

THE CHEMICAL FORMULARY

**A CONDENSED COLLECTION OF VALUABLE, TIMELY,
PRACTICAL FORMULAE FOR MAKING THOUSANDS
OF PRODUCTS IN ALL FIELDS OF INDUSTRY**

VOLUME I

Editor-in-Chief
H. BENNETT



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H. BENNETT

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PREFACE

Chemistry as taught in our schools and colleges is confined principally to synthesis, analysis and engineering—and properly so. It is part of the proper foundation for the education of the chemist.

Many a chemist on entering an industry soon finds that the bulk of the products manufactured by his concern are not synthetic or definite chemical compounds but are mixtures, blends or highly complex compounds of which he knows little or nothing. The literature, in this field, if any, may be meagre, scattered or antiquated.

Even chemists, with years of experience in one or more industries, spend considerable time and effort in acquainting themselves on entering a new field. Consulting chemists, similarly, have problems brought to them from industries foreign to them. A definite need has existed for an up-to-date compilation of formulae for chemical compounding and treatment. Since the fields to be covered are many and varied an editorial board was formed, composed of chemists and engineers in many industries.

Many publications, laboratories, manufacturing companies and individuals have been drawn upon to obtain the latest and best information. It is felt that the formulae given in this volume will save chemists and allied workers much time and effort.

Manufacturers and sellers of chemicals will find in these formulae new uses for their products. Non-chemical executives, professional men and others, who may be interested, will gain from this volume a "speaking acquaintance" with products which they may be using, trying, or with which they are in contact.

It often happens that two individuals using the same ingredients in the same formula get different results. This may be the result of slight deviations or unfamiliarity with the intricacies of a new technique. Accordingly, repeated experiments may be necessary to get the best results. Although many of the formulae given are being used commercially many have been taken from patent specifications and the literature. Since these sources are often subject to various errors and omissions,

due regard must be given to this factor. Wherever possible it is advisable to consult with other chemists or technical workers regarding commercial production. This will save time and money and avoid "head-aches."

It is seldom that any formula will give exactly the results which one requires. Formulae are useful as starting points from which to work out one's own ideas. Formulae very often give us ideas which may help us in our specific problems. In a compilation of this kind errors of omission, commission and printing may occur. We shall be glad of any constructive criticism in this, our first attempt.

To the layman, it is suggested that he arrange for the services of a chemist or technical worker familiar with the specific field in which he is interested. Although this involves an expense it will insure quicker and better formulation without wastage of time and materials.

H. BENNETT
1933

CONTENTS

	PAGE
ADDENDA, ALCOHOLIC LIQUORS	541
ADHESIVES	1
AGRICULTURAL SPECIALTIES	16
ALLOYS	19
ANIMAL PREPARATIONS	24
BEVERAGES AND FLAVORS	25
FOOD PRODUCTS	47
CLEANERS, SOAPS	75
BLEACHING, COLORING, DYEING	87
COSMETICS	101
DECOLORIZING, DEODORIZING, DISINFECTING	148
EMULSIONS	151
ETCHING, ENGRAVING, LITHOGRAPHING	164
EXPLOSIVES, PYROTECHNICS, MATCHES	169
FIRE PROOFING, FIRE EXTINGUISHING	173
FLUXES AND SOLDERS; WELDING	176
FUELS	179
GLASS, CERAMICS, ENAMELS	182
INK, CARBON PAPER, DUPLICATORS, CRAYONS, ETC.	192
INSECT, RODENT AND WEED DESTROYERS	214
INSULATION, ELECTRICAL SPECIALTIES	224
LACQUERS, PAINTS, VARNISHES, STAINS	225
LEATHER, HIDES, SKINS, FURS	307
CEMENT, CONCRETE, STONE AND MATERIALS OF CONSTRUCTION	328
METALS AND TREATMENT	341
MISCELLANEOUS	345
OILS, FATS, GREASES, LUBRICANTS, CUTTING OILS	356
PAPER AND PULP	367
PHARMACEUTICAL AND PROPRIETARY PREPARATIONS	375
PHOTOGRAPHY	391
PLASTICS, CELLULOID, CELLULOSE ESTERS, COMPOSITIONS	394
PLATING	399

	PAGE
POLISH, ABRASIVES, METAL CLEANERS	417
REPAIRING, RENOVATING, REMOVING STAINS	433
RESINS, GUMS, WAXES	442
RUBBER	448
RUST PREVENTING, PICKLING	458
SILK, RAYON, COTTON, FIBRE	459
SIZING AND STIFFENING, SOFTENERS	474
WATERPROOFING	478
TABLES	484
REFERENCES CONSULTED	491
INDEX	493
SUPPLY SECTION	
CHEMICAL ADVISORS	
SPECIAL RAW MATERIALS	
EQUIPMENT	
CONTAINERS, ETC.	
PUBLICATIONS	

Please read Preface before attempting to make up any formula.

ADHESIVES

* Bakelite, Adhesive

Shellac	16
Pontianak Gum	8
Titanium Dioxide	2
Asbestine	22
Alcohol	22

Box Toe Adhesive

1. Rosin	1300 gm.
2. Shellac	200 gm.
3. Alcohol	1520 c.c.
4. Whiting	4000 gm.

Dissolve one and two in three and then work in four until uniform.

* Adhesive, Casein

Casein	50
Magnesium Oxide	3
Soda Ash	1
Water	500
Yeast	1
Sod. Borate	2

* Adhesive, Casein

Casein	75
Slaked Lime	15
Kieselguhr	5
Sodium Fluoride	7

Mix the above with water for use.

* Adhesive, Waterproof Casein

Soda Ash	15
Sod. Acetate	6
Sod. Fluoride	5
Slaked Lime	45
Casein	140
Basic Copper Carbonate	3

* Casein, Liquid Adhesive

Casein	100
Urea	90
Water	100

Mix together and allow to stand until dispersed and free from lumps; this may be hastened by heating to 140-160° F. with stirring. Addition of more water causes thickening or precipitation. This adhesive is fairly water-proof and not alkaline like most commercial casein adhesives.

All formulae preceded by an asterisk (*) are covered by patents.

A glue base which when mixed with water and alkalis produces a smooth glue (having a much longer "life" than a similar material made without casein and seed meal) is formed of dried blood albumin 90, dried milk casein 15-30, a seed meal high in protein material such as peanut, cotton-seed or soy-bean meal 30-45 and finely comminuted cellulose about 100 parts.

* Adhesive, Moisture-Proof Cellophane

Ethylene Glycolmonoethylether	20-30%
Lactic Acid	80-20%

The above is mixed with an equal volume of water.

Adhesive for Celluloid to Celluloid

Gum Camphor	1 part
Alcohol	4 parts

Dissolve the camphor in the alcohol and then add 1 part Shellac. Warm to dissolve. This cement is applied warm, and the parts united must not be disturbed until the cement is hard.

* Celluloid and Rubber, Adhesive for

Ethyl Crotonate is a solvent for both pyroxylin and rubber. Both surfaces are cleaned and each is wet with Ethyl Crotonate and pressed together.

Cellulose Ester Adhesives

1.
15 parts nitrocotton.
6 parts camphor.
79 parts acetone.
10 parts filler.

2.
20 parts scrap film.
60 parts ethyl acetate.
20 parts ethyl alcohol.
10 parts aluminium powder.

3.
16 parts nitrocotton.
10 parts ethyl acetanilide.
74 parts acetone.
15 parts starch.

4.
12 parts cellulose acetate.
8 parts tricresyl phosphate.
20 parts methyl alcohol.
30 parts ethyl acetate.
30 parts methyl acetate.
25 parts filler.

5.
12 parts nitrocotton.
4 parts ethyl acetanilide.
2 parts castor oil.
20 parts ethyl acetate.
20 parts methyl acetate.
17 parts methyl alcohol.
25 parts starch.

6.
14 parts scrap film.
2 parts ethyl acetanilide.
2 parts castor oil.
3 parts tricresyl phosphate.
13 parts ethyl acetate.
13 parts methyl acetate.
6 parts methyl alcohol.
21 parts acetone.
6 parts benzine.
20 parts starch.

