

### REMOVING STAINS FROM CONCRETE\*

While practically every type of stain can be removed from concrete, eradication of old, long neglected stains may require patience. It is often a matter of repeating the treatment until the desired results are attained. When the staining matter is unknown, the treatment may require some experimentation. Many chemicals may be applied to concrete without appreciable injury, but acids or chemicals having an acid reaction should be avoided. Even weak acids may roughen the surface if left for any length of time.

For stains which penetrate, it is necessary to resort to a poultice or bandage. A poultice is made by mixing active chemicals with fine inert powder to a pasty consistency; is applied in a thick layer. Bandages consist of cotton batting, or layers of cloth, soaked in chemicals and pasted over the stain.

#### Treatment of Iron Stains

Iron stains can usually be recognized by their resemblance to iron rust or by their proximity to steel or iron in the building. Large areas stained from using curing water containing iron may be improved in appearance by mopping with a solution containing 1 lb. of oxalic acid powder per gallon of water. After 2 or 3 hours rinse with clear water, scrubbing at same time with stiff brushes or brooms. Bad spots may be scrubbed with second application. For deeper stains the following methods may be used.

*Method 1*—Dissolve 1 part sodium citrate in 6 parts water. Mix thoroughly with equal volume of glycerin. Mix part of this liquid with whiting to form a paste just stiff enough to adhere to the surface in a thick coat. Apply with putty knife or trowel. This will dry in a few days. It should then be replaced with a new layer or softened by addition of more liquid. While this treatment has no injurious effects, its action may be too slow to be practical with bad stains. Ammonium citrate may produce quicker results than sodium citrate, but may injure polished surfaces slightly.

*Method 2*—For deep and intense iron stains, it is more satisfactory to use sodium hydrosulphite ( $\text{Na}_2\text{S}_2\text{O}_4$ ). The surface should be first soaked with a solution made by dissolving 1 part of sodium citrate crystals in 6 parts water. Dip white cloth or cotton batting in this solution and paste over the stains for 10 or 15 minutes. On horizontal surfaces, sprinkle over with thin layer of hydrosulphite crystals, moisten with water, and cover with stiff paste of whiting and water. On a vertical surface, place whiting paste on a plasterer's trowel, sprinkle on layer of hydrosulphite, moisten slightly,

and apply to the stain. Remove after one hour. Do not leave longer or a black stain may develop. If stain is not completely removed, repeat the operation with fresh materials. When the stain disappears, rinse surface thoroughly with water.

#### Copper, Bronze and Aluminum Stains

Copper and bronze stains are nearly always green, but in some cases may be brown.

Mix dry, 1 part ammonium chloride (sal ammoniac) and 4 parts powdered talc. Stir in ammonia water to make a paste. Place this over stain and leave until dry. A stain of this kind that has been collecting for some years may require several repetitions to remove it. Aluminum chloride may be used instead of sal ammoniac.

Aluminum stains appear as a white deposit which can be removed by scrubbing with a 10 to 20 per cent muriatic acid solution. On colored concrete a weaker solution should be used.

#### Ink Stains

Different inks require different treatments.

Ordinary writing inks may etch concrete due to acid content. To remove a stain of this type, make strong solution of sodium perborate in hot water. Mix with whiting to a thick paste, apply in  $\frac{1}{4}$ -in. layer, and leave until dry. If some of the blue color is visible after poultice is removed, repeat. If only a brown stain remains, treat it by method 1 for iron rust. Sodium perborate can be obtained from any druggist.

Many red, green, violet and other bright colored inks are water solutions of synthetic dyes. Stains made by this type of ink can usually be removed by the sodium perborate poultice described above. Often the stain can be removed by applying ammonia water on cotton batting. Javelle water is also effective, used the same as ammonia water, or mixed to a paste with whiting and applied as a poultice. A mixture of equal parts of chlorinated lime and whiting reduced to a paste with water may also be used as a poulticing material.

Some blue inks contain Prussian blue, a ferrocyanide of iron. These stains cannot be removed by the perborate poultice, Javelle water, or chlorinated lime poultice. Such stains yield to treatment of ammonia water applied on a layer of cotton batting. Strong soap solution applied the same way may also be effective.

Indelible ink often consists entirely of synthetic dyes. Stains may be treated as outlined above for that type. However, some indelible inks contain silver salts which cause a black stain. This may be removed with ammonia water applied by bandage. Usually several applications are necessary.

\*Information is adapted from cooperative research work of the Bureau of Standards and the National Association of Marble Dealers, as presented in Technologic Paper No. 350 of the Bureau.

