 | 5.207 | 0.001 |
| 3-3 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.184 | 5.189 | 0.005 |
| 3-4 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.203 | 5.207 | 0.004 |
| 3-5 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.291 | 5.294 | 0.003 |
| 3-6 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.273 | 5.275 | 0.002 |
| 3-7 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.183 | 5.184 | 0.001 |
| 3-8 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.157 | 5.159 | 0.002 |
| 3-9 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.212 | 5.216 | 0.004 |
| 3-10 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.229 | 5.235 | 0.006 |
| 3-11 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.259 | 5.262 | 0.003 |
| 3-12 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.208 | 5.214 | 0.006 |
| 3-13 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.274 | 5.277 | 0.003 |
| 3-14 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.237 | 5.241 | 0.004 |
| 3-15 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.325 | 5.328 | 0.003 |
| 3-16 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.163 | 5.167 | 0.004 |
| 3-17 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.223 | 5.226 | 0.003 |
| 3-18 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.326 | 5.327 | 0.001 |
| 3-19 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.165 | 5.168 | 0.003 |
| 3-20 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.205 | 5.207 | 0.002 |
| 3-21 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.236 | 5.238 | 0.002 |
| 3-22 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.246 | 5.246 | 0.000 |
| 3-23 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.232 | 5.237 | 0.005 |
| 3-24 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.149 | 5.152 | 0.003 |
| 3-25 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.234 | 5.234 | 0.000 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.003 |
| Mode: | 0.003 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 3-26 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.267 | 5.267 | 0.000 |
| 3-27 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.176 | 5.178 | 0.002 |
| 3-28 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.145 | 5.148 | 0.003 |
| 3-29 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.206 | 5.208 | 0.002 |
| 3-30 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.264 | 5.266 | 0.002 |
| 3-31 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.257 | 5.257 | 0.000 |
| 3-32 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.282 | 5.284 | 0.002 |
| 3-33 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.179 | 5.179 | 0.000 |
| 3-34 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.158 | 5.158 | 0.000 |
| 3-35 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.187 | 5.189 | 0.001 |
| 3-36 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.189 | 5.190 | 0.001 |
| 3-37 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.124 | 5.125 | 0.001 |
| 3-38 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.341 | 5.342 | 0.001 |
| 3-39 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.191 | 5.191 | 0.000 |
| 3-40 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.210 | 5.210 | 0.000 |
| 3-41 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.157 | 5.158 | 0.001 |
| 3-42 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.121 | 5.124 | 0.003 |
| 3-43 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.148 | 5.150 | 0.002 |
| 3-44 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.211 | 5.210 | (-.001) |
| 3-45 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.168 | 5.168 | 0.000 |
| 3-46 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.157 | 5.160 | 0.003 |
| 3-47 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.162 | 5.160 | (-.002) |
| 3-48 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.228 | 5.228 | 0.000 |
| 3-49 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.235 | 5.235 | 0.000 |
| 3-50 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.247 | 5.248 | 0.001 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

