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APPLIED CHEMISTRY: METHODS AND FORMULAS FOR EVERYDAY PRACTICAL USE

HENLEY'S FORMULAS, RECIPES AND PROCESSES

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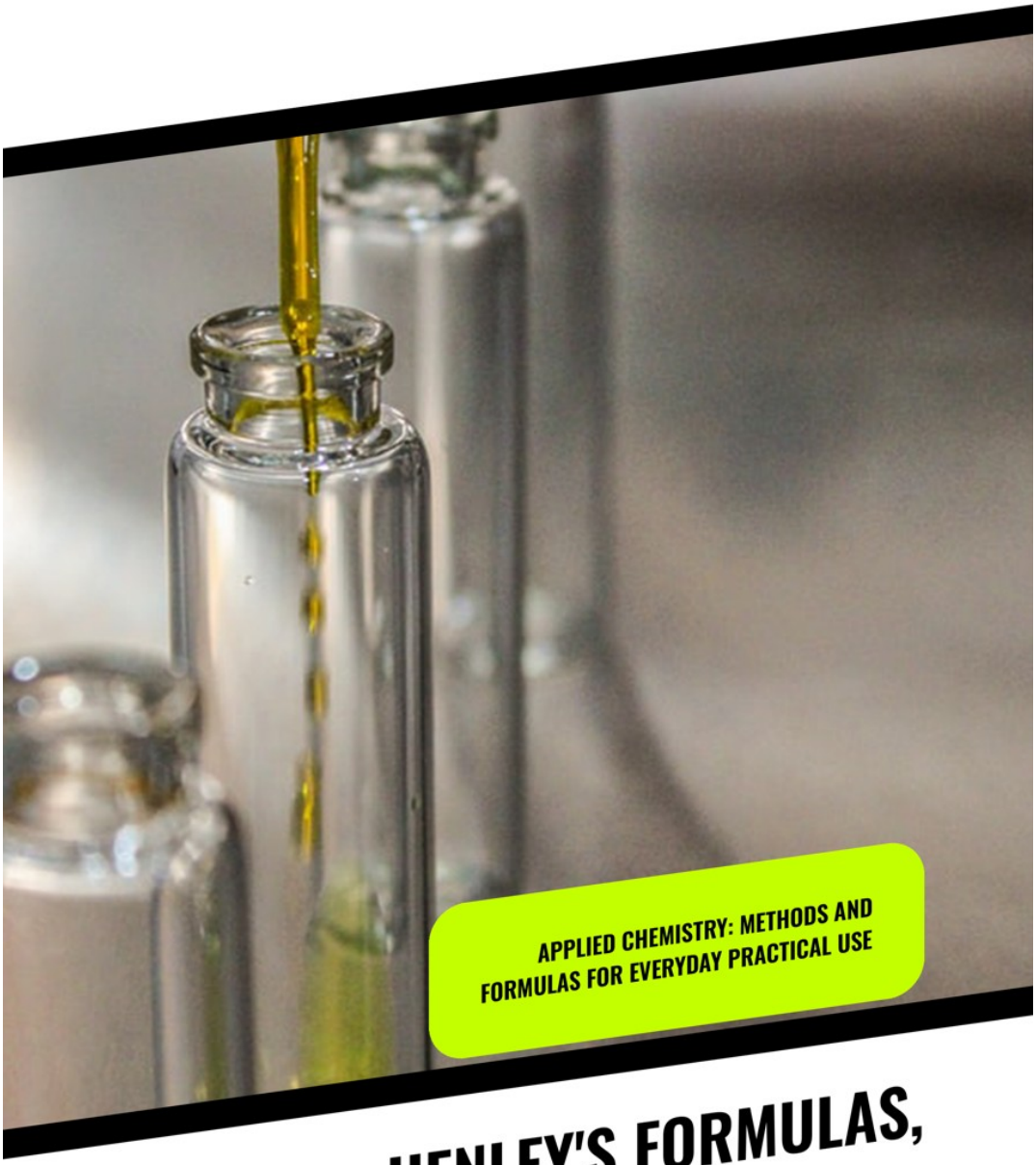

APPLIED CHEMISTRY: METHODS AND FORMULAS FOR EVERYDAY PRACTICAL USE

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Henley's Formulas, Recipes and Processes

Applied Chemistry: Methods and Formulas for Everyday Practical Use

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PREFACE

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In compiling this book of formulas, recipes and processes, the Editor has endeavored to meet the practical requirements of the home and workshop—the mechanic, the manufacturer, the artisan, the housewife, and the general home worker.