### **Tobacco Stains**

The following formula is generally effective: dissolve 2 lb. of trisodium phosphate crystals in 1 gal. hot water. Mix 12 ounces of chlorinated lime to a paste in a shallow enameled pan by adding water slowly and mashing the lumps. Pour this and the trisodium phosphate solution into a 2 gal. stoneware jar and add water until full. Stir well, cover the jar, and allow lime to settle. To use, add some of the liquid to powdered talc until thick paste is obtained. Apply with trowel as a ¼-in. poultice. To apply with a brush, add about one teaspoon of sugar to each pound of powdered talc. When dry, scrape off with wooden paddle or trowel. This mixture is a strong bleaching agent and is corrosive to metals. Care should be taken not to drop it on colored fabrics or metal fixtures.

This method is valuable for treating other stains. Trisodium phosphate may be purchased at drug stores, chemical supply, or laundry supply houses.

If the stain is not bad, grit scrubbing powders, commonly used on marble, terrazzo, and tile floors are often satisfactory as a poulticing material. Stir powder into hot water until mortar consistency is obtained. Mix thoroughly, then apply to stained surface in a ½-in. layer. Leave until dry. In most cases, two or more applications will be necessary.

### **Urine Stains**

Use method as outlined for tobacco stains. Should the stain prove stubborn, saturate cotton batting in the liquids and paste over remaining stain. Resaturate the cotton if necessary.

### **Fire Stains**

Concrete is often badly discolored from smoke or pitch from burning wood. Sometimes the appearance may be restored by the following process: scour with powdered pumice or grit scrubbing powder to remove surface deposit. Then make a solution of trisodium phosphate and chlorinated lime, described for tobacco stains. Fold a white Canton flannel cloth to form three or four layers and saturate with the liquid. Paste this over stain, and cover with slab of concrete or glass, making sure the cloth is pressed firmly against the surface. If on a vertical plane, devise method to hold the flannel and its covering snug against the stain. Resaturate the cloth as often as necessary. Deep pitch stains may require several treatments.

### **Lubricating Oil Stains**

Lubricating oil may penetrate concrete. It should be mopped up immediately, covering the spot with a dry powdered material such as portland cement, fuller's earth, or hydrated lime. If treated promptly, no staining will occur. If the oil remains for some time, other methods may be required.

Make a paste of a solution of 1 lb. of trisodium phosphate to 1 gal. of water and sufficient whiting to thicken. Spread this paste in a layer about ½ in. thick over the surface to be cleaned and let it dry (approximately 24 hours). Remove the paste and wash surface with clear water.

An alternate treatment consists of the application

of a poultice made by adding powdered talc or whiting to a 5 per cent solution of caustic soda.

Commercial degreasing products also are available. Some are marketed in aerosol spray cans. The stain is sprayed with the solution and flushed with clear water to carry away the residue.

### **Rotten Wood Stains**

Under damp conditions, wood will rot and cause a chocolate-colored stain which is readily distinguished from most other stains by its dark color. The best treatment is that recommended for fire stains. Action may be accelerated by first scrubbing the surface thoroughly with glycerin diluted with four times its volume of water.

### **Coffee Stains**

Coffee stains can be removed by applying a cloth saturated in glycerin diluted with four times its volume of water. Javelle water, or the solution used on fire stains, is also effective.

### **Iodine Stains**

An iodine stain will gradually disappear of its own accord. It may be removed quickly by applying alcohol and covering with whiting or talcum powder. If on a vertical wall, mix talcum to a paste with alcohol, apply some alcohol to the stain, then cover with the paste.

### **Perspiration Stains**

Secretions from the hands or oil from the hair may produce stains on concrete. The stain is brown or yellow and may be mistaken for an iron stain. The best treatment is that recommended for fire stains. Bad stains may require several treatments.

### **General Service Stains**

When areas of terrazzo floors become yellow while adjacent slabs remain free from discoloration, the trouble is probably due to the original finishing of the floor. Such discolorations are not usually hard to remove by poultice methods, or may yield to a surface scrubbing with Javelle water. Javelle water can usually be purchased at drug stores or may be prepared as follows:

Dissolve 3 lb. of washing soda in 1 gal. of water. Mix 12 ounces of chlorinated lime to a paste in a shallow enameled pan by adding water slowly. Mash the lumps. Add the paste to soda solution, make up to 2 gal. by adding water, and place in a covered stoneware jar to settle. Use the clear liquid when required, diluting with six times its volume of clear water. Use as a soap or other scrubbing solution, first rinsing the surface with clear water. Javelle water is a strong bleaching material, and should not be allowed to drop on colored fabrics. It is not recommended for general cleaning purposes, but its occasional use on stained concrete is believed to be entirely safe.

Poulticing with commercial grit scrubbing powders, such as those used for cleaning marble floors, will prove satisfactory for removing most stains of this class. In poulticing with these, the material is slowly stirred into a pail of hot water until a thick paste of mortar consistency is obtained.