

MATERIAL AND CHEMICAL HANDBOOK

UC Berkeley College of Environmental Design

BALSA WOOD

VARIATIONS

Sheets, Rods

DESCRIPTION

Tan, heavy grained and slightly textured wood.

USES

Balsa wood is easier to cut and lighter than basswood, but much more difficult to make into a good looking model. The very apparent and sloppy looking grain keeps balsa in the realm of mostly massing or sketch models. Because the wood is so light, it also distorts under pressure from anything but the sharpest blade, making clean joins more difficult to make. Can be laser cut.



MANUFACTURE

Trees harvest for balsa wood can be found in northern South America, and 90% of all balsa wood comes from Ecuador. These trees don't grow in farms, and tend to be harvested directly from the jungle. Balsa wood enjoys a relatively quick regrowth rate of 6-10 years.

NOTABLE INGREDIENTS

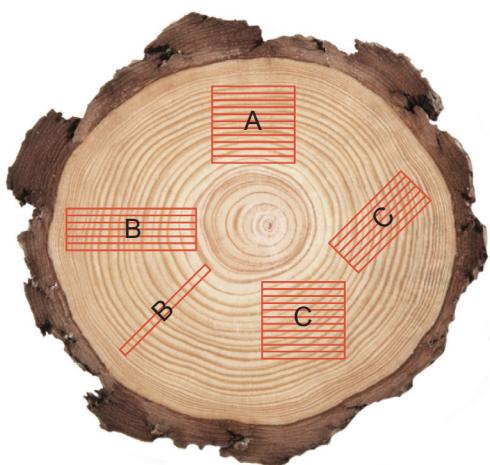
Ochroma Lagopus (Balsa Wood Tree)

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will completely biodegrade without any issue.

SAFETY NOTES

Always be careful when cutting- use a sharp blade. Almost all cuts are best made with multiple, low pressure passes- this reduces the chance of slipping and increases the precision of the cut.



Grain Types

A - tangent



B - quarter



C - random



BASSWOOD



VARIATIONS

Sheets, Rods, Dowels, Structural Shapes

DESCRIPTION

Pale, smooth, fine grained wood.

USES

Excellent modeling material. Basswood accepts all types of glues, especially craft glues, and can be cut by hand at thicknesses up to 1/8". Cuts with the grain must be carefully made to ensure the blade does not follow the slight curve of the grain instead of the straight edge; cuts against the grain must be scored and made in a number of passes. Can be laser cut.

MANUFACTURE

The American Basswood tree is native to states as far west as Minnesota and as far south as Missouri, stretching all the way to the east coast. The tree becomes mature in 10-15 years at which point it is harvested and cut down to desired sizes, then shipped.

NOTABLE INGREDIENTS

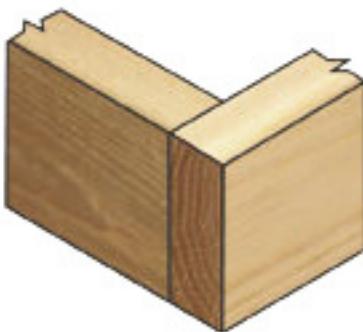
Tilia Americana (American Basswood)

DISPOSAL

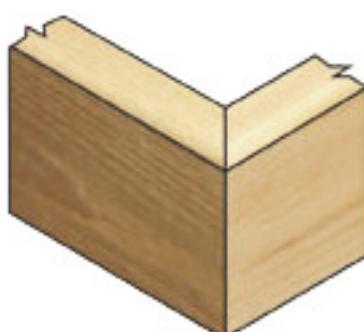
Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will biodegrade without any issue.

SAFETY NOTES

Always be careful when cutting- use a sharp blade. Almost all cuts are best made with multiple, low pressure passes- this reduces the chance of slipping and increases the precision of the cut.



Standard Joint. The right side here will read more dominantly. Use if the design has a particular directionality.



Miter Joint. The object modeled will appear to have more unity and solidity. These joints take a little longer to make right.

CARDBOARD



VARIATIONS

A, B, C, D, E, F-Flute, Honeycomb Board

DESCRIPTION

Corrugated sheet lined on one or both sides by flat sheets.

USES

Corrugation provides lightweight thickness, ideal for rough topo and massing. Single layers can be removed to signify changes in material or texture. Cross section can signify texture as well. Can be laser cut.

MANUFACTURE

Wood is pulped mechanically and chemically then formed into sheets. Sheets are corrugated by a series of gears and then adhered to flat liner sheets with a starch based adhesive.

NOTABLE INGREDIENTS

Wood, Starch Glue, Bleaches

DISPOSAL

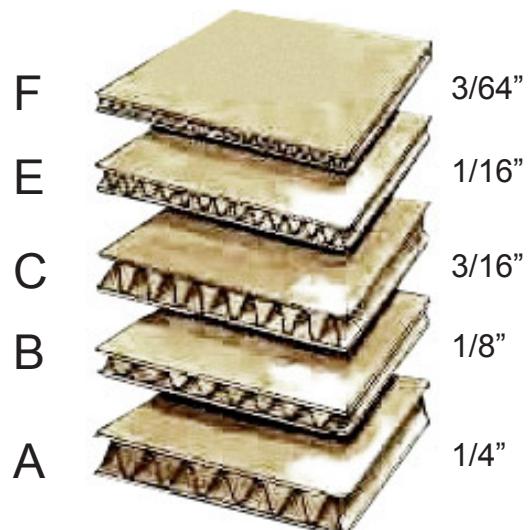
100% recyclable - blue bins. Flatten boxes and models as much as possible.