In addition to exercising the utmost care in selecting his materials from competent sources, the Editor has also modified formulas which were obviously ill adapted for his needs, but were valuable if altered. Processes of questionable merit he has discarded. By adhering to this plan the Editor trusts that he has succeeded in preparing a repository of useful knowledge representing the experience of experts in every branch of practical achievement. Much of the matter has been specially translated for this work from foreign technological periodicals and books. In this way the Editor has embodied much practical information otherwise inaccessible to most English-speaking people.

Each recipe is to be regarded as a basis of experiment, to be modified to suit the particular purpose in hand, or the peculiar conditions which may affect the experimenter. Chemicals are not always of uniform relative purity and strength; heat or cold may markedly influence the result obtained, and lack of skill in the handling of utensils and instruments may sometimes cause failure. Inasmuch as a particular formula may not always be applicable, the Editor has thought it advisable to give as many recipes as his

space would allow under each heading. In some instances a series of formulas is given which apparently differ but slightly in their ingredients. This has been done on the principle that one or more may be chosen for the purpose in hand.

Recognizing the fact that works of a similar character are not unknown, the Editor has endeavored to present in these pages the most modern methods and formulas. Naturally, old recipes and so-called trade secrets which have proven their value by long use are also included, particularly where no noteworthy advance has been made; but the primary aim has been to modernize and bring the entire work up to the present date.

THE EDITOR.

J**ANUARY,** 1914.

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ABSINTHE: See Wines and Liquors.

ACID-PROOFING

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An Acid-proof Table Top.—

1.

Copper sulphate	1 part
Potassium chlorate	1 part
Water	8 parts

Boil until salts are dissolved.

2.

Aniline hydrochlorate	3 parts
Water	20 parts

Or, if more readily procurable:

Aniline	6 parts
Hydrochloric acid	9 parts
Water	50 parts

By the use of a brush two coats of solution No. 1 are applied while hot; the second coat as soon as the first is dry. Then two coats of solution No. 2, and the wood allowed to dry thoroughly. Later, a coat of raw linseed oil is to be applied, using a cloth instead of a brush, in order to get a thinner coat of the oil.

A writer in the *Journal of Applied Microscopy* states that he has used this method upon some old laboratory tables which had been finished in the usual way, the wood having been filled oiled, and varnished. After scraping off the varnish down to the wood, the solutions were applied, and the result was very satisfactory.

After some experimentations the formula was modified without materially affecting the cost, and apparently increasing the resistance of the wood to the action of strong acids and alkalies. The modified formula follows:

1.

Iron sulphate	4 parts
Copper sulphate	4 parts
Potassium permanganate	8 parts
Water, q. s.	100 parts

2.

Aniline	12 parts
Hydrochloric acid	18 parts
Water, q. s.	100 parts

Or:

Aniline hydrochlorate	15 parts
Water, q. s.	100 parts

Solution No. 2 has not been changed, except to arrange the parts per hundred.

The method of application is the same, except that after solution No. 1 has dried the excess of the solution which has dried upon the surface of the wood is thoroughly rubbed off before the application of solution No. 2. The black color does not appear at once, but usually requires a few hours before becoming ebony black. The linseed oil may be diluted with turpentine without disadvantage, and after a few applications the surface will take on a dull and not displeasing polish. The table tops are easily cleaned by washing with water or suds after a course of work is completed, and the application of another coat of oil puts them in excellent order for another course of work. Strong acids or alkalies when spilled, if soon wiped off, have scarcely a perceptible effect.

A slate or tile top is expensive not only in its original cost, but also as a destroyer of glassware. Wood tops when painted, oiled, or paraffined have objectionable features, the latter especially in warm weather. Old table tops, after the paint or oil is scraped off down to the wood, take the above finish nearly as well as the new wood.

To Make Wood Acid- and Chlorine-proof.

—Take 6 pounds of wood tar and 12 pounds rosin, and melt them together in an iron kettle, after which stir in 8 pounds finely powdered brick dust. The damaged parts must be cleaned perfectly and dried, whereupon they may be painted over with the warm preparation or filled up and drawn off, leaving the film on the inside.

Protecting Cement Against Acid.

—A paint to protect cement against acid is obtained by mixing pure asbestos, very finely powdered, with a thick solution of {10} sodium silicate. The sodium silicate must be as alkaline as possible. The asbestos is first rubbed with a small quantity of the silicate, until a cake is obtained and then kept in well-closed vessels. For use this cake is simply thinned with a solution of the silicate, which furnishes a paint two or three applications of which protect the walls of reservoirs, etc., against any acid solid or liquid. This mass may also be employed for making a coating of sandstone.