Large Test Tubes 4-1

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 4-1 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.070 | 5.072 | 0.002 |
| 4-2 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.195 | 5.196 | 0.001 |
| 4-3 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.176 | 5.177 | 0.001 |
| 4-4 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.116 | 5.119 | 0.003 |
| 4-5 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.152 | 5.154 | 0.002 |
| 4-6 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.174 | 5.176 | 0.002 |
| 4-7 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.156 | 5.158 | 0.002 |
| 4-8 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.181 | 5.182 | 0.001 |
| 4-9 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.129 | 5.129 | 0.000 |
| 4-10 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.086 | 5.089 | 0.003 |
| 4-11 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.130 | 5.134 | 0.004 |
| 4-12 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.129 | 5.131 | 0.002 |
| 4-13 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.158 | 5.162 | 0.004 |
| 4-14 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.144 | 5.146 | 0.002 |
| 4-15 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.160 | 5.161 | 0.001 |
| 4-16 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.087 | 5.088 | 0.001 |
| 4-17 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.150 | 5.153 | 0.003 |
| 4-18 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.166 | 5.168 | 0.002 |
| 4-19 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.160 | 5.163 | 0.003 |
| 4-20 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.063 | 5.065 | 0.002 |
| 4-21 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.148 | 5.152 | 0.004 |
| 4-22 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.090 | 5.091 | 0.001 |
| 4-23 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.151 | 5.152 | 0.001 |
| 4-24 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.075 | 5.076 | 0.001 |
| 4-25 | 65° | 46% | 48° | 8 drops | 2 min | 5 min | 5.183 | 5.186 | 0.003 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 4-26 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.112 | 5.119 | 0.007 |
| 4-27 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.171 | 5.174 | 0.003 |
| 4-28 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.082 | 5.085 | 0.003 |
| 4-29 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.098 | 5.110 | 0.002 |
| 4-30 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.130 | 5.136 | 0.006 |
| 4-31 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.130 | 5.136 | 0.006 |
| 4-32 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.173 | 5.178 | 0.005 |
| 4-33 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.251 | 5.256 | 0.005 |
| 4-34 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.060 | 5.066 | 0.006 |
| 4-35 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.112 | 5.120 | 0.008 |
| 4-36 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.135 | 5.139 | 0.004 |
| 4-37 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.130 | 5.134 | 0.004 |
| 4-38 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.138 | 5.146 | 0.008 |
| 4-39 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.103 | 5.112 | 0.009 |
| 4-40 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.101 | 5.111 | 0.010 |
| 4-41 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.183 | 5.185 | 0.002 |
| 4-42 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.132 | 5.136 | 0.004 |
| 4-43 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.155 | 5.158 | 0.003 |
| 4-44 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.147 | 5.151 | 0.004 |
| 4-45 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.089 | 5.092 | 0.003 |
| 4-46 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.186 | 5.193 | 0.007 |
| 4-47 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.222 | 5.225 | 0.003 |
| 4-48 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.271 | 5.277 | 0.006 |
| 4-49 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.172 | 5.180 | 0.008 |
| 4-50 | 65° | 46% | 40° | 8 drops | 2 min | 5 min | 5.098 | 5.102 | 0.004 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.005 |
| | 0.003 |
| Mode: | 0.004 |

Large Test Tubes 5-1

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 5-1 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.199 | 5.203 | 0.004 |
| 5-2 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.206 | 5.207 | 0.001 |
| 5-3 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.184 | 5.189 | 0.005 |
| 5-4 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.203 | 5.207 | 0.004 |
| 5-5 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.291 | 5.294 | 0.003 |
| 5-6 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.273 | 5.275 | 0.002 |
| 5-7 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.183 | 5.184 | 0.001 |
| 5-8 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.157 | 5.159 | 0.002 |
| 5-9 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.212 | 5.216 | 0.004 |
| 5-10 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.229 | 5.235 | 0.006 |
| 5-11 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.259 | 5.262 | 0.003 |
| 5-12 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.208 | 5.214 | 0.006 |
| 5-13 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.274 | 5.277 | 0.003 |
| 5-14 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.237 | 5.241 | 0.004 |
| 5-15 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.325 | 5.328 | 0.003 |
| 5-16 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.163 | 5.167 | 0.004 |
| 5-17 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.223 | 5.226 | 0.003 |
| 5-18 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.326 | 5.327 | 0.001 |
| 5-19 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.165 | 5.168 | 0.003 |
| 5-20 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.205 | 5.207 | 0.002 |
| 5-21 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.236 | 5.238 | 0.002 |
| 5-22 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.246 | 5.246 | 0.000 |
| 5-23 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.232 | 5.237 | 0.005 |
| 5-24 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.149 | 5.152 | 0.003 |
| 5-25 | 75° | 60% | 46° | 8 drops | 2 min | 5 min | 5.234 | 5.234 | 0.000 |