SAFETY NOTES

Always be careful when cutting- use a sharp blade. The corrugation makes cutting along the grain easy and cutting against the grain comparatively difficult.



Honeycomb Board



Flutes

CEMENT

VARIATIONS

Portland, Masonry, Portland Blastfurnace, Fly Ash

DESCRIPTION

Powder that hardens and binds with the introduction of water; key ingredient in concrete.

USES

Can be used as a scaled modeling material- forms can be made of plexi for a shiny finish or wood for more texture . Can also be used to model full scale details.



MANUFACTURE

Limestone is heated to 1450 degrees celsius, releasing CO₂. The result is ground and combined with gypsum and small amounts of other materials. The cement industry is the second largest CO₂ emitting industry behind the energy industry.

NOTABLE INGREDIENTS

Limestone, Gypsum, Quartz

DISPOSAL

Re-Use stations for unused material. Landfill for DRY waste- cured cement creates no environmental damage. DO NOT dispose in sink.

SAFETY NOTES

- If skin comes in contact with wet cement for sufficient duration, chemical burns will occur.
- Contact with the eyes should receive immediate medical attention and thorough flushing.
- Always wear a respirator while using cement; prolonged inhalation of particulate can cause disabling, and eventually permanent lung problems.



Limestone



Portland Cement

CRAFT GLUE

VARIATIONS

Tacky, Sobo, Elmer's, Wood Glue, PVA



DESCRIPTION

White, thick adhesive that dries in 5 to 30 minutes.

USES

Craft glue is most effective with porous materials: wood, paper, boards, and cloth. It will form a much less brittle bond than super glues, making models more durable. Craft glue is very forgiving as it remains workable for a good amount of time and excess can be easily scraped away for clean looking joins. Drying joins can be held in place by masking tape while work elsewhere on the model can continue. Craft glues are not waterproof, and will not cure in excessively wet or humid conditions.

MANUFACTURE

Craft glues are polyvinyl acetate (PVA) suspended in water- when it is applied, the water evaporates and the PVA hardens. PVA is made from a number of chemical reactions

NOTABLE INGREDIENTS

Polyvinyl Acetate [ethylene, acetic acid, oxygen], Water

DISPOSAL

Place all spent containers at Re-Use Stations.

SAFETY NOTES

-These adhesives are generally the least toxic and threatening option. Use these over super glues, cements, and epoxies whenever possible.



Yellow wood glue dries faster than white glue, but its color remains after curing.



The LEAST toxic glue can be made by mixing flour and water into a smooth paste.

EPOXY ADHESIVE



VARIATIONS

Gels, Pastes

DESCRIPTION

Two substances, a 'resin' and a 'hardener', that cure when mixed together.

USES

Epoxy adhesive forms an extremely strong bond, which makes it excellent in full-scale construction and repairs. Epoxy is an excellent joiner of obscure materials that no other adhesive works on. A palette knife or wood stick should be used to mix and apply.

MANUFACTURE

The 'resin' component is an epoxide, the 'hardener' a polyamine. Both substances are the result of complex chemical reactions.

NOTABLE INGREDIENTS

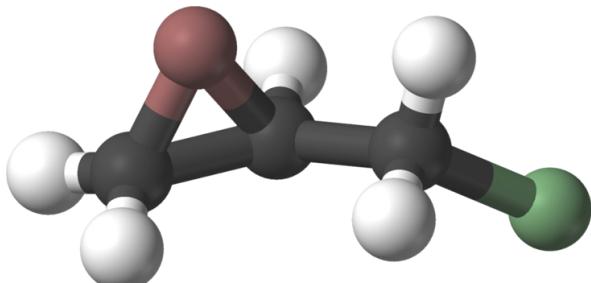
Epoxides, Polyamines, Bisphenol A [Volatile Organic Compound]

DISPOSAL

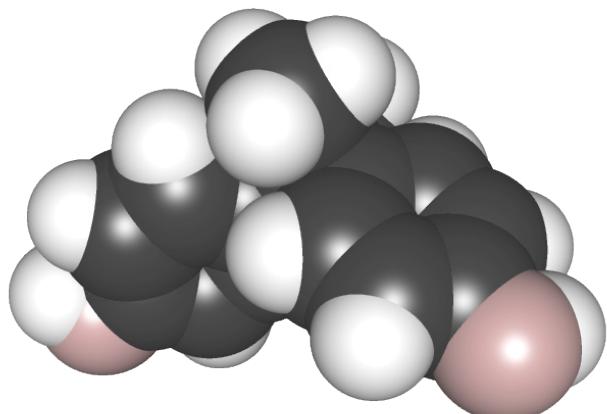
Place all spent containers at Re-Use Stations.

SAFETY NOTES

- Always wear a respirator and eye protection.
- Should either component of the epoxy contact the skin, wash for 10-15 minutes.
- Bisphenol A is a controversial chemical suspected of having negative effects on the brain, increasing breast cancer risk, hampering sexual development, and increasing obesity.



