

# PLASTIC FORMULAS

Look around you. Almost everything you see is made of plastic. Now with these 16 formulas you can make your own items, such as lamps, plaques, vases, toys, desk sets, novelty items and more. It's an endless list. The only requirement needed is a small space to work in, a heater or stove. You need a kettle or pan to heat the mixture in and a table or bench to work on. Your dining table can be used.

## SULPHO-PLASTICS

This plastic is particularly adaptable for making molds and light castings requiring low tensile strength but very clear outline. It may also be used for making novelties and ornaments. However, as this is inflammable, do not use for ashtrays.

The name would convey the thought of plastic sulphur which is an unstable allotropic form of sulphur, this is not the case. The sulphur acts as a bond to hold the filler together and form a stable material.

Marble effects may be obtained by varying the filler used, and by substituting a small quantity of chalk to replace some of the graphite. A very pleasing glazed marble effect is formed.

As long as graphite is retained as a filler, this plastic may be electroplated and forms a very economical base for such work.

**FORMULA:** Mix thoroughly and smooth together 25 parts graphite and 75 parts sulphur and place over low heat. As soon as the mass has melted and runs like water, remove from heat. In any case, a temperature of 235 degrees F. should not be exceeded. It heated about 250 degrees F. the plastic will form a rubbery mass and will have to be cooled and reheated. In this liquid state the plastic is ready for casting, and may be poured into smooth surfaced molds.

**N.B.** to heat this mixture properly, a good even heat is necessary. Should the heating be done by flame, the container should be placed in a sand bath to insure an even heat. The cast iron top of a stove or heater is excellent.

**EQUIPMENT:** The only equipment for the above that is required, is space enough to work. a heater or stove, a kettle or pan to heat the mixture in, and a table or bench.

**PROCEDURE:** Before making in castings you will need a pattern. After choosing a design that fits your need, your next step is to make a mold. Then you start into production. If your product requires any holes, threads or machining, this may be done in the same manner as in working with a metal casting.

Always think of your castings as metal, for they have metallic properties, i.e., conduct heat, electricity and can be electroplated. In fact, the most valuable quality of Sulpho-Plastic is the fact that it can be used as a metal substitute. This permits you to make products that look and are as good and even better, in some cases, than a true metal. For instance, to make a chrome plated metal lamp base, other metal casting would require foundry equipment and machine shop work. A process miles out of reach of the small manufacturer. However, with your plastic lamp base, similar in all respects, may be made for a fraction of the other cost.

**ELECTROPLATING:** While this can be done at home with very little equipment, it is advisable to have it done by a commercial form. They do it very cheaply and much more efficiently. Electroplating is only used on expensive replicas and is not advisable for a start.

**DESIGN:** The number and variety of articles that can be made from Sulpho-Plastic is practically unlimited and to make a complete list would be impossible. Though any article of reasonable size and simplicity of design such as lams, vases, plaques, brooches, desk-sets, toys, paper weights, etc., may be cast by using an original article for a pattern or model. Or an original design may be patterned in clay and used to make a mold. It is advisable for the beginner to choose a simple article to start with, preferably solid, such as book-ends or paper weights.

**MOLDS:** Molds may be made of metal or plaster of paris. Metal models require a great deal of skill and equipment to produce. therefore for the beginner, it is advisable to use plaster of paris.

To make a plaster of paris mold. First obtain a box, wood or cardboard, about an inch larger than the article to be cast. Coat the inside of the box very thoroughly, yet thinly with stearine or sweet oil. Use this also on the article to be cast. This acts as a lubricant and the plaster of paris will not cement itself to either the box or the article, if the oil is evenly distributed. Next make a thick, creamy mixture of plaster of paris by sifting the plaster gradually into the water, stirring constantly to prevent lumping. Let this stand for a few minutes to allow the air bubbles to escape. Pour mixture slowly over pattern in the box to about double the thickness of the pattern. Allow several hours to dry, then remove. when the mold is thoroughly dry, give it a thin coat of shellac and repeat in 12 hours. Now the mold is ready to use.

