**Bleaching, Dyeing, Printing, etc.**

The desire to furnish goods whose colours are fast, knit goods especially, does not give much trouble to the manufacturer, but the dye of the yarn for these enters no small difficulties. These are not only caused by the demand that the colours shall be fast to washing, but particularly that they must not rub off upon paper, or mud in the water. What is required is that the yarn should be dyed in fast colours that meet the requirements of consumers, only in case it is not fast to washing, but in particular they must not rub off. To attain this result, it is necessary to dye ourselves with the combined knowledge of dyeing that yields colours absolutely fast to washing but not with those methods that give colours less fast to washing but which do not rub off. In producing fast colours upon cotton knitting yarn, by the processes described below, the two methods are united.

A blue fast to washing, but rubbing off, is vat blue. To the same class of colours belongs catechu brown, a disperse dye, produced catechu, blackened with tannin, and boiled with bichromate of potash. Not perfectly washing-fast, but rubbing off, are the colours produced by the following processes: brown, benzene-brown, benzene-azure, benzo-black blue, violet black, and cotton brown, all of which are dyed upon a strongly alkaline bath with soap, and boiling for one hour.

**VAT BLUE** is combined with these dyestuffs by bringing upon the vat to half the depth of the required strength, washing well after developing and dying upon an alkali bath with benzene-azure or naphtho-sulphonate for light shades, with benzene-azure or benzene black, and with violet black for deep shades; finally washing well and soaping upon a fresh bath. A very dark, nearly black shade is obtained, before entering the vat, being boiled with tannin, with catechu (developed with potassium chromate), washed, blued upon the vat, and finished as above.

**azo derivatives of beta-naphthohydroquinone.**

The ortho-derivatives of aromatic hydrocarbons, as a rule, are capable of being converted into azo compounds. This has been attempted by many chemists, because, judging by analogy, these dyestuffs will yield faster colouring matters and are simpler in nature. On the other hand, the fact that they do not form azo compounds by the ordinary processes has hitherto been considered as useless. Dr. Otto Witt has, however, found that the above views are incorrect, and that the azo derivatives can be produced by combination of aluminium, iron, and chromium oxides, to form insoluble lakes. These new colouring matters can therefore, be dyed on morndated fibres like alizarins and purpurs, and thus dyed they give shades of colour said to be very fast to washing.

By using diazo-benzene chloride to combine with the diazo-naphthalein an orange powder is obtained which can be introduced into commerce in the form of powder, which can be used for dyeing and printing cottons. The staining of cottons is bluish pink is obtained; with iron mordants a grey violet, while chrome mordants give purple tints.

By using diazo-benzene sulphonic acid to react with the beta-naphthohydroquinone, a colouring matter is obtained which is soluble in water, and can be used for dyeing and printing cottons. The staining which produces red or purplish tints, according to the concentration used, can be used for mordants in the same manner as with azo dyestuffs.