| | |
|---|---|
| Mean: | 0.003 |
| Median: | 0.003 |
| Mode: | 0.003 |

Large Test Tubes 5-1-2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 5-1 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.221 | 5.223 | 0.002 |
| 5-2 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.159 | 5.160 | 0.001 |
| 5-3 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.243 | 5.246 | 0.003 |
| 5-4 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.278 | 5.281 | 0.003 |
| 5-5 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.220 | 5.221 | 0.001 |
| 5-6 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.248 | 5.249 | 0.001 |
| 5-7 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.198 | 5.202 | 0.004 |
| 5-8 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.266 | 5.266 | 0.000 |
| 5-9 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.238 | 5.242 | 0.004 |
| 5-10 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.150 | 5.152 | 0.002 |
| 5-11 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.274 | 5.274 | 0.000 |
| 5-12 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.143 | 5.145 | 0.002 |
| 5-13 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.244 | 5.245 | 0.001 |
| 5-14 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.286 | 5.288 | 0.002 |
| 5-15 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.240 | 5.243 | 0.003 |
| 5-16 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.303 | 5.307 | 0.004 |
| 5-17 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.206 | 5.208 | 0.002 |
| 5-18 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.256 | 5.258 | 0.002 |
| 5-19 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.179 | 5.179 | 0.000 |
| 5-20 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.160 | 5.163 | 0.003 |
| 5-21 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.139 | 5.142 | 0.003 |
| 5-22 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.290 | 5.291 | 0.001 |
| 5-23 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.315 | 5.318 | 0.003 |
| 5-24 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.274 | 5.277 | 0.003 |
| 5-25 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.141 | 5.142 | 0.001 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.003 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 5-26 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.267 | 5.267 | 0.000 |
| 5-27 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.176 | 5.178 | 0.002 |
| 5-28 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.145 | 5.148 | 0.003 |
| 5-29 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.206 | 5.208 | 0.002 |
| 5-30 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.264 | 5.266 | 0.002 |
| 5-31 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.257 | 5.257 | 0.000 |
| 5-32 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.282 | 5.284 | 0.002 |
| 5-33 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.179 | 5.179 | 0.000 |
| 5-34 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.158 | 5.158 | 0.000 |
| 5-35 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.187 | 5.189 | 0.002 |
| 5-36 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.189 | 5.190 | 0.001 |
| 5-37 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.124 | 5.125 | 0.001 |
| 5-38 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.341 | 5.342 | 0.001 |
| 5-39 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.191 | 5.191 | 0.000 |
| 5-40 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.210 | 5.210 | 0.000 |
| 5-41 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.157 | 5.158 | 0.001 |
| 5-42 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.121 | 5.124 | 0.003 |
| 5-43 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.148 | 5.150 | 0.002 |
| 5-44 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.211 | 5.210 | (-.001) |
| 5-45 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.168 | 5.168 | 0.000 |
| 5-46 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.157 | 5.160 | 0.003 |
| 5-47 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.162 | 5.160 | (-.002) |
| 5-48 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.228 | 5.228 | 0.000 |
| 5-49 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.235 | 5.235 | 0.000 |
| 5-50 | 75° | 60% | 74° | 8 drops | 2 min | 5 min | 5.246 | 5.248 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 5-26 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.211 | 5.211 | 0.000 |
| 5-27 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.315 | 5.315 | 0.000 |
| 5-28 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.174 | 5.175 | 0.001 |
| 5-29 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.208 | 5.208 | 0.000 |
| 5-30 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.263 | 5.263 | 0.000 |
| 5-31 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.233 | 5.235 | 0.002 |
| 5-32 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.245 | 5.246 | 0.001 |
| 5-33 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.214 | 5.214 | 0.000 |
| 5-34 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.194 | 5.195 | 0.001 |
| 5-35 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.176 | 5.176 | 0.000 |
| 5-36 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.199 | 5.199 | 0.000 |
| 5-37 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.219 | 5.219 | 0.000 |
| 5-38 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.259 | 5.259 | 0.000 |
| 5-39 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.189 | 5.192 | 0.003 |
| 5-40 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.218 | 5.218 | 0.000 |
| 5-41 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.259 | 5.257 | (-.002) |
| 5-42 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.181 | 5.181 | 0.000 |
| 5-43 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.222 | 5.226 | 0.004 |
| 5-44 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.189 | 5.190 | 0.001 |
| 5-45 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.305 | 5.305 | 0.000 |
| 5-46 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.292 | 5.294 | 0.002 |
| 5-47 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.206 | 5.206 | 0.000 |
| 5-48 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 4.979 | 4.983 | 0.004 |
| 5-49 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.172 | 5.174 | 0.002 |
| 5-50 | 74° | 62% | 60° | 8 drops | 2 min | 5 min | 5.164 | 5.166 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.000 |
| Mode: | 0 |