**MOLDING:** First always make sure that you have lubricated your mold with stearine or beeswax. Place molds on a reasonably level surface and pour the Sulpho-Plastic into the mold, quickly and smoothly. Do not pour from a height as this will break the lubricant and leave blemishes on the castings. Plastic must be poured quickly to prevent cooling in folds and thus making a poor casting. One of the big assets of Sulpho-Plastic is the fact that it dries and hardens almost immediately. There is no long wait for the casting to dry.

**SOURCES OF SUPPLIES:** Graphite and Sulphur can be obtained from most any hardware or paint store. Also plaster of paris. Stearine, beeswax, sweet oil can be purchased from most drug or grocery stores.

**FORMULA:**

Foam density lbs./cu.ft.  
11/2 8 24 48

Polylite 8601  
50. 50. 50. 50.

Catalyst RI  
1.3 0.65 0.65 0.65

Water  
3.7 0.4 0.1 0.0

Polylite 8621  
100. 50. 48.5 47

(polylite 8601 is a polyseter) (polylite 8621 is a polyiscyanate)

PROCEDURE: In order to prepare a foam of give density, thoroughly mix Polylite 8601 with the necessary amount of catalyst RI and water. This mixture is stable when foam is required. Add the necessary amount of Polylite 8621. Mix thoroughly for 25 to 30 seconds and then pour. Do this right after mixing foams per instructions above. The foam will fully expand within 3 to 5 minutes and set within 5 to 7 minutes into a rigid unicellular structure.

Available mixing time can be extended by moderately chilling the catalyzed resin and the Polysicyanate. It will attain nearly maximum physical properties upon standing a few hours at room temperature and ultimate strength in about one week. Surface brittleness may be evident with some formulations after initial set. This brittleness disappears upon further curing, leaving a tough non-friable foam. curing can be accelerated with moderate heat up to 100 degrees F. after the foam has set if desired.

SOURCES OF SUPPLIES: Polylite 8601, Polylite 8621 and Catalyst RI can all be obtained from: Reichold Chemicals Inc. 525 N. Broadway, White Plains, NY 10602

#### CRAFT PLAX CLEAR FLEXIBLE PLASTIC

Vinyl Chloride Type

Suitable for molding in a letter press

#### FORMULA:

Pliovic AO.....25 ounces

Dioctyl Phthalate.....12 ounces

Panaflex BN 2.....4 ounces

Aluminum Stearate....1 ounce

PROCEDURE: The aluminum stearate is mixed with hot Dioctyl Phthalate. After cooling to room temperature, add the panaflex BN 2, and finally, the Pliovic AO. Small scale mixing can be done with a paddle, but commercial size batches will require the use of a planetary dough type mixer such as used by bakers.

PACKING: One pint paint cans and a paper label.

DIRECTIONS FOR USE: Mold with your hands or press into molds with a letter press. Heat to 350 degrees F. and hold this temperature until the plastic has cured. This will require from a few minutes to an hour or more, depending on the thickness of the object. Curing time can be determined by trial. Molds can be made of 50-50 solder.

COMMENT: Plastic of this kind is known as plastigel, since it is in the form of easily manipulated, putty-like gel in its uncured state. No other form of plastic is better suited to the operation of the homemaker because no expensive dyes or high pressure pressing equipment is needed to produce first class flexible objects.

#### SOURCE OF SUPPLIERS:

Pliovic AO..Goodyear Tire and Rubber Co. Akron, OH. Dioctyl Phthalate.. Monsanto Chemical Corp...1700 S. 2nd St., St. Louis MO.

Panaflex BN-2.. Amoco Chemical Corp. 555 Fifty Ave., New York, NY.

Aluminum Stearate.. Witco Chemical Co., 277 Park Ave., New York, NY.  
Paint Cans. Fruend Can Co., 4439 S. Cottage Grove Ave., Chicago, IL.  
Labels. Frazer Label Co., 734 S. Federal St., Chicago, IL. Mixers.. A. Daigger & Co., 189 W. Kinzie St., Chicago, IL.

## IMITATION PAPER MACHE

### FORMULA 1:

Wet paper pulp.....10 ounces  
Casein.....5 ounces  
Lime.....2 ounces  
Whitting.....20 ounces

Use as little water as possible in mixing this formula. Make up small batches until you see if the composition is exactly what you desire. Hot compositions, of course cannot be used in glue molds.

