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Processing Guidelines and Instructions

Thanks for purchasing Monster Makers Theatrical Latex Foam. A flexible art casting material that picks up the finest of detail, Monster Makers Foam produces a velvety, soft, natural, latex foam rubber with a micro-cellular structure. The system is versatile and can be manipulated to make foam suitable for appliances, animatronics, costumes, puppets, masks, props, toys, dolls, prototypes, etc. Enjoy making your flexible creations!

Process Overview

This is a manual process where:

- 1) A 'batch' of liquid latex base, curing agent and foaming agent are **mixed together at low speed** in a food mixing machine.
- 2) The mixture then has air incorporated into it by **Frothing it at high speed**, very much like beating egg whites into meringue.
- 3) The now foamed liquid latex is **De-Ammoniated at a middle speed until there is substantially reduced ammonia smell**.
- 4) A delayed-action coagulant, the **gelling agent is then blended into the foamed latex mixture**.
- 5) The liquid foam has its cell size further reduced by **Refining at a low mixer speed**.
- 6) The gelling agent **activated latex is then cast into molds and allowed to gel** (forming a semi-solid yet easily deformed mass).
- 7) The gelled foam is then **vulcanized (cured) in an oven, de-molded, washed and dried**. The resulting product is a light, spongy natural latex foam material.

Requirements:

- Components: **High Solids Latex Base, Curing Agent, Microcellular Foaming Agent, Mold Release** • Rubber Gloves • Eye protection • Respirator approved for filtering ammonia fumes and or a method of removing vapors from the work area. • A 12 Speed Sunbeam Mixmaster (Stand Type Model) or similar food mixing machine. (**HAND MIXERS ARE NOT RECOMMENDED**) • Gram Scale (O HAU Triple Beam Balance) or digital kitchen scale able to measure in single grams • Room temperature between 70 °F and 85 °F (foam may not gel consistently under 70 °F) • Mold(s) made of Ultra Cal 30, Dental Stone, Fiberglass, Epoxy, Silicone, Aluminum or Steel. • Oven Capable of 200 ° F, preferably with fan assisted circulation for even heat distribution • Thermometer for room temperature • Thermometer for oven temperature • Hygrometer for humidity • Stopwatch • Foam log sheet • Spatula • Small cup and stirring stick for gelling a gent.

The Foam Run

A foam run is the routine of making latex foam by the batch process. The typical basic foam run uses 150 grams of latex base and is often referred to as a "single batch" run. A 150 gram (latex base) 'Batch' is usually enough for one medium sized full faced appliance, or a pair of solid hands, or a dozen or more partial appliances, or one small to medium sized puppet head. Depending on the temperature, humidity, ventilation, mixer type and size of your foam run this can take anywhere from 12-30 minutes or longer for very large foam runs. The typical single batch run takes around 12 minutes.

Foam Volume

The amount of air whipped into the latex plays a very important role in the movement and feel of the foam. It governs the DENSITY of the manufactured foam. Foams of different densities have different qualities with varying uses. Foam density can be categorized as: **High, Medium and Low**. These translate as: High Density=Firm Foam, Medium Density=Medium Soft Foam, Low Density=Soft Foam. A foam 'VOLUME' refers to the air-to-latex ratio. 1 VOLUME being the level in your food mixer of one 'batch' of latex (with accompanying chemicals) but with no air frothed into it. A 2 VOLUME FOAM has the ratio of one part air to one part of latex mixture and will be twice the level of a single batch, a 3 VOLUME FOAM will be three times the height of one batch and so on. Measuring your foam by volume will enable you reproduce a given foam quality with more accuracy. The simple rule of thumb is: the Higher you whip the foam, the softer, lighter and less dense it will become. The opposite is true of low volume foam. A simple way to accurately measure volume is to create a volume measuring stick. To do this you will need to weigh all components into a cup (not including the gel) and mark the level with a marking pen. (Save this mixture for a foam run so you don't waste anything.) Next, pour water into another cup up to the same level and mark as well. Transfer the water into your mixing bowl. The level in the bowl now is a one volume. Place a popsicle stick in the bowl and probe straight down to the bowls bottom to transfer the level onto the popsicle stick. Mark the height on the stick with the pen. Refill the cup to the material line and repeat the process until volume 7 is reached and marked on the stick. You can then use the stick to check volume by submerging it into the foam as it is being frothed. (A plastic stick will probably last longer though, if you can find a substitute.) Alternately, you can fill the bowl to the various volumes and scribe the level permanently into the bowl with a glass scribing tool. This will give you a visual cue of the level while mixing is taking place

Mixing

IMPORTANT TIPS! Before beginning a foam run, shake all components well. Especially the curing agent which is more prone to settling than the other components. To ensure that that a component is adequately mixed, shake vigorously, then flip the bottle over and examine the bottom of the container. A properly shaken bottle will allow you to see into the bottle. If you can see bubbles collecting as the material runs off the bottom and into the container, than the component is properly mixed. In instances where the cure has been sitting unused for weeks or months you may have some hard sediment which is more difficult to mix back into solution. To correct this, simply sit the (closed) bottle in a pan of very hot water for about 5 minutes, then shake. Curing agent that is not shaken well may result in foam that is permanently undercured.