Large Test Tubes 6-1

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 6-1 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.152 | 5.152 | 0.000 |
| 6-2 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.115 | 5.118 | 0.003 |
| 6-3 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.160 | 5.160 | 0.000 |
| 6-4 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.186 | 5.186 | 0.000 |
| 6-5 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.143 | 5.143 | 0.000 |
| 6-6 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.147 | 5.148 | 0.001 |
| 6-7 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.196 | 5.196 | 0.000 |
| 6-8 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.167 | 5.168 | 0.001 |
| 6-9 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.175 | 5.176 | 0.001 |
| 6-10 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.144 | 5.144 | 0.000 |
| 6-11 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.140 | 5.141 | 0.001 |
| 6-12 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.089 | 5.089 | 0.000 |
| 6-13 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.125 | 5.125 | 0.000 |
| 6-14 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.063 | 5.064 | 0.001 |
| 6-15 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.092 | 5.093 | 0.001 |
| 6-16 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.218 | 5.218 | 0.000 |
| 6-17 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.145 | 5.146 | 0.001 |
| 6-18 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.163 | 5.163 | 0.000 |
| 6-19 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.091 | 5.093 | 0.002 |
| 6-20 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.145 | 5.145 | 0.000 |
| 6-21 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.113 | 5.116 | 0.003 |
| 6-22 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.135 | 5.137 | 0.002 |
| 6-23 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.147 | 5.148 | 0.001 |
| 6-24 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.101 | 5.105 | 0.004 |
| 6-25 | 66° | 50% | 51° | 8 drops | 2 min | 5 min | 5.071 | 5.073 | 0.002 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

Large Test Tubes 6-2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 6-26 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.170 | 5.171 | 0.001 |
| 6-27 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.099 | 5.101 | 0.002 |
| 6-28 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.186 | 5.188 | 0.002 |
| 6-29 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.157 | 5.160 | 0.003 |
| 6-30 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.263 | 5.265 | 0.002 |
| 6-31 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.250 | 5.251 | 0.001 |
| 6-32 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.086 | 5.089 | 0.003 |
| 6-33 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.156 | 5.156 | 0.000 |
| 6-34 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.122 | 5.122 | 0.000 |
| 6-35 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.286 | 5.291 | 0.003 |
| 6-36 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.268 | 5.268 | 0.000 |
| 6-37 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.123 | 5.124 | 0.001 |
| 6-38 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.122 | 5.126 | 0.004 |
| 6-39 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.260 | 5.262 | 0.002 |
| 6-40 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.266 | 5.268 | 0.002 |
| 6-41 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.212 | 5.212 | 0.000 |
| 6-42 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.173 | 5.174 | 0.001 |
| 6-43 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.143 | 5.143 | 0.000 |
| 6-44 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.123 | 5.123 | 0.000 |
| 6-45 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.314 | 5.317 | 0.003 |
| 6-46 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.221 | 5.223 | 0.002 |
| 6-47 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.202 | 5.208 | 0.006 |
| 6-48 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.165 | 5.168 | 0.003 |
| 6-49 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.158 | 5.159 | 0.001 |
| 6-50 | 66° | 50% | 47° | 8 drops | 2 min | 5 min | 5.251 | 5.254 | 0.003 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.001<br>0.003 |