7.
10 parts nitrocotton.
4 parts camphor.
2 parts tricresyl phosphate.
50 parts acetone.
20 parts butyl acetate.
14 parts filler.

Cellulose Ester, Adhesives for

SOLUTION I. 12.8 kg. alcohol-damp nitrocotton in 12.0 kg. methyl acetate.

SOLUTION II. 25.0 kg. first crepe latex dissolved in 72 kg. benzole,
or

SOLUTION I. 7.5 kg. celluloid in 7.5 kg. acetone, 7.5 kg. methyl acetate and 15 kg. ethyl acetate.

SOLUTION II. 17.5 kg. first crepe latex in 72 kg. benzole.

Solutions I and II are mixed and thinned to a suitable viscosity.

An even simpler method consists in dissolving celluloid in acetone or a similar solvent, the layer remaining after evaporation being highly adhesive, soft

and elastic, and is not attacked by cold or warm water.

Resins may also be added to the straightforward celluloid solution, in which case a solvent must be selected which dissolves both celluloid and resin. Acetone is probably the most suitable in this connection. Cellulose acetate may be used in place of celluloid, and suitable resins are copal and rosin, the following mixture, for example, giving excellent results:

Celluloid	20 g.
Acetone	60 g.
Copal	5 g.
Rosin	5 g.
White lead	1 g.
Acetone	20 g.

In addition there may be added a small proportion of nitro-benzole, which improves the odour.

An adhesive layer of exceptional properties is obtained by using de-camphored celluloid and castor oil, which are thoroughly incorporated in ethyl acetate or acetone. This adhesive is stable for an unlimited period and may be made up on the following lines:

Castor oil	85 g.
Nitrocellulose	15 kg.

Solvents as required.

Pigments, fillers and odoriferous substances may also be incorporated.

* Cigarette Tip Adhesive

Nitrocellulose 1.5, rosin 13, tricresyl-phosphate 13.4, triacetin 1.6, ethylene glycol 2.5, glycol monoformate 5 and lithopone 45 kg.

* Decalcomania Adhesive

Glue	13.5
Water	28
Butanol	7.3
Toluol	9.7
Alcohol	26.8
Turkey Red Oil	14.7

* Glass to Cement Adhesive

Glass is coated on one side with a mixt. of Na silicate and a metal oxide, *e.g.*, ZnO, which readily forms a silicate. The glass is then heated gradually to 100°, preferably by heating it to 40°, maintaining that temp. for a few hrs., raising the temp. to 100°, and maintaining that temp. for 1-2 hrs. The solid coating thus obtained does not corrode the glass and adheres well to cement or gypsum.

Glass to Brass Adhesive

Caustic Soda	1
Rosin	3
Plaster of Paris	3
Water	5

Boil together until all lumps disappear and cool before using. This sets in about 20 min.

Quicksetting Insulating Adhesive

Modified Alkyd Resin	11-20
Pyroxylin Solution (35%)	64-73
Tricresyl Phosphate	4-8
Lacquer Thinner	11-21

This is useful on coils and radio parts.

*** Latex Adhesives**

Latex	100
Invert Sugar	2
Sod. Thiosulfate	3
Pot. Bichromate	2

Latex	100
Albumen	2
Carrageenan Moss	5
Formaldehyde	3
Sod. Bichromate	3

Adhesive, Leather Shoe

Good leather adhesives for use by the shoe industry are based on nitrocellulose, rubber or casein. A nitrocellulose compn. contains nitrocellulose 200, AcOAm 15, AmOH 15, rosin 10, camphor 5, Venice turpentine 15 and linseed oil 20 parts. Soft leather is made to adhere especially well by the following compn.: gutta percha 85, rosin 25, asphalt 26, petroleum 130 and CS₂ 300-350 parts.

*** Adhesive, Mask**

Beeswax	52
Lanolin	24
Venice Turpentine	15
Castor Oil	9

*** Mica Adhesive**

Gilsonite	2
Rubber	1
Benzol	3

Allow to swell and mix properly. This may be thinned down with benzol or naphtha.

*** Adhesive, Heat Plastic**

The following is used for special adhesive binding tapes.

Balata	10 lb.
Rosin	5 lb.
Mineral Oil	6 oz.

*** Synthetic Resin Adhesive**

For the prepn. of a transparent weatherproof resin to be used in the manuf. of reflectors for uniting glass particles to a support, a mixt. of PhOH 40, CH₂O soln. 100, and NaOH 1.2 parts is warmed to about 62° for about 2.5 hrs., treated with 3.3 parts of lactic acid, and warmed again to about 60° until the mixt. becomes sirupy.

*** Adhesive for Silk or Rubber**

Latex	5-15
Rubber	20-52
Rosin	1.5-5
Copal	3-10
Filler	6-25
Color	3-18
Gum Arabic	6-25

*** "Masking" Adhesive Tape**

For making a paper base or backing, the paper is first submitted to a preliminary treatment by a saturating solution involving a glue base. The saturating solution is composed of the following materials and proportions.

36 pounds of dry glue
72 pounds of water

108 pounds (approx. 16° Twaddell) glue solution. Complete swelling is permitted, assisted by warming.

To this is then added 108 pounds of yellow glycerine.
108 pounds (approx. 16° Twaddell) glue solution
108 pounds pale yellow glycerine

216 pounds glue-glycerine water solution.

To this is added 216 pounds of water.

216 pounds water
2 pounds Formaldehyde

434 pounds

The paper above described is preferably continuously submerged and passed through a bath of the saturating solution as above prepared and then passed through pressure rolls to squeeze off the excess and then dried by heating. It will be observed that just complete saturation is preferred as this step is closely

related to the success or failure of the treatment.

The rubber resin compounds in their solvents may be spread upon the paper backing directly, utilizing a knife spreader to uniformly and equally distribute this material upon the base or backing. The solvent may thereafter be removed by evaporation, preferably without recovering the solvent and leaving the rubber mixture upon the paper backing.

Rubber Resin

- 2 lb. of plantation rubber.
- 5 lb. of Mexican or wild rubber, high in natural resin content.
- 1 lb. of zinc oxide pigment.

The ingredients above enumerated are compounded on a rubber mixing roll and then cut to the desired consistency in a rubber solvent, based upon the necessary viscosity for spreading this material. Ordinarily, the solvent is calculated by the number of pounds of solid compound in one gallon of solvent such as, for instance, 8 pounds of solid or compounded material and 1 gallon of benzol, which is commonly referred to as an 8 pound cut. The variations in proportions of solvent added will depend upon the desired thickness of adhesive coating required in the residuum.

It will be understood that the examples above given are for purposes of getting the requisite adhesiveness in temperate climates. An increase in resinous material or wild rubber may be made for material to be used in colder climates and in warmer climates the resin component may be reduced.

The resinous component may also be varied in its reactions to solvents by choice of the resinous material. Thus, for purposes of removal of the adhesive from some body to which it may be applied, it may be made soluble to various organic solvents, either benzol, gasoline, acetone or alcohol. Thus, where it is desirable to make a surgeon's tape, which is soluble in alcohol, an alcohol soluble resin is added in the examples above cited. Such resin may be Burgundy pitch. This will permit alcohol to be used in removing a piece of adhesive tape from any surface, such as from the skin of a patient, by merely soaking the backing of the tape in alcohol. The rubber, in any event, merely acts as a vehicle for the resin and the character of the adhesive in its reaction to solvents will be dependent upon the character of the resin incorporated with the rubber.

* Adhesive Tape

Plasticized Crepe Rubber	10
Cumarone Resin	2
Zinc Oxide	1/2

Compound to a plastic mass on a rubber mill and then "cut" to desired body with benzol or naphtha. Before applying to cloth or paper the latter should have the reverse treated with a flexible glue (formalized) to prevent soaking thru and sticking. Then apply above mixture with a knife spreader evenly and allow to dry.

Tape, Coating for Adhesive

Heat 10 parts Castor Oil to 270° C. and to it add slowly with stirring 6 parts shellac and 1 part rosin. The addition of glycerol or glycols produces more sticky products.

Tape, Masking

As above except that 9 parts of shellac is used.