Epichlorohydrin



Bisphenol A

FOAMCORE

VARIATIONS

Foam Board

DESCRIPTION

Board of varying thickness consisting of foam sandwiched between two flat sheets.



USES

Foamcore is a versatile modeling material, but is difficult to make presentable. It is best used in quick massing studies and in places where it is not visible- such as the filler in a veneered base. Craft glue works well due to its porosity. Foamcore cuts cleanly with a sharp exacto or olfa blade and has no 'grain'. It can also be used as a backer on which drawings are mounted.

MANUFACTURE

The foam is polystyrene- chemically made from adding alcohols to styrene. Styrene is a by-product of particular petroleum manufacturing methods. Once the polystyrene dries in molds, it is sprayed with adhesive and sandwiched between two sheets of cardstock. The cardstock is manufactured similarly to bleached paperboard.

NOTABLE INGREDIENTS

Cardstock (typ. acid free), Bleach, Polystyrene

DISPOSAL

Place all extra pieces at re-use stations. Foamcore is not recyclable, and polystyrene is notorious for remaining in landfills for hundreds of years without decomposing.

SAFETY NOTES

-Foamcore cutting requires a sharp blade- make sure you are cutting against a metal straight edge



GRAVEL

VARIATIONS

Crushed rock, Pea Gravel, Creek Rock

DESCRIPTION

Loose rock



USES

As a medium sized aggregate in concrete, it greatly reduces the amount of portland cement needed.

MANUFACTURE

Gravel is generally mined in open pit mines, often occurring near rivers, where not only habitat destruction but runoff are concerns. Mines located away from rivers and streams, and gravel from crushed rock, are best.

NOTABLE INGREDIENTS

Assorted rock

DISPOSAL

Re-Use stations for unused material. Otherwise, landfill; gravel is naturally occurring and does not harm the environment.

SAFETY NOTES

When mixing concrete, always wear proper skin protection and wear a respirator in poorly ventilated areas.

River



Fine



Crushed



Pea



HOMASOTE

VARIATIONS

Cellulose Based Fiber Wall Board



DESCRIPTION

1/2" Board consisting of pressed paper fiber with a subtle square-grid texture.

USES

Though homasote can only easily be cut by power tools, it can be useful for massing or model bases. It is cheap and can be glued with wood or craft glue. Though its edges are rough and messy, homasote cuts very cleanly. Be careful when working with power tools; this material tends to burn if left on a tool for too long.

MANUFACTURE

Homasote is 100% recycled paper product (98% post consumer) and non VOC adhesive pressed at high temperature.

NOTABLE INGREDIENTS

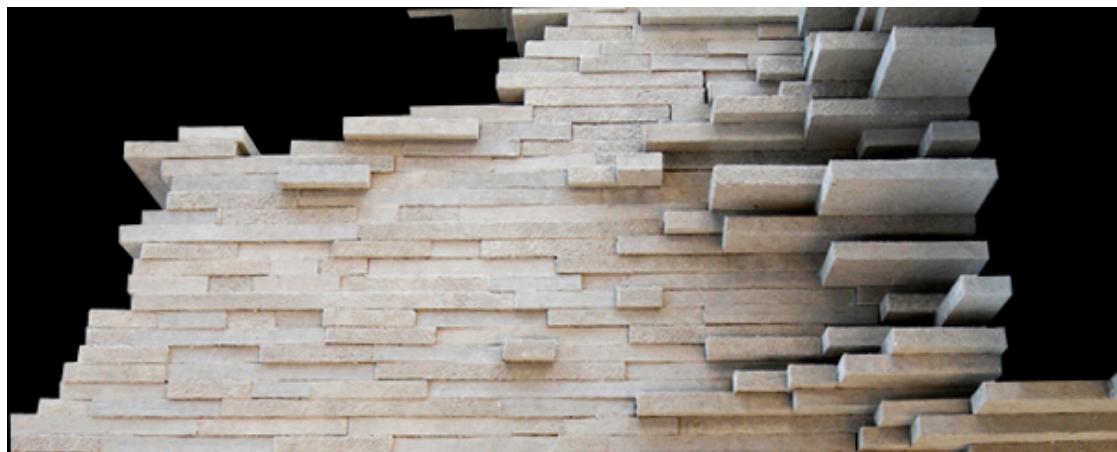
Paper Fiber (usually from newsprint)

DISPOSAL

Place all extra pieces at re-use stations. Homasote is a paper board, which qualifies it for paper recycling.

SAFETY NOTES

-Working with paper board in the shop is like working with light wood, take standard power tool precautions.



Homasote as both massing and model base.

HOT GLUE

DESCRIPTION

Solid, usually translucent glue sticks are heated with a special gun to produce liquid adhesive.

USES

Hot glue is extremely difficult to control in detailed applications such as models. It works best on fabric and foam, and has a rapid curing time.



MANUFACTURE

Hot glues are typically based on one material, though a number of additives exist. This base material is a thermoplastic that must be chemically mixed and created in a heat-intensive process. Once the thermoplastic is made, additives enter the mix, and the batch cools in stick shaped molds.

NOTABLE INGREDIENTS

Ethylene-vinyl acetate

DISPOSAL

Re-Use stations for unused sticks. Also Re-Use stations for glue material to be disposed; glue sticks may contain hazardous chemicals.

SAFETY NOTES

-The tip of the glue gun is significantly hotter than the glue coming out of it. Touching the glue itself will sting but touching the gun tip will burn.