Measuring Tip: Be careful to measure the chemicals carefully and if possible, directly into the bowl beginning with the cure, then foaming agent, then the base. That way, if you make a mistake you can always locate what you've put into the bowl and remove a portion with an eyedropper if need be. If you start with the base, it's much harder to extract material from the smaller portions of chemicals that may have already sunk into the latex base.

Measurements using Kitchen Measuring Spoons: If you don't have access to a gram scale, you can measure the components as follows for a 150 gram batch run: 5 oz. Latex Foam Base, 1 Tablespoon of Microcellular Foaming Agent, 1 Teaspoon of Curing Agent and 1 Teaspoon of Gelling. Please be sure not to use the measuring utensils for food once they have been used with the foam chemicals. Please be sure to wash hands when handling foam chemicals.

SUGGESTED RUN SCHEDULES AND STARTING POINTS

MEDIUM, SOFT DENSITY 3-4 VOLUME FOAM

SMALL SUNBEAM MIXING BOWL
(average) room temperature 75°F, (average) Humidity 50%

in bowl weigh:

150 grams of Base
30 grams of Microcellular Foaming Agent
15 Grams of Standard Cure

in a separate cup weigh:
12 grams of gelling agent

SOFT DENSITY 5-6 VOLUME FOAM

SMALL SUNBEAM MIXING BOWL
(average) room temperature 75°F, (average) Humidity 50%

in bowl weigh:

150 grams of Base
30 grams of Microcellular Foaming Agent
15 Grams of Standard Cure

in a separate cup weigh:
12 grams of gelling agent

- 1) **START** at lowest speed to **MIX** ingredients. Slowly, over the course of **30 seconds**, increase to **speed 12**.
- 2) **FROTH** at **speed 12** for **2 to 3 minutes** or until just over half the bowl is filled with foam.
(Note: If foam reaches volume sooner than **2 to 3 minutes**, add remaining minutes into the the deammoniation **speed (4)**.)
- 3) Once volume is reached, reduce mixing speed to **speed 4**.
- DE-AMMONIATE** at **speed 4** for **4 minutes** (add remaining minutes, if any, left over from frothing **speed (12)**)
- 4) **ADD 12 grams GELLING AGENT** at **speed 4** over **30 seconds**.
- 5) **ADD COLOR** (if using) over **10-15 seconds**.
- 6) Rotate bowl backwards (**BACKBOWL**) by hand for **30 seconds**.
- 7) **SCRAPE FOAM** from sides and bottom of bowl into foam with small spatula, **up to 1 minute** (take care not to introduce too much air into mix).
- 8) Reduce **speed to 1** and **ULTRA-REFINE** for **2 minutes**.
- 9) **TRANSFER** liquid foam into molds and allow foam to **GEL (10 -20 min.)**
- 11) **BAKE** at **185°F** in a preheated oven for **2 to 2 1/2 hours** for small molds. Larger molds may need **3 to 4 hours**.
- 12) **DEMOLD** only when molds reach comfortable handling temperature but are still warm.
- 13) **WASH AND DRY** resulting foam pieces to achieve maximum foam quality and to wash out any residual curing agent.

TIPS: Depending on the factory calibrated speed of your mixer, (individual mixers can vary greatly from one to another even within the same make and model!) your foam should gel in anywhere from 10 to 20 minutes on average. If your foam gels too fast, try reducing the amount of gelling agent in two gram increments. If your foam takes longer to gel than 20 minutes, you may want to try adding 2 minutes to the the deammoniation speed (4) for every 10 minute increments past 20 minutes. Example: 30 minute gel add 2 minutes to DEAMMONIATION. 40 minutes add 4 minutes etc. If foam still gels too slow, try adding more gelling agent in one gram increments, up to 15 grams total, per single batch of foam. Though Monster Makers Foam is formulated with added stability and can tolerate long gels, many foam runners prefer to have gelation complete by 20 minutes. Reasons vary from increased production to reducing any chance of cell breakdown. However, in the case of large molds where more work time is required, longer gels are often desirable and easily attainable with Monster Makers Foam. Incidentally, the easiest way to calculate the gel time is at the conclusion of the mix cycle, when the mixer is stopped. For example: if your run takes 13 minutes and the foam gels at 30 minutes. You have a 17 minute gel. Some folks begin timing the moment the gel is added, but we feel that this is an easier way.