### FORMULA 2:

Paper pulp.....10 ounces  
Whitting.....8 ounces  
Rice flour.....5 ounces

Cook to a heavy paste, or 5 ounces of rice may be cooked to a past and mixed with the dry materials. A hard paper mache.

### FORMULA 3:

Use paper pulp or whitting...5 pounds

Liquid Glue.....1 pound  
Clear Varnish.....4 ounces  
Linseed Oil.....4 ounces

MIXING: Pour the glue into a tin or pail with a tight fitting lid so that it can be kept tightly closed when not in use. Then add the whitting or paper pulp, stirring in a little at a time to a smooth paste. Then add the varnish and linseed oil, mixed well. Keep the mixture covered well when not in use as it dries rapidly. This mixture will adhere firmly to wood, glass, tin, chinaware, etc. paper mache surfaces are greatly improved after drying if they are coated with shellac, 2 coats.

## SYNTHETIC RESIN PLASTIC

FORMULA: Phenol and a solution of Formaldehyde, in equal portions are put in a steam jacketed kettle and heat is gradually applied. Soon the materials will begin to react, and in doing so - liberate heat so intense the reaction may become that the steam must, at times be shut off and cold water circulated in the jacket to keep the process from going too far, or the materials from boiling out of the kettle. After a few hours of heating the contents of the kettle will be found to have separated into layers. The heavy melted resin n the bottom and the water on top. When the water is removed, the melted resin is allowed to run from the kettle into small pans to cool. This is a process that requires some experimenting with to get just right. But it is an interesting experience, and lays the foundation for later work on a commercial basis. Different treatment will produce many different qualities of the product. So it is good to keep a record of every operation. Put them all down in a record book, when a

satisfactory product is obtained, it can later be duplicated.

#### SOURCE OF SUPPLIES:

Phenol and Formaldehyde can be purchased from most any wholesale drug supply Co.

#### FIBERGLASS REINFORCED PLASTIC

#### FORMULA:

Laminac 4134.....24.45%

Laminac 4110.....75.00%

Cobalt Nephthenate (Liquid)...0.24%

Methyl Ethyl Ketone Peroxide...0.3%

#### ALSO NEEDED:

Talc

Fiberglass mat

Color paste for Laminac resin

Cellophane

No. 1894 EX-L-WAX

Woven Fiberglass cloth

#### PROCESS:

This method of forming reinforced plastic objects is known as "open mold fabrication." It is best suited to the home craftsman because it is the simplest method available and requires the lowest investment. Extreme wide variation in the techniques are possible and they type of structures that can be made are almost limitless. For molding a boat hull, a female mold is used. This mold is made to conform exactly to the exterior dimensions and finish desired in the completed molded boat hull. The mold may be made of wood, plaster, metal, or plastic. The best practical and inexpensive molds are made of the same plastic from which the boat itself will be made. The interior of the mold is first coated with the parting agent - No. 1894 EX-L-WAX. Apply the least amount that will provide easy removal of the hull from the mold. Mix the laminac 4134 and 4110 in the proportions stated in the above formula. Add the cobalt naphthenate accelerator and mix thoroughly before adding the methyl ethyl ketone peroxide catalyst. The catalyst will react violently with the pure accelerator so make certain these materials are mixed separately. Add talc to the mixture to thicken it so that application to a vertical surface will not produce sags... Apply a coat of the thickened resin to the inside surface of the mold. This is to insure a smooth and durable surface. Lay up a single layer of fiberglass mat over the entire surface of the mold. Using a paint roller or brush impregnate the layer of fiberglass with resin. Regardless of how the resin is applied, the paint roller must also be used to assure against entrapped air bubbles.

Lay up another layer of mat and impregnate with resin same as the first. Repeat this process until desired thickness is attained. Finish with a layer of fiberglass cloth and work vigorously with the roller to remove excess resin. Finally apply cellophane over the entire surface to produce a smooth finish. Allow to harden at room temperature. Remove from the mold and place in an even heated oven to 170 degrees F. and not over 200 degrees F. Bake until full hardness is achieved.