Glue sticks typically come in a standard dimension to fit all guns.



A heat gun can be used to keep the glue workable for longer (shop).

LUMBER

VARIATIONS

Finished, Rough



DESCRIPTION

Wood boards.

USES

For framing heavy model bases and constructing almost any furniture piece. The variety of dimensions lumber comes in makes it very flexible.

MANUFACTURE

Trees can be harvested from forests or tree farms, which are then stripped and shipped to processing facilities as logs. Logs are cut to dimension in the most efficient way possible, with scrap wood going to various other manufacturing processes. Cut lumber then dries, is sent to a planar to smooth and square surfaces.

NOTABLE INGREDIENTS

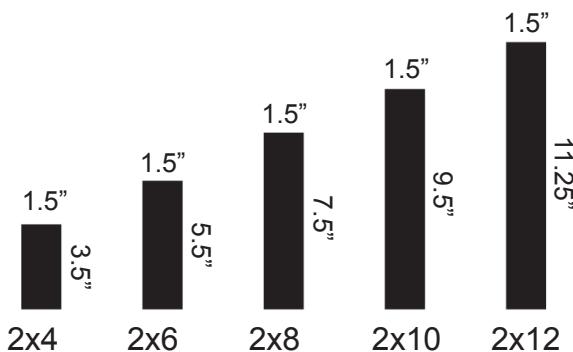
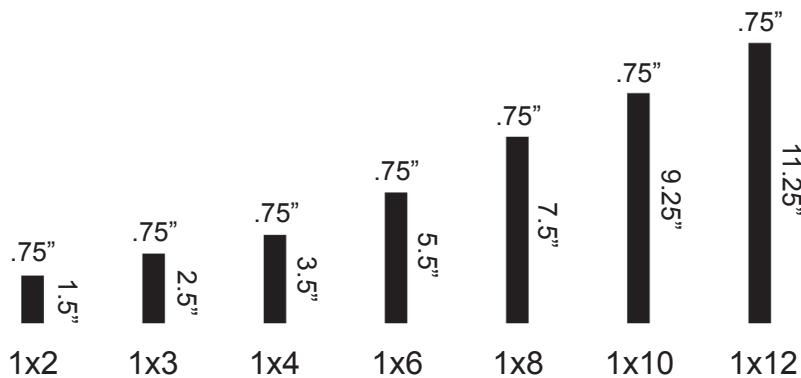
Pine, Fur, Spruce

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will biodegrade without any issue.

SAFETY NOTES

-Lumber should be cut in the shop. Follow all precautions associated with the particular tools used in the shop.



MASONITE

DESCRIPTION

Thin, dark brown wood board with no apparent grain direction.



USES

Masonite can be used for a smooth and cheap drawing board or desktop surface, and can also be cut like any other wood in the shop for model construction. Can be laser cut.

MANUFACTURE

Wood chips and sawdust are blasted with steam until they are elongated into fibers and then formed into boards. Typically, no adhesive is used. Boards may be polished to a smooth, almost glossy finish.

NOTABLE INGREDIENTS

Wood

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will completely biodegrade without any issue.

SAFETY NOTES

- Masonite cannot be cut without shop access. Follow all precautions associated with the particular tools used in the shop.

MEDIUM DENSITY FIBERBOARD



VARIATIONS

MDF, High Density Fiberboard

DESCRIPTION

Uniformly colored board consisting of pressed wood particles without any grain.

USES

MDF's lack of grain and uniform color make it set it apart from other wood products. MDF can serve the same utility in model bases or furniture pieces as plywood or OSB. It is a favorite material to be machine routed because of its lack of grain.

MANUFACTURE

Much MDF is manufactured in Europe, though a good amount is produced in New England as well. A number of types of species may be inputs; wood is ground and compacted, softened, and fed into a defibrator. The defibrator further grinds the material in a steam environment. Resin and wax are added before pressing under tremendous pressure.

NOTABLE INGREDIENTS

Woods, recycled paper, bamboo, sawmill cut offs, Formaldehyde (carcinogenic) (unless otherwise noted by producer).

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Formaldehyde will contaminate the ground.

SAFETY NOTES

-MDF should be cut in the shop. Follow all precautions associated with the particular tools used in the shop.

-Due to its density, when MDF is cut, it produces a lot of sawdust. This dust contains amounts of formaldehyde, a carcinogen that is not desirable to inhale. Always wear a respirator when cutting or sanding MDF.



MDF sheet CNC routed

ORIENTED STRAND BOARD

VARIATIONS

OSB, Waferboard, Sterling Board, SmartPly

DESCRIPTION

Board consisting of variously oriented wood strands pressed together.



USES

OSB can be used much like plywood, however its appearance tends to be less refined, which is the trade off for its cheaper price. It has a slight directionality, a result of the strands roughly aligning to its long dimension.

MANUFACTURE

Almost all of the raw tree can be used to produce OSB. The production process does not require mature trees and can accept many species of wood. Strands are pressed together with wax and resin and heated in ovens to cure. Most OSB is produced in the US and Canada.

NOTABLE INGREDIENTS

Various Wood Species, Resin and Wax (5%)

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will biodegrade without any issue, and the types of resins and waxes in OSB are not tremendously detrimental to the environment.