Adhesive, Tin

1. Pot. Hydroxide	5
2. Water	56
3. Rosin	50
4. Rezinel No. 2	5

Heat one and two to boiling and while stirring vigorously run in three and four which have been melted together: stir until uniform and add

Water	50
-------	----

* Adhesive, Vegetable

(a) Soya bean flour	30
Alum	1
Water	70
Caustic Soda 18%	13
{ Slaked Lime	4
{ Water	20
(b) Cottonseed flour	30
Alum	1
Water	70
Caustic Soda 18%	13
{ Slaked Lime	4
{ Water	20
(c) Low grade wheat flour	30
Portland Cement	10
Water	30
Caustic Soda 18%	30

Warm to 80° C. and add

Sod. Silicate	15
---------------	----

Adhesive Wax

Rosin	100
Paraffin Wax	10
Thin Mineral Oil	88

Sticky Wax

Rosin	100
Talc	16
Lanolin	60
Paraffin	8
Sapon. Wax	2

Melt together and while stirring rapidly add slowly a boiling caustic soda solution (10° Bé.) stir until uniform.

Adhesive for Wigs

Damar	20
Rosin	20
Beeswax	40
Venice Turpentine	20

Heat to 90° C. and stir until uniform; cast in sticks.

* Adhesive, Wood

Casein	23
Hydrated Lime	4
Pot. Chlorate	1.5
Sod. Fluoride	1.5
Soda Ash	1.9
Borax	4
Alum	1
Titanic Anhydride	1

This will not combine with tannins and oils present in wood.

* Adhesive, Wood Veneer

Pot. Dichromate	0.25-2.0%
Slaked Lime	1-1.5%
Tapioca or Cassava flour	balance

Mix with water for use.

Waterproof Adhesive for Wood

Light gasoline	0.5 gal.
Acetone	0.5 gal.
Soft cumarone	10.0 lb.
Pine oil	0.5 lb.
Tricresyl phosphate	0.25 lb.

Adhesive for Fixing Wood, Tin, etc. to Celluloid

Shellac	2 gm.
Spirits of Camphor	3 gm.
Alcohol	4 cc.

Warm together until dissolved.

* Adhesive, Water-Resistant

Peanut Meal	100 lb.
Hydrated Lime	16 lb.
Soda Ash	10 lb.
Sod. Silicate	30 lb.
Copper Sulfate	2 lb.
Water	400 lb.

The above is used in glueing wood.

Casein, "Dissolving"

3 to 4 parts of cold water by weight to each pound of dry Casein.

1 ounce 26° Ammonia to each pound of dry Casein.

If a heavy solution is required, use 3 to 1 proportion; if a thinner solution is desirable, use 4 to 1.

Pour water into a jacketed kettle, or a kettle heated by live steam, and add the Casein. Stir well to break down any lumps that may form and then add Ammonia. Stir the mixture after adding the Ammonia and immediately turn on the heat. Heat, while stirring, to about 160° F. Turn off the heat when this temperature is reached and continue to stir, preferably with a mechanical agitator, until the Casein is completely dissolved, which will take about half an hour.

If the temperature exceeds 160° during the heating, it is not serious, although it is advisable not to apply excessive heat, particularly when Ammonia is used, as there is a tendency to somewhat weaken the Casein and to darken it in color.

When the Casein is completely dissolved it may be diluted, if necessary, by the addition of warm water and used, as dissolved, either hot or cold, in the same manner as ordinary glue.

10 pounds Casein
1½ lb. Powdered Borax
40 to 60 pounds cold water

Stir cold for about 15 minutes or until the Casein commences to swell.

Then heat in a jacketed kettle for 40 to 60 minutes at a temperature not higher than 160° F. stirring constantly.

Ammonia 26° can be used in place of Borax.

To make a thin solution we suggest using equal parts of Ammonia 26° and Trisodium Phosphate or Borax and Trisodium Phosphate.

If a preservative is desired you can use about 2% of Benzoate of Soda or ¼ of 1% Carbolic Acid.

Note—do not dissolve Casein in a copper kettle as this tends to discolor the Casein particularly if the solvent is Ammonia.

Cork and Wood Flour, Binders for

A. Rosin	100
Dibutyl Phthallate	35
Sod. Silicate	4
Nitrocellulose	4
Castor Oil	2

B. Ester Gum	50
Cumarone Resin	50
Linseed Oil bodied	10
Dibutyl tartrate	35
C. Urea formaldehyde resin	50
Cumarone Resin	25
Rosin	25
Tricresyl phosphate	20
Dibutyl phthalate	20

* Binder, Oilproof and Waterproof

Lead Oxide	59.6
Iron Powder	2.0
Portland Cement	18.2
Slaked Lime	5.8
Glycerol	8.2
Water	6.2

This sets quickly and is resistant to shock.

* Cement, Acid Proof

SiO₂ powder ground from grains of good strength and of sufficient purity not to be attacked by acids is mixed with a hardening agent, *e.g.*, NaBF₄ or Na₂SiF₆, and a solution of Na silicate in which the SiO₂/Na₂O ratio is < 3.5:1. Graphite may be added as a lubricant.

Aquarium Cement

To 10 lbs. of glazier's putty add 1 lb. dry litharge, 1 lb. dry red lead, and 1 gill of asphaltum. Mix to a stiff consistency with boiled linseed oil and add sufficient lampblack to give a slate color.

Another well-known formula consists of 10 parts by bulk of plaster of Paris, 10 of fine sand, 10 of litharge, 1 part of powdered rosin, and sufficient boiled linseed oil to make a stiff putty. A third formula is as follows: Red lead 3 parts, litharge 7, fine sand 10, powdered rosin 1 part, and spar varnish sufficient to make a stiff cement.

In each case add the linseed oil or varnish little by little and mix the ingredients very thoroughly. If the putty should become too soft, merely add more of the dry materials as the exact proportions are not especially important.

Adhesive Cement (For Fine Furniture)

Casein (fine ground)	12 lb.
Lime (powdered, unslaked)	13 lb.
Mica (dry, ground)	15 lb.
Barium sulphate (barytes)	60 lb.

Mix all ingredients. Keep in dry container. To use, mix with water until pasty. Hardens in about 24 hours.

Bituminous Cement

A mixt. of asphalt 660, asbestos fiber 60, pulverized soapstone 100, infusorial earth 80 and sand 300 lb. is used with a softening agent formed from a mixt. of (a) asphalt 48.8 lb., "turpentine substitute" 2.9 gal. and coal oil 10.7 gal. and (b) paraffin wax 73.1, Al stearate 3.6 lb. and coal oil 9.7 gal. The product is suitable for sealing pipes and conduits.

* Cement, Dental

Zinc Oxyphosphate	3
Tin C. P.	1

* Glass Cement

Chlorinated Naphthalene	10 lb.
Ester Gum	10 lb.
Rubber Latex	1 lb.

Melt together and apply hot. This may also be used for uniting metals, wood, etc.

Cement, Safety Glass

Pyroxylin	12
Camphor	2
Ethyl Methyl Ketone	30
Alcohol	15
Gum Benzoin	2
Triacetin	5
Benzyl Alcohol	2.5

Waterproof Glass and Metal Cement

This cement will also stand fairly high temperatures.

Cement and litharge in equal parts are thoroughly mixed. Then glycerine in an amount equal in volume to half the volume of the mixed powder is added and the whole thoroughly mixed with a spatula. This cement will set under water.

To repair leaks in pipes, fill the hole with the cement and bind it in place with cheese cloth. Then daub a quantity of the cement on the cloth and wrap the whole tightly together with iron wire.

The powders may be mixed ready for use, but the glycerine must only be added as needed.

* Iron Cement

Ground birch charcoal	4
Am. Chloride	0.5
Rye flour	1
Soda Ash	1
Sod. Nitrate	0.25

Iron Cement (for castings)

Iron filings	128 lb.
Plaster of Paris	20 lb.
Whiting	8 lb.
Gum Arabic	8 lb.
Carbon Black	1 lb.
Portland Cement	4 lb.

Make into a paste with water directly before using.

Linoleum Cement

Clay	20
Red Oxide of Iron	20
Dextrin	60

The powders are thoroughly mixed and made into a paste of desired consistency with water.

* Cement, Linoleum and Tile

1. Sicapon	82
2. Paraffin	9
3. Glycerin	9

Heat 1 and 3 to 80° C. and add 2 which has been melted to it slowly with vigorous stirring until emulsified.

