

other theory of dyeing are perhaps wrongly based on supposed analogies with chemical processes. It is stated, for instance, that wool removes the base from the solution of a basic dyestuff, leaving the acid in solution. It is known, however, that during solution some salts are dissociated into free acid and free base, and if this happens with the basic dye then the wool may absorb the free base without it having really been the cause of its separation from the acid.

Vignon has measured the heat developed when fibres are steeped in normal solutions of acid and bases, and thus showed the inertness of vegetable fibres, compared with animal fibres, but it is not proved that this heat is really heat of neutralization, nor is it possible to make calculations of any value when dealing with fibres the molecular weight of which is unknown.

Weber considers the formation of colors on wool as a chemical process analogous to that of the precipitation of dyestuff solutions by an acetic acid solution of albumin. These latter precipitates may, however, depend on coagulation of the albumen, which then retains mechanically the dyestuffs in the same condition as that in which it exists in solution.

A new chemical theory intended to cover all phenomena of dyeing has been put forward. The dyeing process always takes place in two stages—namely, (1) absorption of the dyestuff, and (2) fixation and development of the color. Absorption: The dissolved dyestuff diffuses from the solution into the fibre. It is not necessary to assume that any attraction by the fibre takes place, for any body held in the water can pass by free diffusion into the fibre. Chemical combination of dyestuff and fibre can scarcely be expected, for the textile fibres are inert substances and undoubtedly of very high molecular weight. They are also colloidal and hygroscopic. Every body which possesses similar absorbent properties can be dyed according to the same general laws, as, for instance, amorphous carbon, coagulable albumen, and certain colloidal metallic oxides. These substances can remove from solution those dyestuffs which dye textile fibres direct. Fixation: The dyestuff which has passed into the fibre by diffusion must now be fixed—that is, it must be transformed into an insoluble dye, incapable of being washed out again. This may take place either by chemical precipitation, as with chrome yellow, indigo blue, etc., or by colloidal precipitation, as with direct dyestuffs. The solutions of many dyestuffs and solutions of color lakes in acids are colloidal in nature, and the precipitation of insoluble colloidal substances from them is accelerated by the presence of the fibre, which by virtue of its structure exercises a catalytic action. As a rule the dyebath is not fully exhausted by such colors, but if the dyes formed by hydrolysis or other chemical change are very insoluble, the equilibrium between the amount of dye absorbed by the fibre and that in the dye liquor is constantly being destroyed, and further amounts of dyestuffs are taken up until the bath is exhausted.

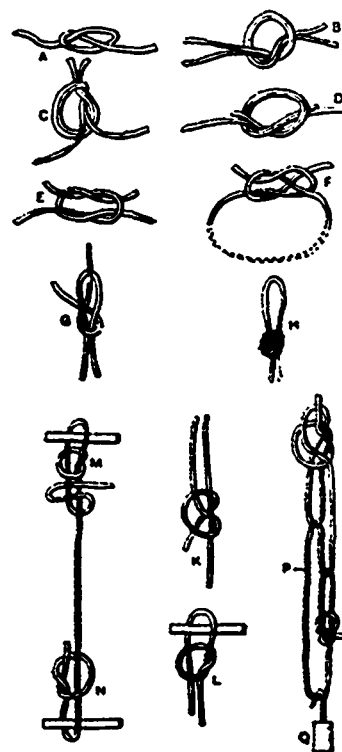
With the salts known as acid and basic dyestuffs, the colors formed on the fibre are the free colloidal color acids or bases. With the direct cotton dyestuffs of high molecular weight and pronounced colloidal character, the colors on the fibre do not differ in chemical constitution from the dyestuffs in solution. These dyes are not fast to washing, since they are readily transformed back to the soluble condition. Dyes which are fast to washing are always produced by some chemical alteration of the dyestuff. The various dyestuffs can be divided into crystalline and colloidal bodies, but the division between these groups is not sharp. Picric acid, for example, is crystalline, but has weak colloidal properties: it dyes wool quickly, but does not give a fast color, and it is incapable of dyeing vegetable fibres. Magenta is colloidal but not sufficiently so to be capable of dyeing cotton direct.

Every substance which assists the colloidal (insoluble) separation of the dye is a useful addition to the dyebath. For this purpose acids are often added, while dyeing is seldom done in an alkaline bath, since alkalis tend to bring colloids into solution, when they cannot be absorbed by the textile fibres.—Textile Mercury.

WEAVERS' KNOTS.

The round knot is either single or double. The single knot A is but rarely used, and then it is employed for preparing a loop or to hold another knot. The double form B joins two ends, and is sometimes used by silk weavers in threading shuttles. In the ordinary knot formed on the finger tips, C, the ends of the threads project in the same direction. This knot, which comes wholly on one side of the thread, is frequently caught by the reed and the heddle eye, and it is best to use that shown at D, where the two ends project in different directions, thus distributing the knot more around the thread so that it passes more easily through the heddle eye and reed than the preceding knot. These two knots (C and D) are used for splicing warp threads; the first when the yarn is fine and the reed coarse; the second when the yarn is coarse and the reed fine.

When the warp threads are either double or three-ply, and one of the single strands breaks, it is not drawn through the heddles and reed, but is simply twisted around one of the other strands, as shown at K.



The flat knot shown at E is used when it is desired to tie two ends which are to be subjected to considerable strain, such as the lacing of jacquard cards. A weaver's knot is shown at F, which is frequently used in putting new heddles into the jacquard loom and for similar small cords. It is, however, says "Les Metiers a Tisser," less secure than the preceding one E, and is formed by the finger and thumb-nails; it can be quickly tied, and there is the additional advantage that it can be formed very close to the end of the thread. The knot shown at G is used more especially to fasten the harnesses. A running knot is shown