SAFETY NOTES

-OSB should be cut in the shop. Follow all precautions associated with the particular tools used in the shop.



OSB has a rough appearance in cross section, and will tend to fray at the edges when not handled carefully.

PAPERBOARD



VARIATIONS

Chipboard, Museum Board, Butter Board

DESCRIPTION

Solid paper sheet material of varying white, grey, and brown tones. Same composition as paper except thicker.

USES

Thin sheets lend themselves to representation of planar elements in models, also used to layer topography. Layers can be peeled away to reveal different tones and texture. Slight grain of pulp lends to an ease of bending in one direction. Can be laser cut.

MANUFACTURE

Wood is pulped mechanically and/or chemically then formed into sheets. Bleach or other brightening agents may be added. Virgin pulp is generally brown, recycled takes on grey due to inks, and bleached board will approach white. Coatings may be added to improve texture or color.

NOTABLE INGREDIENTS

Wood, Bleaches, Starch

DISPOSAL

100% recyclable - blue bins

SAFETY NOTES

Always be careful when cutting- use a sharp blade. Any board higher than single ply will prove difficult to make complex cuts.



Museum



Chip



Chip



Butter

PARTICLE BOARD

VARIATIONS

Wheat Board, Sunflower Board, Straw Board

DESCRIPTION

Board of gritty appearance, composed of wood particles.

USES

Particle board has no directionality to it, but certainly has a texture. It has all the utility as other wood board products.

MANUFACTURE

Component wood particles are mixed with resin and the substance is formed into a sheet, usually by spraying. The result is a less dense variation of MDF.

NOTABLE INGREDIENTS

Woods, recycled paper, sawmill cut offs, wheat, Formaldehyde (carcinogenic) (unless otherwise noted by producer).

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Formaldehyde will contaminate the ground.

SAFETY NOTES

- Particle board should be cut in the shop. Follow all precautions associated with the particular tools used in the shop.
- Not all types of particle board contain formaldehyde, but many do, and a respirator should be worn when cutting and sanding.
- Wheat, straw, and sunflower boards contain no VOCs and are made from agricultural waste.



Sorghum



Sunflower



Straw



Wheat

PLASTER

VARIATIONS

Gypsum (Plaster of Paris), Lime, Cement, Model Paste

DESCRIPTION

White powder that becomes a paste when water is added.

USES

Plaster or modeling paste can be used to smooth out topographical models or simply to add a consistent white matte to everything in a model. Blocks of cured plaster can be carved to create subtractive models or molds.



MANUFACTURE

Plaster of Paris is created by heating gypsum to 150 degrees celsius. Lime plaster comes from heating limestone to 850 degrees celsius or more, and depends on the stone's release of CO₂.

NOTABLE INGREDIENTS

Gypsum or Limestone

DISPOSAL

Re-Use stations for unused material. Otherwise, landfill. DO NOT dispose in sink.

SAFETY NOTES

Some types of plaster may contain trace amounts of substances that irritate the lungs when inhaled.

When plaster is curing, it releases heat; large amounts of curing plaster exposed to the skin for an extended duration can cause severe burns.



Plaster Mold

PLASTIC CEMENT

VARIATIONS

Acrylic Cement, Weld-On

DESCRIPTION

Clear, very sharp smelling liquid.

USES

Plastic adhesive physically joins acrylic, polystyrene, and styrene. These solutions actually melt the plastics, and as they evaporate, the plastics dry together as one. Best applied with a syringe or squeeze bottle. This chemical distorts all plastic surfaces it touches, use sparingly.



MANUFACTURE

Chemical reactions and mixing.

NOTABLE INGREDIENTS

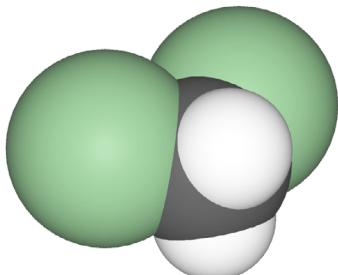
Methylene Chloride, Trichloroethane, Methyl Methacrylate Monomer

DISPOSAL

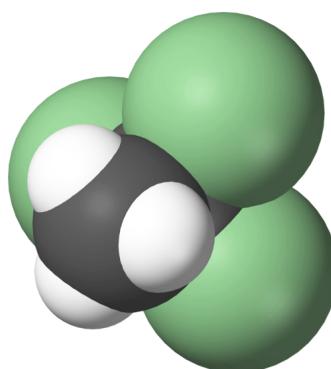
Place all spent containers at Re-Use Stations.

SAFETY NOTES

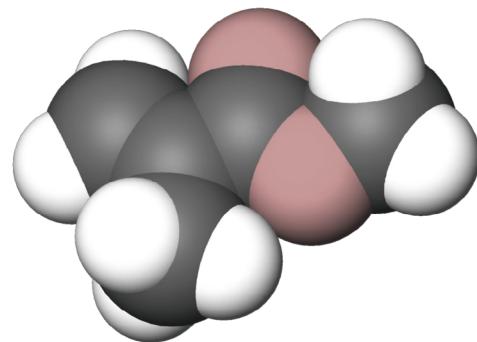
- Exposure of any kind is harmful. Wear a respirator, rubber gloves, and eye protection.
- Ingredients in plastic cement can cause: headache, confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, visual disturbances. Also may cause cancer.