* Cement, Linoleum Backing

A satd. felt base is coated with an alkyd resin paint which may be made by heating together at 150-180° ethylene glycol 35, diethylene glycol 3.5-7.5, glycerol 8-13, phthalic anhydride 105 and drying oil acids 30 parts and dissolving the product in ethylene glycol monoethyl ether or similar low-boiling solvents.

* Cement, Oxychloride

Fused Calcium Chloride	111
Magnesium Sulfate	120
Calcined Magnesite	250
Casein	10
Water	204

* Cement, Pipe Thread

Graphite	55%
Sicapon	45%

To the above paste may be worked in amounts of oils or water to obtain a lubricating effect. This paste hardens under heat to seal joints effectively.

* Lute, Chlorine Resistant

Burnt Clay (finely ground)	65
Caustic Soda 40° Bé.	35

* Pipe Cement, Plastic

Asphalt	24-28
Tung Oil	4-8
Asbestos Fibres	40-48
Petroleum Naphtha	20-24

Rubber Cement (For Use on Leather Shoes)

Naphtha (62° Bé.)	9.8 pt.
Carbon Tetrachloride	5.4 lb.
Crepe Rubber	0.33 lb.

Makes 1 gal. cement on allowing to swell.

Raincoat Rubber Cement

Hevea Rubber	50
Litharge	20
Whiting	26.5
Rosin	2
Sulfur	1.5

Grind and mix thoroughly. Apply with heat and pressure.

* Cement, Rubber to Metal

Crepe Rubber	68 lb.
Benzol	6800 lb.
Bromine	40-80 lb.

Allow to stand and shake slowly until uniform.

Cement, Rubber Tire

Crude Rubber	2 lb.
Rosin	2 lb.
Carbon Bisulfide	1 gal.

* Cement for Repairing Shoes

Portland Cement	10 lb.
Rubber	10 lb.
Rosin	1.5 lb.
Shellac	2 lb.
Sole Leather Scrap	6 oz.
Benzine	1 qt.

* Pipe Joint Compound

The following compound contains no poisonous materials and may be prepared in dry form which will keep indefinitely. It forms perfectly leak proof joints when applied as a paste by mixing with water.

Flour	66
Portland Cement	25
Talc	3
Lamp Black	3
Sea Sand	3

* Filler, Expansion Joint

Cottonseed Oil	16
Rosin	4
Diglycol Oleate	1

Melt the above and add

Sulfur	8
Silica Dust	4

Continue heating and stirring until thick.

Floor Crack Finer

Plaster of Paris	32 lb.
Silica	200 lb.
Dextrine Yellow	33 lb.

Make into a stiff dough with water before use.

Glue

Blood albumin (90 per cent solubility)	100 parts
Water	170 parts
Ammonium hydroxide (specific gravity 0.90)	4 parts
Hydrated lime	3 parts
Water	10 parts

Pour the larger amount of water over the blood albumin and allow the mixture to stand undisturbed for an hour or two. Stir the soaked albumin until it is in solution and then add the ammonia while the mixture is being stirred slowly. Slow stirring is necessary to prevent foamy glue. Combine the smaller amount of water and the hydrated lime to form milk of lime. Add the milk of lime, and continue to agitate the mixture for a few minutes. Care should be exercised in the use of the lime, inasmuch as a small excess will cause the mixture to thicken and become a jellylike mass. The glue should be of moderate consistency when mixed and should remain suitable for use for several hours. The exact proportions of albumin and water may be varied as required to produce a glue of greater or less consistency or to suit an albumin of different solubility from that specified.

Blood albumin (90 per cent solubility)	100 parts
Water	140-200 parts
Ammonium hydroxide (specific gravity, 0.90)	5½ parts
Paraformaldehyde	15 parts

The blood albumin is covered with the water and the mixture is allowed to stand for an hour or two, then stirred slowly. The ammonium hydroxide is next added with more stirring. Then the paraformaldehyde is sifted in, and the mixture is stirred constantly at a fairly high speed. Paraformaldehyde should not be poured in so rapidly as to form lumps nor so slowly that the mixture will thicken and coagulate before the required amount has been added.

The mixture thickens considerably and usually reaches a consistency where stir-

ring is difficult or impossible. However, the thickened mass will become fluid again in a short time at ordinary temperatures and will return to a good working consistency in about an hour. It will remain in this condition for 6 or 8 hours, but when the liquid finally sets and dries, as in a glue joint, it forms a hard and insoluble film.

This glue may be used in either hot or cold presses. When cold pressed, however, it has only moderate strength, and for that reason is not to be depended upon in aircraft construction where maximum strength is required. If hot pressed, it is high in strength and very water resistant.

Flexible Bindery Glue

Glue No. 1	123 lb.
Glycerin	90 lb.
Water	123 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Extra Flexible Bindery Glue

Glue No. 2	75 lb.
Glue No. 3	75 lb.
Glycerin	64 lb.
Water	144 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Flexible Machine Bindery Glue

Glue No. 3	150 lb.
Glycerin	105 lb.
Water	135 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Regular Bindery Glue

Glue No. 1	175 lb.
Glycerin	10 lb.
Water	175 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Tablet Binding Glue

Glue No. 1	120 lb.
Glycerin	113 lb.
Water	113 lb.
Zinc Oxide	5 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Glue for Cellophane

17½ parts gum arabic
52½ parts water
30 parts Glycerine
.05 part Formaldehyde

*** Casein Glue, Water Resistant**

Casein	39
Peanut Meal	39
Hydrated Lime	11
Trisodium Phosphate	4
Sodium Fluoride	7
Water	225-235

Add the solids slowly to the water while stirring with an efficient stirrer. Continue until smooth and free from lumps. Allow to stand 20-30 minutes and add a mixture of aldol $\frac{1}{2}$, water 1, and 50% copper nitrate 2. Stir for 5 minutes when it is ready for use.

"Dissolving" Glue

In a 100 gal. steam jacketed kettle place 80 gal. water; to this add 100 lbs. glue and soak for one hour; turn on steam and cook glue until dissolved; do not heat above 110° F.

Cabinet Makers' Glue

Glue No. 2	87½ lb.
Glue No. 3	87½ lb.
Glycerin	10 lb.
Water	175 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

In the above formulae the glue is soaked in cold water over night and heated not over 150° F. and stirred until dissolved. The other ingredients are then dissolved in it and the liquid is then poured into molds where it sets on cooling.

Case Making Machine Glue

Glue No. 2	175 lb.
Glycerin	10 lb.
Water	175 lb.
Betanaphthol	½ lb.
Terpineol	½ lb.

Furniture Glue

Animal glue	10 lb.
Powd. white lead	2½ lb.
Powdered Chalk	5 oz.
Sodium salicylate	2 lb.
Wood alcohol	1¼ pt.
Water	19 lb.

Dissolve sodium salicylate in water. Dissolve animal glue in the same water. Mix lead and chalk; add to the sodium salicylate water and glue. Add wood alcohol to the batch.

Leather Sole Glue

Rosin	60
Crepe Rubber	40
Varnish	20
Digest on a water-bath and when dissolved cool and add	
Naphtha	30

*** Liquid Glue**

Sod. Chlorate	3.5 lb.
is stirred into a hot solution of	
Glue	10 lb.
Water	13 lb.

Liquid Glue

Borax	2
Water (Boiling)	4
Pot. Carbonate	1
Stir the above into	
Glue	16
Water (Boiling)	32

Masking Tape Glue

Glue (compatible with Calcium Chloride)	50
Water	35
Allow to swell for 3-4 hrs. Heat to 160° F. and then add while stirring	
Glycol Bori-Borate	8
Glycerin	7
followed by	
Calcium Chloride	0.35
Water	2
Care must be taken that temperature is kept below 170° C.	

*** Glue, Vegetable**

Soya Bean Flour	100 lb.
Slaked Lime	10-20 lb.
Caustic Soda	5 lb.
Water	100 or more lb.

Mucilage

To 30 gallons water add 75 lbs. gum arabic, clean sorts. Mix at 160° F. until completely dissolved; add 6 lbs. carbolic acid, 1 lb. oil of cloves. Strain and fill.