Any other structure, large or small is molded in the same way. Whether you use a male or female mold depends on which surface of the finished piece should have the finished side. The surface in contact with the mold is always the most highly finished.

Colors may be added to suit by using color paste made for the purpose. These are incorporated into the resin at the time the talc is added.

More complete instructions on this process may be found in "Fabrication with Laminac Resins. Write to: American Cyanamid Co., 30 Rockefeller Plaza, New York, NY 10020.

**SOURCES OF SUPPLIES:**

Laminac 4134 and Laminac 4110 from..American Cyanamid Co. Plastics Div., 30 Rockefeller Plaza, New York, NY 10020  
Cobalt Nephthenate (liquid) from..Carlisle Chemical Works, Inc. Reading, OH.  
Methyl Ethyl Ketone from..Enjay Co., 15 W. 51st, New York, NY 10020  
Talc from... Johns-Manville Co., Celite Div., 22 E. 40th St., New York, NY 10016  
No. 1894 EX-L-WAX from...Mitchell Rand Mfg. Co. 51 Murray St., New York, NY 10007

Fiberglass Mat from....Bigelow Fiberglass Products, 140 Madison Ave., New York, NY 10016  
Woven Fiberglass Cloth from....Hess Goldsmith & Co., 1450 Broadway, New York, NY  
Color Pastes from...Plastic Molders Supply Co., 74 South Ave., Fanwood, NJ  
Cellophane from...Olin Products Co., 270 Park Ave., New York, NY

**FISHING LURES, FROGS & WORMS**

**FORMULA:**

Geen 121.....30 ounces  
Geen 202.....20 ounces  
  
Good-Rite GP-261...25 ounces  
Tin Stabilizer....1 ounce  
Hydrogenated Terphenyl...25 ounces

**PROCEDURE:**

A small quantity like this may be mixed with an electric hand mixer, or by hand. This mixture is fluid and may be poured into suitable molds. Heating the molds to 350 degrees F. in an oven. It will fuse and harden the plastic. There will be little shrinkage and the cast objects have a life-like feeling. Molds may be made of any material that will stand the curing temperature.

**SOURCES OF SUPPLIES:**

Geen 121 & 202 from..B.F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland, OH  
Good-Rite GP-261 from...B.F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland, OH  
Hydrogenated Terphenyl from...Harshaw Chemical Co., 1945 E. 97th St., Cleveland, OH  
Tin Stabilizer from...Metal Thermit Corp., Rahway, NJ

**CELLO SPONGE RUBBER**

**FORMULA:**

Geen 121.....100 ounces  
Paraplex G-25.....50 ounces  
Paraplex G-50.....50 ounces  
  
Dythos (stabilizer)....3 ounces  
BL-353 (blowing agent)..10 ounces

Sponge Density 7 lbs. per cu. ft. Expansion 1100%.

**PROCEDURE:**

Heat the pastisol in the mold or on the desired substrate at 212 degrees F. until expansion is completed. When the GL-353 is used. The pigmented plastisol will show a yellow-green (the color of BL-353) to white when all the blowing agent is decomposed.

**SOURCES OF SUPPLIES:**

Geen 121 from..B.F. Goodrich, 3135 Euclid Ave., Cleveland, HO  
Paraplex G-25 & G-50 from...Relm & Haas Co., Washington Square, Philadelphia, PA  
Dythos from...National Lead Co., 111 Broadway, New York, NY  
BL-353 from...E.I. Dupont Co., Wilmington, DE

**SIMPLIFIED PLASTICS**

The amount of ingredients used in these various formulas is considered to be correct. But you may have to do some experimenting on your own, to obtain the proper flow properties.

**FORMULA 1:**

Wood Flour...5 parts  
Sodium Silicate....15 parts

**PROCEDURE:**

Mix the wood flour and Sodium Silicate together. Add more water if necessary until a dough like mixture is formed by kneading with the hands. This material may be molded into hard objects by pressure. Colors may be added while kneading. Use aniline dyes or dry colors. This material is suited for plaques, statues, book ends and etc.

**FORMULA 2:**

Dissolve 20 parts of flake glue in water n a double boiler. Add the dissolved glue to 90 parts of gelatin. Add 50 parts of wood flour and 300 parts of powdered chalk. Mix A and B together to make a heavy batter. This is done in enough warm water to loosen the material. Add dry colors (can be obtained from any paint dealer) and mold under pressure.