Methylene Chloride



Trichloroethane



Methyl Methacrylate

PLEXIGLASS



VARIATIONS

Lucite, Acrylic

DESCRIPTION

Clear, durable, semi-flexible sheet thicker than 1/16".

USES

Entire models can be made from lasercut plexi. This is desirable when light or view transmission is desired. Plexi is not forgiving; trace amounts of glue will leave residue, it cannot be cut outside of the shop or laser lab, and tends to fog up in layers with glue. Due to plexi's crisp and clean look, it is difficult to unify it with any other materials besides styrene or other plastics. Plexiglass can be melted with a heat gun as well. Can be laser cut.

MANUFACTURE

Plexiglass is petroleum based; to produce one unit mass of plexi requires two units mass of petroleum. Sheets are formed in molds heated to a minimum 85 degrees celsius, often exceeding 160 degrees celsius.

NOTABLE INGREDIENTS

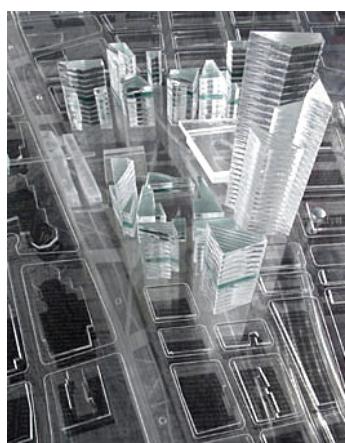
Ethyl Acrylate (.1%)(Possibly carcinogenic), Poly(methyl methacrylate) (99%)

DISPOSAL

Place all extra pieces at re-use stations. Plexiglass is not recyclable, and will remain in the landfill for a long time.

SAFETY NOTES

- To avoid inhaling fumes or dust when melting and cutting, wear a respirator.
- Fumes and dust may also irritate the eyes, always wear eye protection when using power tools



Plexiglass with a combination of scores and stacks overlaid on printed information.



Very thick stacks of material are best held together mechanically- with hardware- to avoid fogging and stains that come with adhesives.

PLYWOOD

VARIATIONS

Tropical, Hardwood, Softwood, Decorative, Craft

DESCRIPTION

A number of thin sheets of wood adhered together with alternating grain direction.



USES

The wide variety of quality and types of plywood lend it to be useful for anything from model bases to high quality furniture. Plywood's unique look in cross section is often used to communicate a directionality in model bases. This cross section can be stacked and individual sheets disappear and only the grain reads through.*

MANUFACTURE

Sheets are produced by rolling a log against a long blade, peeling thin layers off. These layers are then cut, stacked, glued, and baked in a press at 140 degrees celsius. Panels are then recut, sanded, or refinished, depending on type and grade.

NOTABLE INGREDIENTS

Various Wood Species, Urea Formaldehyde (carcinogenic), Phenol Formaldehyde (carcinogenic)

DISPOSAL

Usable scraps to Reuse Stations, unusable scraps to wood dumpster behind shop. Untreated wood will biodegrade without any issue, but adhesives contaminate the area.

SAFETY NOTES

- Aside from the craft variety, Plywood should be cut in the shop. Follow all precautions associated with the particular tools used in the shop.
- Plywoods now carry a rating revealing their formaldehyde content. This is the "E-Rating", with E0 indicating essentially zero formaldehyde.



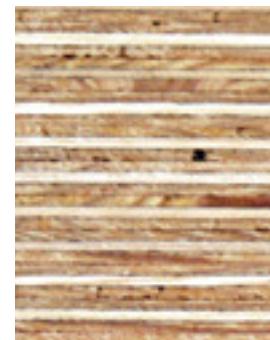
A

B

C

D

E



*

SYNTHETIC RESIN

VARIATIONS

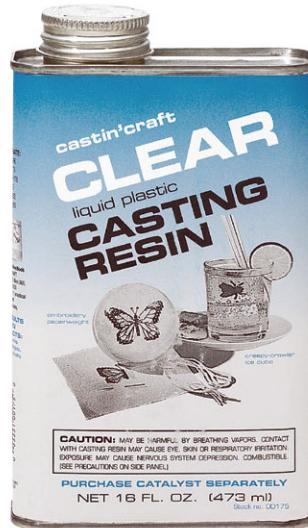
Polyurethane, Epoxy, Acrylic

DESCRIPTION

Clear or translucent liquid that dries at room temperature when combined with a curing agent.

USES

The most common casting resins will be polyurethane or acrylic. When casting in a mold, resin should be mixed carefully to minimize air bubbles and the mold should be designed so that gravity naturally pulls the resin into all places. Acrylic resins will dry clear, polyurethane usually opaque, and epoxy clear in thin layers.



MANUFACTURE

The manufacture of synthetic resin varies between types and applications, however the process is always dominated by chemical reactions. Countless additives and catalysts end up in the mix on top of the base formula.

NOTABLE INGREDIENTS

Alcohols, Diisocyanates (known to cause asthma)

DISPOSAL

Place all spent containers at Re-Use Stations.

SAFETY NOTES

- Always wear a respirator and eye protection.
- Do not store resin in areas that can reach excessive temperatures (cars).



Polyurethane



Epoxy



Acrylic

RUBBER CEMENT

DESCRIPTION

Translucent, gummy liquid usually applied with a brush. Dries quickly, but produces a weak bond.