Plastic Bags 1

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.242 | 0.243 | 0.001 |
| 2 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.242 | 0.243 | 0.001 |
| 3 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.250 | 0.251 | 0.001 |
| 4 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.248 | 0.248 | 0.000 |
| 5 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.249 | 0.250 | 0.001 |
| 6 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.241 | 0.242 | 0.001 |
| 7 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.247 | 0.249 | 0.002 |
| 8 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.242 | 0.243 | 0.001 |
| 9 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.238 | 0.238 | 0.000 |
| 10 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.240 | 0.241 | 0.001 |
| 11 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.243 | 0.244 | 0.001 |
| 12 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.239 | 0.239 | 0.000 |
| 13 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.248 | 0.248 | 0.000 |
| 14 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.243 | 0.243 | 0.000 |
| 15 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.240 | 0.242 | 0.002 |
| 16 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.240 | 0.240 | 0.000 |
| 17 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.243 | 0.244 | 0.001 |
| 18 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.241 | 0.241 | 0.000 |
| 19 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.245 | 0.246 | 0.001 |
| 20 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.246 | 0.247 | 0.001 |
| 21 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.252 | 0.252 | 0.000 |
| 22 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.246 | 0.247 | 0.001 |
| 23 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.248 | 0.248 | 0.000 |
| 24 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.241 | 0.241 | 0.000 |
| 25 | 43° | 39% | 44° | 16 drops | 5 min | 25 min | 0.245 | 0.246 | 0.001 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.240 | 0.243 | 0.003 |
| 27 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.247 | 0.248 | 0.001 |
| 28 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.244 | 0.246 | 0.002 |
| 29 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.249 | 0.251 | 0.002 |
| 30 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.246 | 0.249 | 0.003 |
| 31 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.250 | 0.251 | 0.001 |
| 32 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.244 | 0.246 | 0.002 |
| 33 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.245 | 0.246 | 0.001 |
| 34 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.243 | 0.245 | 0.002 |
| 35 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.255 | 0.257 | 0.002 |
| 36 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.253 | 0.255 | 0.002 |
| 37 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.252 | 0.253 | 0.001 |
| 38 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.246 | 0.246 | 0.000 |
| 39 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.249 | 0.250 | 0.001 |
| 40 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.240 | 0.243 | 0.003 |
| 41 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.248 | 0.251 | 0.003 |
| 42 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.241 | 0.243 | 0.002 |
| 43 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.245 | 0.245 | 0.000 |
| 44 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.243 | 0.246 | 0.003 |
| 45 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.242 | 0.245 | 0.003 |
| 46 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.241 | 0.243 | 0.002 |
| 47 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.243 | 0.245 | 0.002 |
| 48 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.241 | 0.242 | 0.001 |
| 49 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.242 | 0.244 | 0.002 |
| 50 | 50° | 38% | 51° | 16 drops | 5 min | 25 min | 0.243 | 0.243 | 0.000 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.002 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.241 | 0.244 | 0.003 |
| 52 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.239 | 0.242 | 0.003 |
| 53 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.244 | 0.246 | 0.002 |
| 54 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.243 | 0.246 | 0.003 |
| 55 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.239 | 0.241 | 0.002 |
| 56 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.237 | 0.238 | 0.001 |
| 57 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.253 | 0.255 | 0.002 |
| 58 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.249 | 0.250 | 0.001 |
| 59 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.240 | 0.241 | 0.001 |
| 60 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.238 | 0.241 | 0.003 |
| 61 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.247 | 0.249 | 0.002 |
| 62 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.243 | 0.244 | 0.001 |
| 63 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.245 | 0.247 | 0.002 |
| 64 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.235 | 0.237 | 0.002 |
| 65 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.239 | 0.242 | 0.003 |
| 66 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.234 | 0.236 | 0.002 |
| 67 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.243 | 0.244 | 0.001 |
| 68 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.238 | 0.239 | 0.001 |
| 69 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.244 | 0.245 | 0.001 |
| 70 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.235 | 0.237 | 0.002 |
| 71 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.244 | 0.246 | 0.002 |
| 72 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.240 | 0.242 | 0.002 |
| 73 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.245 | 0.247 | 0.002 |
| 74 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.248 | 0.249 | 0.001 |
| 75 | 60° | 64% | 59° | 16 drops | 5 min | 25 min | 0.247 | 0.249 | 0.002 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.002 |
| Mode: | 0.002 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post-Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.251 | 0.251 | 0.000 |
| 77 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.247 | 0.248 | 0.001 |
| 78 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.245 | 0.247 | 0.002 |
| 79 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.242 | 0.243 | 0.001 |
| 80 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.241 | 0.242 | 0.001 |
| 81 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.251 | 0.253 | 0.002 |
| 82 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.255 | 0.255 | 0.000 |
| 83 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.246 | 0.246 | 0.000 |
| 84 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.241 | 0.241 | 0.000 |
| 85 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.243 | 0.243 | 0.000 |
| 86 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.239 | 0.240 | 0.001 |
| 87 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.240 | 0.241 | 0.001 |
| 88 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.241 | 0.241 | 0.000 |
| 89 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.247 | 0.248 | 0.001 |
| 90 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.243 | 0.244 | 0.001 |
| 91 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.247 | 0.247 | 0.000 |
| 92 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.248 | 0.248 | 0.000 |
| 93 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.248 | 0.248 | 0.000 |
| 94 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.249 | 0.249 | 0.000 |
| 95 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.249 | 0.250 | 0.001 |
| 96 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.248 | 0.249 | 0.001 |
| 97 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.251 | 0.251 | 0.000 |
| 98 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.247 | 0.248 | 0.001 |
| 99 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.250 | 0.250 | 0.000 |
| 100 | 70° | 60% | 71° | 16 drops | 5 min | 25 min | 0.252 | 0.253 | 0.001 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0.000 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.834 | 21.825 | (-.009) |
| 27 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 20.099 | 20.089 | (-.010) |
| 28 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 22.306 | 22.299 | (-.007) |
| 29 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.886 | 21.878 | (-.008) |
| 30 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.444 | | |
| 31 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.350 | 21.338 | (-.012) |
| 32 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.221 | 21.213 | (-.008) |
| 33 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.849 | 21.842 | (-.007) |
| 34 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.810 | 21.806 | (-.004) |
| 35 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.687 | 21.677 | (-.010) |
| 36 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.459 | 21.452 | (-.007) |
| 37 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 22.435 | 22.427 | (-.008) |
| 38 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 19.231 | 19.222 | (-.009) |
| 39 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.215 | 21.202 | (-.013) |
| 40 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 20.189 | 20.178 | (-.011) |
| 41 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.544 | 21.535 | (-.009) |
| 42 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.860 | 21.850 | (-.001) |
| 43 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.316 | 21.302 | (-.014) |
| 44 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.802 | 21.793 | (-.009) |
| 45 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 18.418 | 18.411 | (-.007) |
| 46 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 22.136 | 22.127 | (-.009) |
| 47 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 25.305 | 25.293 | (-.012) |
| 48 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.281 | 21.272 | (-.009) |
| 49 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.660 | 21.651 | (-.015) |
| 50 | 72° | 65% | 72° | 8 drops | 2 min | 10 min | 21.939 | 21.929 | (-.010) |