Molds- Molds may be made of gypsum (Ultra Cal 30, Dental Stone), fiberglass, epoxy or silicone. With the exception of silicone, all molds require a thin coating of Stearate mold release for ease of separation. Gypsum molds must also be thoroughly dried and cured before casting foam into them. Depending on thickness, try drying gypsum mold in an oven at 160°F for 4-8hours with the door slightly ajar. Dry Ultra Cal molds until the gray color turns a markedly whiter color throughout. Fiberglass, epoxy and silicones also must be heated for a few cure cycles on their own to bake out any residual catalysts before foam can be introduced. A good rule of thumb is that when the catalyst smell is completely gone the foam can than be cast.

Thinner molds made with lightweight compounds should be baked at lower temperatures for longer times to prevent steam pockets. A 1/4" fiberglass molds for example can be baked at 140°F for 4-5 hours for a complete cure. Even thicker gypsum molds can benefit from lower baking temperatures. It is easier on the molds and lower temperatures make softer foam! Try 140°F for 10 hours with your average gypsum mold and notice the difference in feel.

- 1) **START** at lowest speed to **MIX** ingredients. Slowly, over the course of **30 seconds**, increase to **speed 12**.
- 2) **FROTH** at **speed 12** for **4-5 minutes** or until the bowl is filled with foam from 1 inch to 1/2 inch from the top edge.
(Note: If foam reaches volume sooner than 5 minutes, add remaining minutes into the the deammoniation speed (**speed 4**).
- 3) Once volume is reached, reduce mixing speed slowly to **speed 4**. (This will help maintain foam volume.)
- DE-AMMONIATE** at **speed 4** for **3 minutes** (add remaining minutes, if any, left over from frothing speed (**speed 12**).
- 4) **ADD 12 grams GELLING AGENT** at **speed 4** for **30 seconds**.
- 5) **ADD COLOR** (if using) over 10-15 seconds.
- 6) Rotate bowl backwards (**BACKBOWL**) by hand for **30 seconds**.
- 7) **SCRAPE FOAM** from sides and bottom of bowl into foam with small spatula, up to **30 seconds** (take care not to introduce too much air into mix).
- 8) Reduce **speed to 1** and **ULTRA-REFINE** for **2 minutes**.
- 9) **TRANSFER** liquid foam into molds and allow foam to **GEL**.
- 11) **BAKE** at 185°F in a preheated oven for **2 to 2 1/2 hours** for small molds. Larger molds may need **3 to 4 hours**.
- 12) **DEMOLD** only when molds reach comfortable handling temperature but are still warm.
- 13) **WASH AND DRY** resulting foam pieces to achieve maximum foam quality and to wash out any residual curing agents. (Two drops of dishwashing liquid per gallon of water is sufficient. Rinse pieces repeatedly and squeeze out excess water until water looks clear. Allow to dry thoroughly on paper towel, core or lifecast.)

TIPS FOR FAST AND SLOW GELS: If foam gels too fast, try reducing the deammoniation speed (Speed 4) by 1 minute. If foam still gels too fast, try reducing gelling agent in 1 gram increments. If foam gels too slowly, try to first increase the deammoniation time in one to two minute increments. If foam still gels too slow, try adding more gelling agent up to 15 grams per single batch run.

HOT ROOM TIPS: In extreme cases, with very hot rooms of 90°F +, running foam can be difficult. It may be necessary to both decrease deammoniation and substantially reduce gelling agent. Since very warm and humid rooms result in ammonia being whipping off much faster and because the gelling agent is much more active at these temperatures, the addition of as little of 4 grams of gelling agent per single batch can be used and still allow for the foam to gel. One additional counter measure which can also work to overcome fast gels, if all else fails, is to add a few extra grams of foaming agent per single batch, for added stabilization. The trick is to only make one change each time a new batch is made so you can identify which change led to success. Don't forget to keep careful notes so that you can repeat your successes in the future!

HIGH VOLUME FOAM: Whipping foam to high volumes of 6 or more creates thick foam that can be difficult to pour. Thicker foam is more prone to trapping air when transferring into molds, particularly when injecting. To lower the viscosity and make a more flowable foam similar to the lower volume runs, **Monster Makers Flow Enhancer** can be added at up to 15 grams per single batch for substantial increased flowability. This should have little effect on the gelation.

For additional starting point run schedules, more technical info and a complete list of products please visit monstermakers.com