USES

Rubber cement is very forgiving, allowing adhered materials to be re-positioned without damage. Paper collage type applications are best.



MANUFACTURE

Natural rubber comes from the sap of a rubber tree, and is purified by cooking at high temperature. Synthetic rubber usually is petroleum based. Rubber is pulverized and mixed with the solvents to keep it in liquid form, then packaged. There is no waste in this process, however the solvents are volatile organic compounds.

NOTABLE INGREDIENTS

Rubber, Hexane or Heptane, Alcohol or Ethanol

DISPOSAL

Unused and waste material go to Re-Use Stations. Containers will be disposed of as hazardous waste.

SAFETY NOTES

-Solvents quickly evaporate when exposed to air, causing the cement to harden. These solvents are dangerous to inhale; use in well-ventilated areas.



Harvesting Rubber



Processing Raw Rubber

SAND

DESCRIPTION

Fine grain rock and mineral particles

USES

As an fine aggregate for concrete, allows for greatly reduced use of portland cement while maintaining smoothness. Use for full scale detail models calling for concrete.



MANUFACTURE

Sand is dredged from river, lake, and sea beds- raising environmental concerns regarding habitat destruction and unforeseen increases in landslides and floods.

NOTABLE INGREDIENTS

Silica/Quartz

DISPOSAL

Re-Use stations for unused material. Landfill for waste.

SAFETY NOTES

When mixing concrete, always wear proper skin protection and wear a respirator in poorly ventilated areas.

LIME

DESCRIPTION

Fine white powder

USES

Main component of lime plaster.

MANUFACTURE

Limestone is heated to over 850 degrees celsius, releasing CO₂. The resulting material is hydrated to make Calcium Hydroxide, lime.



NOTABLE INGREDIENTS

Limestone, Water

DISPOSAL

Re-Use stations for unused material. Landfill for waste.

SAFETY NOTES

Always wear proper skin protection and wear a respirator in poorly ventilated areas. Lime is corrosive and can easily burn skin, eyes, stomach, and lungs.

SPRAY PAINT

VARIATIONS

Primer, Latex, Textured, Enamel

DESCRIPTION

Pressurized cans that spray a mist of paint.

USES

Spray paint is a reliable way to color delicate models evenly. Hold the nozzle 6 to 12 inches away from the target and apply in a circular or back and forth motion. Spraying too much in a single place will cause the paint to run. The further from the target the nozzle is held, the thinner but more even the coat. If you tape off portions not to be painted, holding the nozzle farther away will reduce the possibility of paint bleeding under the tape.



MANUFACTURE

Pigments, solvents, and any additives are mixed in massive vats. The mixture is then precisely dispersed in cans along a conveyor, at which point the propellant is added and the can is quickly closed with a valve.

NOTABLE INGREDIENTS

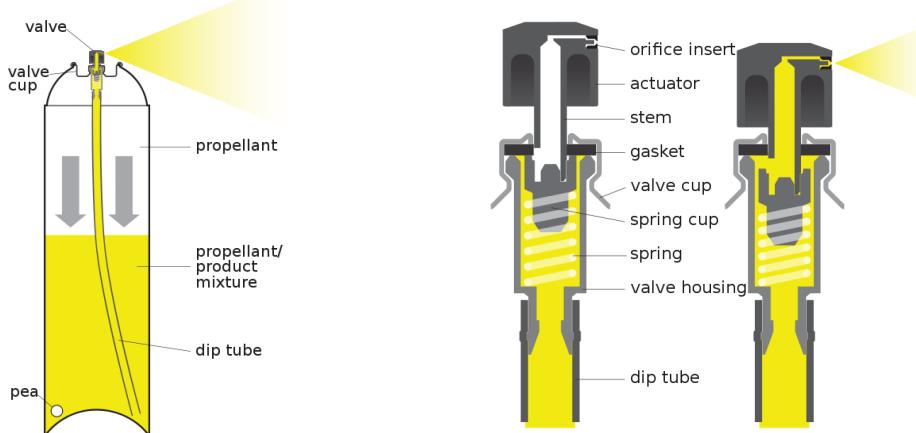
Titanium dioxide, Pigment Chemicals, Hydrocarbons, Hydrofluorocarbons

DISPOSAL

Re-Use stations for spent or partially used cans.

SAFETY NOTES

- Always use in well-ventilated areas. If there is little air movement, wear a respirator.
- Not all spray paints contain hydrocarbons, but those that do contribute to smog and generally poor air quality.
- Hydrofluorocarbons (HCFCs), the propellants meant to replace hydrocarbons, are greenhouse gasses.
- Some types of spray paints use CO₂ as a propellant, which is a less potent greenhouse gas than HCFCs, but these paints tend to have less reliable pressure and spray density.



STYRENE

VARIATIONS

Sheets, Rods, Scale Figures, Scale Structural Members



DESCRIPTION

Opaque, usually white, plastic. When in sheets, typically comes in 1/32" and 1/16" thicknesses.

USES

Styrene can be used to achieve that ideally white architectural model. 1/32" sheets can be easily cut and scored by hand and thicker sheets are typically laser cut. Sanding entire sheets before construction allows for inconspicuous sanding away of mistakes and misalignments later on. Can be laser cut.