| | |
|---|---|
| Mean: | (-.009) |
| Median: | (-.009) |
| Mode: | (-.009) |

Steel-Zinc Washers 2

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 20.528 | 20.536 | 0.008 |
| 52 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.641 | 21.648 | 0.007 |
| 53 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.472 | 21.486 | 0.014 |
| 54 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.461 | 21.467 | 0.006 |
| 55 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 20.582 | 20.589 | 0.007 |
| 56 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 22.276 | 22.284 | 0.008 |
| 57 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.833 | 21.841 | 0.008 |
| 58 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 22.024 | 22.030 | 0.006 |
| 59 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.397 | 21.407 | 0.010 |
| 60 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.334 | 21.340 | 0.006 |
| 61 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.701 | 21.708 | 0.007 |
| 62 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.984 | 21.990 | 0.006 |
| 63 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.404 | 21.411 | 0.007 |
| 64 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.959 | 21.963 | 0.004 |
| 65 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.623 | 21.632 | 0.009 |
| 66 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 22.368 | 22.373 | 0.005 |
| 67 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.484 | 21.490 | 0.006 |
| 68 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.811 | 21.818 | 0.007 |
| 69 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.405 | 21.411 | 0.007 |
| 70 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.280 | 21.288 | 0.008 |
| 71 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 22.133 | 22.138 | 0.005 |
| 72 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 20.749 | 20.756 | 0.007 |
| 73 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.227 | 21.232 | 0.005 |
| 74 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 20.504 | 20.509 | 0.005 |
| 75 | 85° | 59% | 65° | 8 drops | 2 min | 10 min | 21.703 | 21.710 | 0.007 |

| | |
|---|---|
| Mean: | 0.007 |
| Median: | 0.007 |
| Mode: | 0.007 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.750 | 21.765 | 0.015 |
| 102 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.932 | 20.942 | 0.010 |
| 103 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.705 | 21.716 | 0.011 |
| 104 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.798 | 20.809 | 0.011 |
| 105 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.302 | 21.314 | 0.012 |
| 106 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.253 | 20.265 | 0.012 |
| 107 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.190 | 21.205 | 0.015 |
| 108 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.315 | 24.330 | 0.015 |
| 109 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.404 | 24.420 | 0.016 |
| 110 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.393 | 24.406 | 0.013 |
| 111 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.065 | 21.077 | 0.012 |
| 112 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.453 | 21.465 | 0.012 |
| 113 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.898 | 20.911 | 0.012 |
| 114 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.459 | 20.471 | 0.012 |
| 115 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.416 | 24.432 | 0.016 |
| 116 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 22.039 | 22.056 | 0.017 |
| 117 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 25.161 | 25.177 | 0.016 |
| 118 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.423 | 24.435 | 0.012 |
| 119 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 23.955 | 23.971 | 0.016 |
| 120 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 24.431 | 24.446 | 0.015 |
| 121 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 22.852 | 22.867 | 0.015 |
| 122 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.116 | 20.128 | 0.012 |
| 123 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.037 | 21.044 | 0.007 |
| 124 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 20.554 | 20.566 | 0.012 |
| 125 | 76° | 59% | 68° | 8 drops | 2 min | 10 min | 21.557 | 21.567 | 0.010 |