**FORMULA 3:**

Add 100 pars of Zinc Oxide to 4 parts of Silicic Acid. Add 2 parts of Powdered Borax to 2 1/2 parts of Powdered Glass. Then mix both together well. Grind until fine, then bring it into a solution by adding a concentrated Zinc Oxide solution. This material is ideal for small objects, but most be worked fast because of its rapid drying. Color if desired in the usual manner. It may be pressed with a hand press or in a drill press.

**FORMULA 4:**

Dissolve 1 pound of flaked glue in water by boiling. Shred enough tissue paper into the solution to give body and then stir until a thick batter results. Add 1 cup of Linseed Oil into the solution and 1 cup of powdered chalk. Stir well then remove from the double boiler, when cool enough to knead with hands. Press into molds. A pair of old gloves, slightly oiled with pure oil should be used to protect the hands while kneading these materials. It takes a few days for this material to dry. But at the end of the drying time it should be as hard as stone. And it resembles carved wood.

**FORMULA 5:**

Add 11 parts of Epsom Salts to 36 parts of freshly Calcined Magnesite and 2 1/1 parts of Lead

Acetate. Mix thoroughly. Then add enough water to hold the material together. Mold under pressure. This formula is good for outdoor decorations. Such as ducks, birds, etc. They may be painted after they have dried.

#### FORMULA 6:

Add 12 parts Pitch to 6 parts Rosin, mix together then add 1/2 part Caster Oil and 1/4 part melted wax. Blend this mixture together at a temperature of 250 to 260 degrees F. Press while hot into a cold die. Many articles may be made from this material.

#### WOOD PLASTIC

Easy to make. Take any desired amount of wood flour or finely sifted sawdust. Add enough ordinary clear lacquer to make a thick putty like mass. This will keep for a long time if kept in a tightly closed container. It makes a fine durable material for mending and patching wood.

Purchase a can of plastic wood from your local hardware store. You can see how it is packaged. Note: "Plastic Wood" is a registered name. If you wish to package and sell this product, you cannot use that name legally. You can make up a name of your own.

Wood Flour may be purchased from...Wood Flour Inc., Howard Street, Winchester, NH or Composition Materials Co., Ridgeway Cir, Summer St., Stanford, CT 06905.

You may obtain it from local woodworking plants.

#### SOURCE OF SUPPLIES:

Metal can may be purchased from...Fruend Can Co., 4439 S. Cottage Grove Ave., Chicago, IL  
Paper labels from...Fraser Label Co., 734 S. Federal St., Chicago, IL

#### RESIN CASTING PLASTIC

This is called Phenolic-Formaldehyde-Resin: All the materials for this formula can be purchased from any wholesale drug house.

**EXTREME CAUTION:** should be taken when mixing this formula. You should only use a glass or stainless steel vessel, and perform the operation in a place where the fumes will dissipate. Either in open air or into a chimney. These products should never come into contact with the skin. They are highly irritating and corrosive.

#### MATERIALS NEEDED:

Pure Phenol (carbolic acid) crystals, Formalin (30% Formaldehyde), Caustic Soda (sodium hydroxide) or lye, Lactic Acid, Glycerine, and Hydrochloric Acid.

Quantities are given by weight, so that you may make any desired amount of resin.

#### FORMULA:

In a vessel mix 1 part phenol with 2 1/2 parts of formalin. Add caustic soda a 20% solution in water, in the amount of three parts to 100 parts of the phenol and formaldehyde solution. This mixture is then heated for about 6 hours at 150 to 160 degrees F. Remove the water formed by the reaction. When the resin has become a thick syrup, add 6 parts of lactic acid and 15 parts of glycerine. Continue to heat until a small sample congeals on cooling. Add Hydrochloric Acid, 1 part to 100 parts of the mixture by weight, and when sufficiently cool, pour into dies of lead or plaster.



Hardening time depends on so many factors it is hard to predict. It will dry quicker if heated in an oven at 120 to 140 degrees F. The product will be water-white, and may be colored with dyes or pigments if desired.