To Make Corks Impermeable And Acid-proof.

—Choose your corks carefully. Then plunge them into a solution of gelatin or common glue, 15 parts, in 24 parts of glycerine and 500 parts of water, heated to 44° or 48° C. (112°–120° F.), and keep them there for several hours. On removing the corks, which should be weighted down in the solution, dry them in the shade until they are free from all surplus moisture. They are now perfectly tight, retaining at the same time the greater portion of their elasticity and suppleness. To render them acid-proof, they should be

treated with a mixture of vaseline, 2 parts, and paraffine 7 parts, heated to about 105° F. This second operation may be avoided by adding to the gelatin solution a little ammonium dichromate and afterwards exposing the corks to the light.

Lining For Acid Receptacles.

—Plates are formed of 1 part of brown slate, 2 of powdered glass, and 1 of Portland cement, the whole worked up with silicate of soda, molded and dried. Make a cement composed of ground slate and silicate of soda and smear the surface for the lining; then, while it is still plastic, apply the plates prepared as above described. Instead of these plates, slabs of glass or porcelain or similar substances may be employed with the same cement.

ACACIA, MUCILAGE OF: See Adhesives under Mucilages.

ACID-PROOF GLASS: See Glass.

ACID-RESISTING PAINT: See Paint.

ACIDS, SOLDERING: See Solders.

ACID STAINS FROM THE SKIN, TO REMOVE: See Cleaning Preparations and Methods.

ACID TEST FOR VINEGAR: See Vinegar.

ADHESIVES

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Glues:

Manufacture Of Glue.

—I.—The usual process of removing the phosphate of lime from bones for glue-making purposes by means of dilute hydrochloric acid has the disadvantage that the acid cannot be regenerated. Attempts to use sulphurous acid instead have so far proved unsuccessful, as, even with the large quantities used, the process is very slow. According to a German invention this difficulty with sulphurous acid can be avoided by using it in aqueous solution under pressure. The solution of the lime goes on very rapidly, it is claimed, and no troublesome precipitation of calcium sulphite takes place. Both phosphate of lime and sulphurous acid are regenerated from the lyes by simple distillation.

II.—Bones may be treated with successive quantities of combined sulphurous acid and water, from which the heat of combination has been previously dissipated, the solution being removed after each treatment, before the bone salts dissolved therein precipitate, and before the temperature rises above 74° F.—U. S. Pat. 783,784.

III.—A patent relating to the process for treating animal sinews, preparatory for the glue factory, has been granted to Florsheim, Chicago, and consists in immersing animal sinews successively in petroleum or benzine to remove the outer fleshy animal skin; in a hardening or preserving bath, as boric acid, or alum or copper sulphate; and in an alkaline bath to remove fatty matter from the fibrous part of the sinews. The sinews are afterwards tanned and disintegrated.

Test For Glue.

—The more water the glue takes up, swelling it, the better it is. Four ounces of the glue to be examined are soaked for about 12 hours in a cool place in 4 pounds of cold water. If the glue has dissolved after this time, it is of bad quality and of little value; but if it is coherent, gelatinous, and weighing double, it is good; if it weighs up to 16 ounces, it is very good; if as much as 20 ounces, it may be called excellent.

To Prevent Glue From Cracking.

—To prevent glue from cracking, which frequently occurs when glued articles are {11} exposed to the heat of a stove, a little chloride of potassium is added. This prevents the glue from becoming dry enough to crack. Glue thus treated will adhere to glass, metals, etc., and may also be used for pasting on labels.

Preventing The Putrefaction Of Strong Glues.

—The fatty matter always existing in small quantity in sheets of ordinary glue affects the adhesive properties and facilitates the development of bacteria, and consequently putrefaction and decomposition. These inconveniences are remedied by adding a small quantity of caustic soda to the dissolved glue. The soda prevents decomposition absolutely; with the fatty matter it forms a hard soap which renders it harmless.

Liquid Glues.—

I.—	Glue	3 ounces

	Gelatin	3 ounces
	Acetic acid	4 ounces
	Water	2 ounces
	Alum	30 grains
	Heat together for 6 hours, skim, and add:	
	Alcohol	1 fluid ounce
	Brown glue, No. 2.	2 pounds
II.—	Sodium carbonate	11 ounces
	Water	3 $^{1}/_{2}$ pints
	Oil of clove	160 minims

Dissolve the soda in the water, pour the solution over the dry glue, let stand over night or till thoroughly soaked and swelled, then heat carefully on a water bath until dissolved. When nearly cold stir in the oil of cloves.