Envelope Mucilage

Gum arabic	1 part
Starch	1 part
Sugar	4 parts
Water, sufficient to produce the desired consistency.	

The gum arabic is first dissolved in water, the sugar added, then the starch, breaking up all lumps, after which the mixture is boiled for a few minutes in order to dissolve the starch, after which

it is thinned down to the desired consistency with more water.

Mounting Paste

White dextrine	1 lb.
Gum arabic	1 oz.
Water	1½ pt.
Acetic acid	1 oz.
Oil of wintergreen	20 drops
Oil of cinnamon	20 drops
Salicylic acid	20 gr.

The dextrine and the gum, which should be pulverized, are dissolved in the water, and then the salicylic acid added and dissolved. This liquid is heated with the dextrine, and when the whole has become pasty, which should require a quarter of an hour, the acetic acid is added, stirring in slowly. The heating is continued, taking care not to boil the mass. The paste will soon become pearly, and should then be removed from the fire and the perfume oils added while it is cooling. It should be stirred thoroughly while the oils are being added.

Mucilage, Stick Form

Powdered white glue	10 parts
Powdered gum arabic	2 parts
Sugar	5 parts
Water	Sufficient

Mix the glue and gum, then stir in enough cold water to make the solution the consistency of thick syrup. Soak overnight to allow the glue and gum to absorb the water, then add enough water to again bring it to a thick syrup. Pour into a flat bottom pan that has been chilled and cut into sticks of desired size when almost solid. If poured into molds the molds should first be well greased and then chilled by setting upon cracked ice.

The addition of 0.1% of Moldex in the water used will prevent spoilage.

Decorators' Paste

	Pints by Weight
Rye meal	4
Fine whiting	2
Casein	1
Powdered alum	½

Mix the above ingredients together and rub to a fine powder. Use 2 lb. of the mixture to one quart of water either hot or cold.

Flour Paste

Wheat Flour	4 lb.
Cold Water	2 qt.
Boiling Water	3 gal.

Make smooth paste of flour and cold water and then pour into boiling water. Stir and boil for 5 minutes.

Library Paste

1.

Tragacanth (powdered)	20
White Dextrin	10
Wheat Flour	60
Glycerin	10
Cold Water	40
Salicylic Acid	3
Boiling Water	400

Mix the tragacanth with 160 parts of boiling water, stir well and set aside. Mix the dextrin and the flour with the cold water, stir well and add to the tragacanth mucilage. Pour into the resulting mixture the rest of the boiling water stirring constantly. Rub up the salicylic acid with the glycerin, add to the mucilage and boil for 5 to 6 minutes with constant stirring.

2.

White Dextrin	6 oz.
Diluted Acetic Acid	1 oz.
Oil of Clove	10 drops
Glycerin	1 oz.
Water to make	16 fl.oz.

Make a paste of the dextrin with 6 ounces of cold water, add 8 ounces of boiling water, boil 5 minutes with constant stirring, then add enough hot water to make 14 fluid ounces. Let cool then add the other ingredients.

Library Paste

Flour	16
Gum Acacia	12
Gum Tragacanth	3
Salicylic Acid	0.5
Clove	0.6
Water	160

Use part of water to make a paste of flour. Heat another part of water with gums until dispersed. Mix these two well and other ingredients and bring to a boil while stirring.

Library Paste—Photo Mounting

White Potato Dextrine	15 lb.
Water	15 lb.
Glycerin	1 lb. 15 oz.
Formaldehyde	2½ oz.
Oil of Sassafras	2½ oz.

White Library Paste

To 30 gallons cold water, add 75 lbs. white potato dextrine. Break up all lumps then heat to 180° F. Add 6 lbs. carbolic acid and 1 lb. oil of wintergreen. Strain and fill into jars while hot. Allow to stand for three days.

Starch Paste

The strength of starch paste is increased by the addition of a small quantity of ammonium hydroxide. Paste may be rendered flexible by the addition of glycerine. The following formula produces satisfactory results:

100 grams	Water
4 grams	Ammonium Hydroxide
8 grams	Paste Starch
1 gram	Glycerine

Starch Paste

Corn or Tapioca Starch	4
Cold Water	8
Boiling Water	64

Make a paste of starch and cold water then pour into boiling water and stir until translucent.

Putty

Whiting	800
Corn Oil	20
Crude Cottonseed Oil	10
Thin Mineral Oil	69
Sod Oil	3

Elastic Putty

Turpentine	5
Rosin Oil	8
Linseed Oil and drier	5.5
Barytes	8.5
Whiting	73.0

Non-Shrinking Putty

White Lead	150 lb.
Raw Linseed Oil	16 gal.
Whiting	505 lb.
Silica	41 lb.
Flour Paste	41 lb.

Whiting Putty

Whiting	800 lb.
Raw Linseed Oil	23 gal.

White Lead-Whiting Putty

Whiting	700 lb.
White Lead	100 lb.
Raw Linseed Oil	22 gal.

Metal Cap Seal

Rubber Factice	20
Gutta Percha	20
Asbestos Flour	60
Dark Red Iron Oxide	1.5

* Plastic Seal for Glass Jars

This composition withstands action of oils and fats.

Glue Edible	75
Casein	173
Talc	75
Titanium Dioxide	75
Diethylene Glycol	400
Paraformaldehyde	10
Am. Hydroxide	18
Water	900

Sealing Wax

Shellac (Button)	14
Rosin	24
Vermillion	1¼
Barytes	14
French White	4
Turpentine	1

Melt shellac and rosin; keep hot and work in pigment and finally the turpentine. Cast in sticks.

Sealing Wax

Shellac	84
Venice Turpentine	60
Rosin	21

Sealing Wax

Limed Rosin	3
Tallow	6
Turpentine	3
Precipitated Chalk	4
Red Lead	4

Sealing Wax—Red

Orange Shellac	39 lb.
Rosin	73 lb.
Turpentine	14 lb.
Whiting	56 lb.
Silix	35 lb.
Pale Vermillion	5¼ lb.

Sealing Wax—Brown—Cheap

Orange Shellac	26 lb.
Rosin—H grade	83 lb.
Turpentine	7¼ lb.
Whiting	32 lb.
Silix	31 lb.
Burnt Umber	4 lb.

Hard Wax Stopping for Filling Screw Holes in Wood

Carnauba wax	16 lb.
Paraffin wax	8 lb.
Rosin	8 lb.
Asphaltum	1 lb.

Melt the above together and apply hot.

Cellophane Glue

Animal Glue	40%
Water	40%
Aquaresin	20%

Use grade of glue common to paper box work; soak glue in cool water for around one hour, melt in water bath at 140° F. and stir in Aquaresin. Add sufficient water to produce the proper working consistency at 130–140° F.

Liquid Glue

Animal Glue	46.7%
Water	46.7%
Sodium Nitrate	6.6%

Dissolve sodium nitrate in cool water, stir glue into solution, allow to soak two hours, melt in water bath at temperature between 140–160° F. Heat a couple of hours or until mixture remains fluid at room temperature. Glue may be preserved by adding phenol or other common preservative.

Glue—Starch Paste

Starch (Cassava)	30%
Glue (Bone Glue)	10%
Water	60%

The starch and glue are put into solution separately and mixed hot. Any additional water necessary to produce the desired consistency is incorporated later.

Flexible Bookbinding Glue

Animal Glue	30%
Water	29%
Glycerine	30%
Preservative	1%

Soak the glue (medium grade hide) in the cool water for two hours, and melt at a temperature of 140° F. Stir the glycerine into the glue after the 140° F. temperature has been reached. In the event the glue is kept for a period of time, some effective preservative should be incorporated.

Flexible Paper Box Glue

Animal Glue	45%
Glycerine	15%
Water	39%
Preservative	1%

Soak the animal glue (bone glue suitable for paper box work) in cool water for approximately two hours and melt at 140° F. Stir the glycerine into the glue solution after the temperature has reached 140° F. If the glue is kept for a period of time, some effective preservative should be added.

Cement

Celluloid	32 oz.
Acetone	128 oz. or 1 gal.
Amyl Acetate	16 oz. or 1 pint
Methanol	16 oz. or 1 pint

Mix all the ingredients in a jar and allow to stand until dissolved—shaking from time to time.