| | |
|---|---|
| Mean: | 0.013 |
| Median: | 0.012 |
| Mode: | 0.012 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.645 | 21.646 | 0.001 |
| 77 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.778 | 21.782 | 0.004 |
| 78 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 20.248 | 20.251 | 0.003 |
| 79 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.722 | 21.724 | 0.002 |
| 80 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 22.284 | 22.284 | 0.000 |
| 81 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.030 | 21.031 | 0.001 |
| 82 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 20.329 | 20.329 | 0.000 |
| 83 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.852 | 21.853 | 0.001 |
| 84 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.316 | 21.319 | 0.002 |
| 85 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 19.798 | 19.799 | 0.001 |
| 86 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.219 | 21.219 | 0.000 |
| 87 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.284 | 21.285 | 0.001 |
| 88 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.796 | 21.800 | 0.004 |
| 89 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.488 | 21.488 | 0.000 |
| 90 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 27.095 | 27.097 | 0.002 |
| 91 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 22.126 | 22.127 | 0.001 |
| 92 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.393 | 21.396 | 0.003 |
| 93 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.309 | 21.310 | 0.001 |
| 94 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.433 | 21.433 | 0.000 |
| 95 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 22.125 | 22.126 | 0.001 |
| 96 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.873 | 21.873 | 0.000 |
| 97 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.928 | 21.928 | 0.000 |
| 98 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.479 | 21.482 | 0.003 |
| 99 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.792 | 21.794 | 0.002 |
| 100 | 76° | 59% | 74° | 8 drops | 2 min | 10 min | 21.478 | 21.480 | 0.002 |

| | |
|---|---|
| Mean: | 0.002 |
| Median: | 0.001 |
| Mode: | 0.001 |

| Material ID Number | Chamber Temp. | Chamber Humidity | Material Temp. | Cyano-acrylate amount | Fume Time | Time in Chamber | Pre-Fuming Weight (grams) | Post Fuming Weight (grams) | Net Increase |
|---|---|---|---|---|---|---|---|---|---|
| 126 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.241 | 21.243 | 0.002 |
| 127 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 23.175 | 23.177 | 0.002 |
| 128 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.710 | 21.712 | 0.002 |
| 129 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.163 | 21.166 | 0.003 |
| 130 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.103 | 21.103 | 0.000 |
| 131 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 24.497 | 24.499 | 0.002 |
| 132 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 19.807 | 19.808 | 0.001 |
| 133 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.087 | 21.089 | 0.002 |
| 134 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 24.176 | 24.177 | 0.001 |
| 135 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 20.188 | 20.188 | 0.000 |
| 136 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.116 | 21.116 | 0.000 |
| 137 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 28.271 | 28.271 | 0.000 |
| 138 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.894 | 21.894 | 0.000 |
| 139 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.076 | 21.076 | 0.000 |
| 140 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 19.913 | 19.913 | 0.000 |
| 141 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 20.289 | 20.291 | 0.002 |
| 142 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 20.026 | 20.029 | 0.003 |
| 143 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 24.339 | 24.342 | 0.003 |
| 144 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 23.154 | 23.155 | 0.001 |
| 145 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 20.043 | 20.043 | 0.000 |
| 146 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.205 | 21.205 | 0.000 |
| 147 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 19.972 | 19.973 | 0.001 |
| 148 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.590 | 21.590 | 0.000 |
| 149 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 24.581 | 24.582 | 0.001 |
| 150 | 69° | 55% | 62° | 8 drops | 2 min | 10 min | 21.899 | 21.899 | 0.000 |

| | |
|---|---|
| Mean: | 0.001 |
| Median: | 0.001 |
| Mode: | 0 |