By using white glue, a finer article, fit for fancy work, may be made.

III.—Dissolve by heating 60 parts of borax in 420 parts of water, add 480 parts dextrin (pale yellow) and 50 parts of glucose and heat carefully with continued stirring, to complete solution; replace the evaporated water and pour through flannel.

The glue made in this way remains clear quite a long time, and possesses great adhesive power; it also dries very

quickly, but upon careless and extended heating above 90° C. (194° F.), it is apt to turn brown and brittle.

IV.—Pour 50 parts of warm (not hot) water over 50 parts of Cologne glue and allow to soak over night. Next day the swelled glue is dissolved with moderate heat, and if still too thick, a little more water is added. When this is done, add from $2\,{}^{1}/_{2}$ to 3 parts of crude nitric acid, stir well, and fill the liquid glue in well-corked bottles. This is a good liquid steam glue.

V.—Soak 1 pound of good glue in a quart of water for a few hours, then melt the glue by heating it, together with the unabsorbed water, then stir in ${}^{1}/_{4}$ pound dry white lead, and when that is well mixed pour in 4 fluidounces of alcohol and continue the boiling 5 minutes longer.

VI.—Soak 1 pound of good glue in $1\,{}^{1}/_{2}$ pints of cold water for 5 hours, then add 3 ounces of zinc sulphate and 2 fluidounces of hydrochloric acid, and keep the mixture heated for 10 or 12 hours at 175° to 190° F. The glue remains liquid and may be used for sticking a variety of materials.

VII.—A very inexpensive liquid glue may be prepared by first soaking and then dissolving gelatin in twice its own weight of water at a very gentle heat; then add glacial acetic acid in weight equal to the weight of the dry gelatin. It should be remembered, however, that all acid glues are not generally applicable.

VIII.—

Glue	200 parts
Dilute acetic acid	400 parts

Dissolve by the aid of heat and add:

	Alcohol	25 parts
	Alum	5 parts
	Glue	5 parts
IX.—	Calcium chloride	1 part
	Water	1 part
	Sugar of lead	1 $^{1}/_{2}$ drachms
	Alum	1 $^{1}/_{2}$ drachms
X.—	Gum arabic	2 $^{1}/_{2}$ drachms
	Wheat flour	1 av. lb.
	Water, q. s.	

Dissolve the gum in 2 quarts of warm water; when cold mix in the flour, and add the sugar of lead and alum dissolved in water; heat the whole over a slow fire until it shows signs of ebullition. Let it cool, and add enough gum water to bring it to the proper consistence.

XI.—Dilute 1 part of official phosphoric acid with 2 parts of water and neutralize the solution with carbonate of ammonium. Add to the liquid an equal quantity of water, warm it on a water bath, and dissolve in it sufficient glue to form a thick syrupy liquid. Keep in well-stoppered bottles.

XII.—Dissolve 3 parts of glue in small pieces in 12 to 15 of saccharate of lime. By heating, the glue dissolves rapidly and remains liquid, when cold, without loss of adhesive power. Any desirable consistence can be secured by varying

the amount of saccharate of lime. Thick glue retains its muddy color, while a thin solution becomes clear on standing.

The saccharate of lime is prepared by {12} dissolving 1 part of sugar in 3 parts of water, and after adding $^1/_4$ part of the weight of the sugar of slaked lime, heating the whole from 149° to 185° F., allowing it to macerate for several days, shaking it frequently. The solution, which has the properties of mucilage, is then decanted from the sediment.

XIII.—In a solution of borax in water soak a good quantity of glue until it has thoroughly imbibed the liquid. Pour off the surplus solution and then put on the water bath and melt the glue. Cool down until the glue begins to set, then add, drop by drop, with agitation, enough acetic acid to check the tendency to solidification. If, after becoming quite cold, there is still a tendency to solidification, add a few drops more of the acid. The liquid should be of the consistence of ordinary mucilage at all times.

XIV.—

Gelatin	100 parts
Cabinetmakers’ glue	100 parts
Alcohol	25 parts
Alum	2 parts
Acetic acid, 20 per cent	800 parts

Soak the gelatin and glue with the acetic acid and heat on a water bath until fluid; then add the alum and alcohol.

XV.—

Glue	10 parts