Clean surface well before applying then apply a thin coating; first allow to dry then apply another coat and cement articles.

Adhesives for Hard Rubber

1. Carefully melt together 1 part gutta percha and 2 parts coal tar pitch. Immediately apply the fluid, homogeneous hot mass to the parts to be joined, these first having been degreased. Allow the repair to cool under pressure.

2. Broken hard rubber can be repaired by applying to the 2 surfaces to be joined, concentrated silicate of potassium and subjecting them to strong pressure.

3. Marine glue is made of 10 parts rubber dissolved in 120 parts benzol or turpentine. Add 20 parts asphalt or 18 parts gum lac and allow to digest until the mass is homogeneous. The solid glue, when it is to be used, is liquefied by careful heating; while the surfaces to be joined are first heated.

4. Melt together equal parts of pitch and gutta percha. Apply hot.

5. Dissolve 20 parts of rubber in 160 parts benzol or naphtha and mix with a solution of 20 parts gum lac and 50 parts mastic in the smallest possible amount of 90% alcohol.

When the surfaces to be adhered are smooth, it is always necessary to roughen them first by filing them lightly.

Oilproof Joint Cement

For use in connections of rubber and metal pipes carrying gasoline, oils, greases, etc.

A. Aquarestin GM	25
Lampblack	5-15

B. Graphite	10
Sicapon	20-40

Silicate Adhesive

Sod. Silicate	40
Water	10
Tescol	10

The water is mixed with the silicate and the Tescol is added a little at a time with good stirring. Do not add further quantities of Tescol until the previous portion is dissolved. This adhesive is less alkaline and not as brittle as most silicate adhesives. Further flexibility can be gotten by adding some glycerin to the Tescol.

Handling of Glue

Special precaution should be used in all cases to insure a soaking of the glue in the required amount of cold water for at least 4 hours. In order to effect solution of glue the temperature should be increased to about 160° F. Prolonged heating and excessive heating should be avoided, because this has been shown to result in extensive loss due to the hydrolyzing action of the water. In applying the heat, the most advantageous method is to apply heat (*e.g.*, steam or electricity) to a water jacket in which glue container is placed.

To employ glue such that the greatest benefit may be derived from its physical and chemical characteristics, the surface should be made so warm that the melted glue will not be chilled before it has time to effect a thorough adhesion.

For high class joint work only the better grades of hide glue should be employed.

For Veneer work the medium grades are indicated. In this case a high viscosity is desirable on account of the tendency of a thin liquid to penetrate the pores of the thin sheet of wood and show itself on the opposite surface.

Chipped Glass

Glue and Gelatine are allowed to rapidly dry out upon a plate of glass. As the glue loses moisture it contracts and adhesion of the gelatine is so great that it tears away the surface of the glass itself, chipping it into characteristic fern-like patterns. The general appearance of the design can be modified by varying the properties of the solution

used, *i.e.*, addition of 6% alum and other salts. A brittle glue will give a different pattern than a tough glue. Sand sprinkled over film of gelatine is also employed to make certain patterns.

Sizing of Paper

Glue is used to serve for two distinct purposes in the manufacture of wall paper. It is employed as a binder for the clay, or other material with which the papers are grounded, and also as a sizing agent for the ground colors, especially for sun-fast wall paper.

The most general practice is to precipitate the color directly on an insoluble base as finely divided BaSO₄, draw off the precipitated mass after setting, wash, to free it of excess precipitant or reagent, and then separate from the excess of water by running it through a centrifugal hydroextractor. This heavy insoluble base (pulp color) is easily incorporated with glue solution in preparation of sized material.

In preparation of some pulp colors, a number of chemicals are employed in order that the exact shade of color desired may be produced. The viscosity of reagents employed and frequent failure to wash out completely the excess of precipitant or reagent has indicated the use of a good hide or bone glue.

In ordinary sized papers the glue is applied in one of two ways. The glue is either put into the beater with the paper pulp previous to making, or, the paper is run through a dilute bath of glue before drying. There is seldom anything used with the glue except at times a little alum to give paper a somewhat harder finish.

Coated paper is made by applying a mixture of high grade animal glue and various pigments or fillers, about the consistency of cream, to the paper after it has been finished. High gloss papers are of this type.

Sizing of Textiles

For this service hide glue finds extensive use because of absence of the most objectionable impurity SO₂ or sulphites. As the colors employed for dyeing fabrics are much more delicate than those used in paper and are usually soluble, the absence of traces of mineral acids or alkalies is also indicated.

Hide or extracted bone glue is used on cotton goods to stiffen and give body to the material. If solution of this glue is too thin it will penetrate the pores of cotton fibre to such a degree that the

latter will be altogether too stiff to use, while if it is too viscous it will not be absorbed at all and will fail to dry out during passage through drying chamber. The desired results are obtained when a very dilute solution of this glue is treated with a solution of alum. The alum thickens the solution and is satisfactory because no precipitation will result.

Carpets, tapestries, burlap wall covering are all heavily sized with this grade of glue.

In the case of shade cloth where firmness with flexibility is desired—strong high grade glue is used.

All straws used in the manufacture of hats are sized. In this case a product that is more or less resistant to the action of water and also light in weight is desired. A final bleaching is given the material, by the use of oxalic acid, or lead acetate. Many manufacturers bleach their glue before sizing.

Adhesive Paste

Steep 4 oz. of ordinary gelatine in 16 oz. H₂O until it becomes soft, dissolve and while hot add 2 lb. of good flour paste and one part H₂O. Heat to boiling and when thickened remove from fire. While cooling add $\frac{3}{4}$ oz. silicate of soda and stir with wooden spatula.

Pastes for Paper and Fine Fancy Articles

Dissolve 100 parts glue in 200 water and add a solution 2 parts of bleached shellac in 10 of alcohol. Stir constantly while adding. Keep temperature below 50° C.

Paste for Fixing Labels (Machines)

Make 10% solution of glue and add to this 25% by weight of glue or dextrin. Mix while warm and add to every pound thereof $\frac{1}{2}$ oz. each of boiled linseed oil and turpentine. This paste resists dampness and thus prevents printed labels from falling from metallic surfaces.

Paste for Joining Leather to Pasteboard

Dissolve 50 parts of glue with 50 parts water, add 1% Venice turpentine and next a thick paste made with 100 parts starch in water.

Cement for Attaching Metal Letters to Glass, Marble, Wood

Dissolve over a water bath 5 parts glue in a mixture of 15 parts copal varnish, 5 parts boiled linseed oil, 3 parts crude

oil of turpentine and 2 parts of refined oil of turpentine and add 10 parts slaked lime to mixture.

Strong Paste

Glue	4 parts
Water	80 parts
in one pot	
Starch	30 parts
Water	20 parts

so that a thin milky fluid without lumps is obtained. Mix two while hot and after cooling add 5–10 drops phenol.

Venetian Paste

Fish Glue	4 oz.
Cold Water	$\frac{1}{2}$ pt.
Venice Turpentine	2 fl. oz.
Rye Flour	1 lb.
Water	1 pt.
Boiling Water	2 qt.

Soak and dissolve glue and while hot stir in Venice turpentine. Make up rye flour and pour into boiling water. Stir and add glue solution. Will adhere to painted surface.

Label Paste

Soak glue in 15% Acetic Acid solution and heat to boiling and add flour.

Mucilage

Soak 5 parts of good glue in 20 parts of water and to liquid, add 9 parts glucose and three parts gum Arabic. Mixture may be brushed on paper while lukewarm. It does not stick together but adheres to bottles.

Glue for Cementing Glass

(To be exposed to boiling water)

Five parts hide glue, one part dissolved acid chromate of lime; the glue prepared, becomes, after exposed to light, insoluble in water in consequence of a partial reduction of chromic acid.

Leather to Metal Glue

Digest a quantity of nutgalls (approx. 1 part) reduced to powder in 8 parts distilled water for 6 hours and filter. If tannic acid is available use 5% solution instead. Dissolve 1 part by weight of glue in same quantity of water. Leather moistened with decoction of nutgalls or acid solution, and glue applied to metal previously roughened and heated. Dry under pressure.