MANUFACTURE

A chemical cocktail in gas state is mixed in high temperature steam and then passed over a solid catalyst bed (where the gas solidifies into styrene)- the bed's retention rate is 65-75%. Typical by-products are benzyne and toluene (the latter is the chemical that causes people to get high and sometimes die from concentrated inhalation of paint)

NOTABLE INGREDIENTS

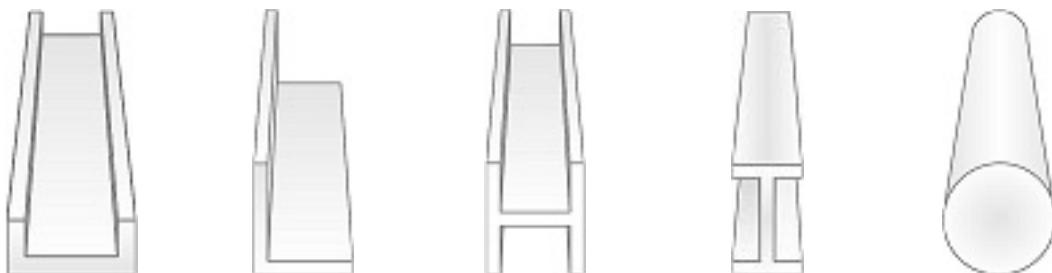
Benzyne, Ethylene, Iron Oxide or Potassium Oxide

DISPOSAL

Place all extra pieces at re-use stations. Styrene is not recyclable, and will remain in the landfill for a long time.

SAFETY NOTES

-Styrene is on the EPA's list of 'suspected carcinogens'; avoid inhaling dust and fumes with a respirator, and wear eye protection when sanding in close proximity.



Craft stores sell scale structural pieces, and scale people to populate your model.

SUPER GLUE

VARIATIONS

Zap-A-Gap, Krazy Glue

DESCRIPTION

Clear adhesive that dries quickly and powerfully. Has a sharp odor.



USES

Excellent adhesive for precision model making with less porous materials. Porous materials such as wood tend to absorb the glue and pull it away from the joint. When accompanied with an "accelerator", it can fully cure within minutes. The less glue applied, the faster, cleaner and stronger it cures. For smoother surfaces such as glass, try a pass of fine grit sandpaper before application.

MANUFACTURE

The chemical ingredients of cyanoacrylate are combined through a series of heating and cooling. Another round of heating causes the glue to crack on a molecular level- super glues cure once moisture (in the air) is introduced and the cracks bond together again.

NOTABLE INGREDIENTS

Cyanoacrylate [Ethyl (a hydrocarbon), formaldehyde, cyanide, acetate]

note: a chemical does not necessarily share the properties of its component parts.

DISPOSAL

Place all spent containers at Re-Use Stations.

SAFETY NOTES

-These adhesives are extremely powerful and can potentially adhere eyelids, lips, or fingers together. Remove glue by flushing with large amounts of warm water. It can take several hours for glue to come off of the body.

-Container nozzles often become glued shut; DO NOT SQUEEZE TO FORCE OUT HARDENED GLUE. Insert a pin into the nozzle to knock away obstruction or use an exacto blade to cut off the blocked portion of the nozzle.

-Adhesive vapor can irritate eyes and lungs; wear eye and respiratory protection or keep face at least a foot distance from uncured glue.

TASKBOARD



DESCRIPTION

Low density paper board with large but fine texture.

USES

Taskboard is a type of paper board designed specifically for modeling. It can do anything chipboard can do, except it is much easier to cut, has a more consistent composition (so edges don't need to be hidden with miter joints), and more cleanly sands. Can be bent when exposed to steam. Can be laser cut.

MANUFACTURE

Wood from sustainably managed forests is mechanically pulped and formed into sheets. Lighter colors of Taskboard are achieved in a totally chlorine free process.

NOTABLE INGREDIENTS

Wood

DISPOSAL

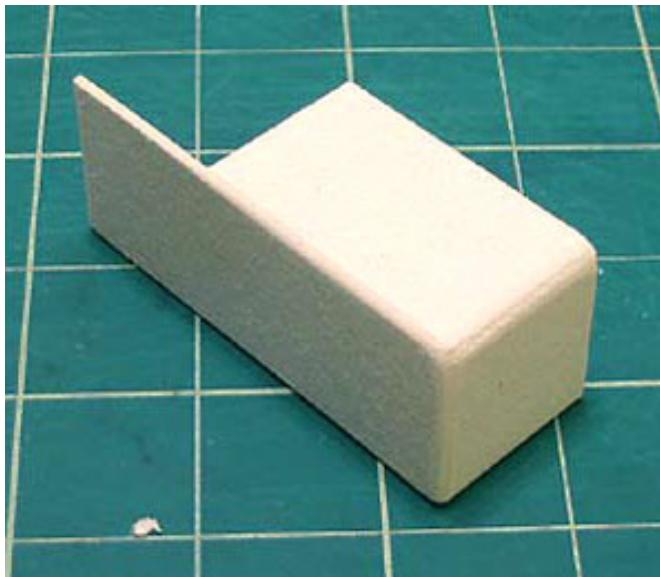
100% recyclable- Blue Bins.

SAFETY NOTES

Always be careful when cutting- use a sharp blade.



Like with chipboard, scratching and scoring can achieve various textures.



Both bent and glued edges can be sanded without fraying, and sanding away the top layer does create discoloration.