Sausage Casing Glue

Glue for making sausage casings: Add to 1 quart of hide glue 20% solution, $\frac{3}{4}$ to 1 oz. bichromate of potash. Warm slightly when about to use it and before application moisten paper, latter must be dried rapidly and then exposed to light until yellow glue becomes brownish, boiled in sufficient quantity of water to which 2 to 3% alum added until chromate is dissolved out.

Wood Coating Glue

A sprayable coating composition suitable for use on wood, cloth, paper, etc., comprises a non-jellying stable solution of substantially 29 parts glue free from foreign substances of acid reaction in a solvent comprising alcohol about 33 parts and water about 35 parts and about 0.1 weight of the glue of a glue plasticizing substance such as glycerol or turkey red oil.

Glue for Hectograph

One part glue, 1 part glycerine and smallest amount of H_2O possible is used as hectograph mass for the transfer of matter, when with concentrated solution of aniline color.

Liquid Glue

Glue liquid is prepared by treating a hot solution of animal glue with a soluble perchlorate not having a tanning action. Sodium perchlorate 3.5 parts may be stirred into a hot solution of glue 10 parts in water 13 parts.

Glue liquid is prepared by treating animal glue with chloric acid. Animal glue 10 parts, dissolved in water 15 parts, may be stirred with 20% chloric acid 3 parts.

Glue for Joints in Leather Driving Belts

Soak 1 part domestic isinglass and 25 parts glue in 75 parts water until thoroughly soft. Heat until solution has been effected. Add 0.2% Beta Naphthol and 0.1% Venice Turpentine C.P. Surfaces to be cemented should be free from grease, slightly roughened and glue applied at a temperature of 150° F.

Jeweler's Cement

Dissolve over the water bath 25 parts of fish glue in a small quantity of alcohol-water mixture 40%, add 2 parts of gum ammoniac. Separately dissolve 1

part of mastic gum in 5 parts alcohol-water solution. Mix the two solutions and keep in well stoppered bottles.

Stratena—Household Cement

Dissolve 12 parts of white glue in 16 acetic acid, and then add this solution to 2 parts gelatine in 16 of water. After mixing add 2 parts shellac varnish.

Banknote or Mouth Glue

Dissolve gelatine with about $\frac{1}{4}$ to $\frac{1}{6}$ of its weight of brown sugar in as small a quantity of water as possible. When liquid cast mixture in thin cakes and when cold cut to size. When required for use moisten one end.

Paste for Cardboard

Dissolve 14 oz. of high grade glue in 26 oz. H_2O . Add 1 oz. of a solution composed of 1 part shellac in 7 parts alcohol and stir as long as solution is warm. Next dissolve $\frac{1}{2}$ oz. of dextrine in 7 oz. of alcohol and $3\frac{1}{2}$ oz. of H_2O , stir and place vessel in warm water until solution is complete. Mix two solutions and allow to cool. When wanted for use cut off a small piece and liquefy by warming.

Paste for Pads

Glue 4 parts, glycerine 2, linseed oil $\frac{1}{2}$, sugar 4, dye to color. Dissolve glue and add glycerine with sugar and then add dye and stir in the oil. Use paste hot.

Waterproof Glue

Solution of glue by itself or mixed with pigments is used in painting walls in distemper. A waterproof coating is obtained as follows: Boil part of powdered gall-nuts and 12 parts H_2O until mass is reduced $\frac{2}{3}$ of its bulk. Strain through cloth and apply solution to dry coat of distemper paint, the latter becoming thereby as solid and insoluble as oil paint. The tannin of gall-nuts acting only upon soft glue, the solution has to be applied so that the lower layer of the glue becomes thoroughly soaked through.

Waterproof Wrapping Paper

Dissolve 24 alum, 4 white soap in 32 water in one pot. In another 2 gum arabic, 6 glue in 32 parts water. Mix 2 solutions. Heat and immerse paper, dry.

TRADE NAME LISTINGS

A		Butalyde	22
A-Syrup	59	Butanol	22
Abalyn	35	Butyl Carbitol	13
Accelerator 808	25	Bromo "Acid"	60
Accelerator 833	25	C	
Acid Black 10 BX.....	60	Cadalyte	61
Adheso Wax	30	Calgon	12
Agerite Gel	79	Calo-Clor	44
Akacene O	3	Calorite	28
Alizarine Blue A. S.....	60	Captax	79
Alftalate No. 222 A.....	65	Carbanthrene	49
Alba Floe	77	Carbex	2
Aloxite	14	Carbitol	13
Altax	79	Carbon Black P-33.....	79
Amberol	62	Carbonex	8
Ammonium Palmolate	30	Carboraffin	2
Anhydron	7	Carborundum	14
Ansol	78	Carboxide	13
Antidolorin	27	CCH	45
Anti-Storch T	25	Celite	39
Aquaresin	30	Cellosolve	13
Aquasol	3	Cellosolve Acetate	13-27
Asbestine	38	Centsteric	16
Astringent Powder No. 1.....	30	Ceraflux	30
Aurasol	6	Cerelose	21
Auromine O	60	Cetamin	30
Avirol	25	Chlorasol	13
Azo Oil Yellow 408.....	60	Chlorex	13
Azo Orange 30.....	60	Chloro Green S.....	60
Azo Rubine	60	Chloro Green S-310.....	60
B		Chrysophinine C Yellow.....	60
Bakelite XR-254	5	Clarex	37
Bardex	8	Cliff Char	20
Bardol	8	Cloth Red	60
Barretan	8	Clovel	30
Base No. 214.....	3	Creolol	40
Beckacite Resins	10	Croceine Scarlet 3 Bx.....	60
Beckolac 1308	10	Crysalba	74
Beutene	51	Cumar	8
Black Walnut Flavor.....	66	Curbay Binder	78
Blandol	69	Cutrilin	3
Blendene	30	Cyanegg	61
Borden's Lemon Powder.....	11	Cyanobrite	61
Borden's Orange Powder.....	11	Cyanogran	61
Bordo	24	Cyanogas A	3
Boroscap	54	Cycline Oil Softener.....	64
B. R. C. Mineral Rubber.....	8	Cycline	47
		Cymanol	37

D		Glyco Wax	30
Dark Red BA Dye.....	60	Glyptal	28
Darco	23	Guantal	64
Decalin	25	H	
Decalso	57	Halazone	47
Deramin	30	Harshaw's No. 42 Cobalt.....	34
Deo-Base	69	Hexalin	47
Diafilt	37	HTH	45
Diatol	78	Hyacelyne	25
Difil	37	Hydristear	81
Dipentene No. 122.....	35	Hydromalin	30
Dipolymer	35	Hydroresin	30
Direct Black E.....	60	Hydrotan	32
Direct Brown	60	Hydrowax	30
Direct Fast Yellow NN.....	60	I	
Direct Pink E.....	60	Imperial Ester Gum.....	43
Direct Sky Blue 5B.....	60	Indusoil	37
Direct Violet N.....	60	Iodeikon	44
Dixie Clay	79	Ischol	30
Doh-Tone	55	Isolene	50
Dowco	24	Isopropanol	13
Dowflake	24	Ivo Bone Black.....	9
Dowicide B	24	K	
Dowmetal	24	Kalite No. 1.....	79
Dowtherm	24	Kallogg KUO	70
Duclean	32	Kolineum	40
Du Pont Antox.....	25	Konate	3
Durez Resin No. 500.....	29	Krone Flake	34
Dutox	32	Koreon	48
E		L	
Emulsone B	30	Lactol Spirits A.....	18
Erio Flavine	60	Leukonin	34
Ervol	69	Lewisol	43
Estersol	78	Lignin Liquor	63
Ethavan	47	Lindol	15
F		Lissamine Fast Yellow.....	60
Ferrite Black	3	Lotol	51
Filter-Cel	39	Lupogum	82
Flectol	47	Lysol	42
Flexoresins	30	M	
Fluf	68	Mallophene	44
Fluxol	47	Manganar	32
Fuma	7	Mapico Brown	9
G		Medium Process Oil.....	73
Galagum C	30	Merclor	47
Gardinol	25	Methyl Cellosolve	13
Gelowax	30	Metso	34
Glycomine	30	Miscibol	30
Glycopon AA	30	Moldex	30
Glycopon AAA	30	Moldol	58
Glycopon S	30	Monex	51
Glycopon XS	30	Monopole Soap	82
Glycosterin	30		

N			
Narobin	30	Pylam Purple	60
National Bismarck Brown Y Extra..	49	Pylam Red	60
National Buffalo Black NBR.....	49	Pylam Orange	60
National Methylene Blue 2B.....	49	Pylam Spirit Black.....	60
National Phosphine BN.....	49	Pylam Spirit Orange.....	60
National Resorcine Brown B.....	49	Pylam Scarlet No. 1323.....	60
National Safranine A.....	49	Pylam Water Maroon.....	60
National Wool Orange A Conr.....	49	Pylam Yellow	60
Nelgin	30	Pylam Yellow S.....	60
Neomerpin	25	Pylam Yellow S-318.....	60
Neozone A	25	Pylam Violet S-333.....	60
Neville Hard Resin.....	52		
Nevindene	52	Q	
Nipagin M	31	Quakersol	56
Nuchar	37		
Nuodex Cobalt	53	R	
		Resin C	8
O		Resinox	22
Opal Wax	25	Rezinels	30
Orthene	47	Rhodamine B Ex.....	60
Orzol	69	Rhodamine Bx	60
Oxone	61	Rhodine	25
Oxynone	47	Rhodol	25
		Rodo No. 10.....	79
P		Roscap	30
Parachol	30	Rozolin	30
Paracide	36	Rubber Orange 2R.....	25
Paradi	36		
Paradow	24	S	
Parafux	33	Salamac	32
Paraplex	62	Sapinone	30
Parasterin	30	Schultz Silica	17
Paris Paste	9	Sheragum	30
Pearl Essence	46	Sicapon	30
Peerless Carbon Black.....	9	Silex	74
Pentacetate	67	Solcastol	3
Pentalarm	67	Solcornol	3
Pentaphen	67	Soljgen Driers	1
Pentasol	67	Solozone	61
Perchloron	55	Solvent No. 75.....	36
Permosalt	30	Solway Green	60
Petrohol	71	Special Oil A.....	3
Pipsol	47	Stearoricinol	30
Plastogen	79	Stripper T. S.....	4
Pyla-White	60	Sulforon	32
Pylakrome Black 319.....	60	Sulfonol	69
Pylakrome Green 430.....	60	Sulfo Turk A.....	30
Pylakrome Green LX 799.....	60	Sono-Jell	69
Pylakrome Oil Green No. 1119.....	60	Super Spectra Black.....	9
Pylakrome Red No. 420.....	60	Synthe-Copal	10
Pylam Amber S-271.....	60	Suspendite	30
Pylam Basic Black.....	60	Santamine	47
Pylam Black	60	Santicizers	47
Pylam Brilliant Gelo Red.....	60	Santochlor	47
Pylam Brilliant Green.....	60	Santolite	47
Pylam Ebony Black.....	60	Santotan	47

T		V	
Tanak	3	Vandex	79
Tecsol	26	Varnolene	72
Teglac	3	Vaseline	19
Tetralin	25	Vaso	80
Texavac	3	Vinylite Resins	13
Thinnex	25	Violamine 2R	60
Thionex	25	Viscogum	30
Thylox	40		
Ti-Tone	41	W	
Titanox B	75	Wetting Oil SF.....	3
Triclene	25		
Trikalin	30	Y	
Tripoli	74	Yarmor Pine Oil.....	35
Trogeen	30		
Tuads	79	Z	
Turpenol	3	Zerone	25
		Zimate	79
		Zyklon B	3
U			
Urazine	25		
Ureka C	64		
Uversol	34		

SUPPLIERS OF "TRADE NAME" CHEMICALS

1	Advance Solvents & Chemical Corp.....	New York City
2	American Active Carbon Corp.....	Columbus, Ohio
3	American Cyanamid & Chemical Corp.....	New York City
4	Arkansas Co.	New York City
5	Bakelite Corp.	New York City
6	Baker & Co., Inc.....	Newark, N. J.
7	Baker, J. T. Chem. Co.....	New York City
8	Barrett Co.	New York City
9	Binney & Smith.....	New York City
10	Beck, Koller & Co.....	Detroit, Mich.
11	Borden Co.	New York City
12	Buromin Corp.	Pittsburgh, Pa.
13	Carbide & Carbons Chem. Corp.....	New York City
14	Carborundum Co.	Niagara Falls, N. Y.
15	Celluloid Corp.	Newark, N. J.
16	Century Stearic Acid & Candle Works Co.....	New York City
17	Chaplin & Bibbo.....	New York City
18	Chemical Solvents Corp.....	New York City
19	Chesebrough Mfg. Co.....	New York City
20	Cleveland Cliffs Iron Co.....	Cleveland, Ohio
21	Corn Products Refining Co.....	New York City
22	Commercial Solvents Corp.....	Terre Haute, Ind.
23	Darco Sales Corp.....	New York City
24	Dow Chemical Co.....	Midland, Mich.
25	Du Pont de Nemours, E. I. & Co.....	Wilmington, Del.
26	Eastman Kodak Co.....	Rochester, N. Y.
27	Franco-American Chemical Works Corp.....	Carlstadt, N. J.
28	General Electric Co.....	Bridgeport, Conn.
29	General Plastics Inc.....	N. Tonawanda, N. Y.
30	Glyco Products Co., Inc.....	Brooklyn, N. Y.
31	Goldschmidt, Th. Corp.....	New York City
32	Grasselli Chemical Co.....	Cleveland, Ohio
33	Hall, C. D. Co.....	Akron, Ohio
34	Harshaw Chemical Co.....	New York City
35	Hercules Powder Co.....	Wilmington, Del.
36	Hooker Electrochemical Co.....	New York City
37	Industrial Chemical Sales Co.....	New York City
38	International Pulp Co.....	New York City
39	Johns Manville Corp.....	New York City
40	Koppers Products Co.....	Pittsburgh, Pa.
41	Krebs Pigment & Chemical Co.....	New York City
42	Lehn & Fink.....	New York City
43	Lewis, John D.....	Providence, R. I.
44	Mallinckrodt Chemical Works.....	New York City
45	Mathieson Alkali Co.....	New York City
46	Mearl Corp.	New York City
47	Monsanto Chemical Wks.....	New York City
48	Mutual Chemical Co. of America.....	New York City

49	National Aniline and Chemical Co.....	Buffalo, N. Y.
50	National Rosin Oil & Size Co.....	New York City
51	Naugatuck Chemical Co.....	New York City
52	Neville Chemical Co.....	Pittsburgh, Pa.
53	Nuodex Products Co.....	Newark, N. J.
54	Pacific Coast Borax Co.....	New York City
55	Penn Salt Mfg. Co.....	Philadelphia, Pa.
56	Penn. Sugar Co.....	New York City
57	Permutit Co.	New York City
58	Pfaltz & Bauer.....	New York City
59	Philadelphia Quartz Co.....	Phila., Pa.
60	Pylam Products Co.....	New York City
61	R & H Chemical Co.....	New York City
62	Resinous Products & Chemical Co.....	Phila., Pa.
63	Robeson Process Co.....	New York City
64	Rubber Service Labs. Co.....	Nitro, W. Va.
65	Scott-Bader & Co.....	London, England
66	Seeley & Co.....	New York City
67	Sharpless Solvents Corp.....	Phila., Pa.
68	Solvay Sales Corp.....	New York City
69	L. Sonneborn Sons, Inc.....	New York City
70	Spencer, Kellogg Co.....	New York City
71	Stanco, Inc.	New York City
72	Standard Oil Co. of New York.....	New York City
73	Sun Oil Co.....	New York City
74	Swann Chemical Co.....	New York City
75	Titanium Pigment Co.....	New York City
76	Takamine Labs.	Clifton, N. J.
77	U. S. Gypsum Co.....	Chicago, Ill.
78	U. S. Industrial Chem. Co.....	New York City
79	Vanderbilt, R. T. Co.....	New York City
80	Virginia Smelting Co.....	W. Norfolk, Va.
81	Will & Baumer Candle Co.....	New York City
82	Wolf, Jacques Co.....	Passaic, N. J.

