ingredients which may have an injurious effect on the skin. The manufacturer of toilet soap generally takes care to present his wares in convenient form and of agreeable appearance and smell ; the more weighty duty of having them free from uncombined alkali is in many cases entirely overlooked. Transparent soaps are prepared by dis­solving ordinary soap in strong alcohol and distilling off the greater portion of the alcohol till the residue comes to the condition of a thick transparent jelly. This, when cast into forms and allowed to harden and dry slowly, comes out as transparent soap. A class of transparent soap may also be made by the cold process, with the use of coco-nut oil, castor oil and sugar. It generally contains a large amount of uncombined alkali, and that, with its unpleasant odour of coco-nut oil, makes it a most undesirable soap for personal use. Toilet soaps of common quality are perfumed by simple melting and stirring into the mass some cheap odorous body that is not affected by alkalis under the influence of heat. The finer soaps are perfumed by the cold method ; the soap is shaved down to thin slices, and the essential oil kneaded into and mixed with it by special machinery, after which it is formed into cakes by pressure in suitable moulds. The greater quantity of high-class toilet soaps are now made by a milling process. A high class soap, which after framing contains about 30% of water, is brought down to a water content of 11-14% by drying in chambers through which warm air is circulated. The soap is now milled in the form of ribbons with the perfume and colour­ing matter, and the resulting strips are welded into bars by forcing through a heated nozzle. The bars are then cut or moulded into tablets, according to the practice of the manufacturer.

Glycerin soap ordinarily consists of about equal parts of pure hard soap and glycerin (the latter valuable for its emollient pro­perties). The soap is melted by heat, the glycerin is stirred in, and the mixture strained and poured into forms, in which it hardens but slowly into a transparent mass. With excess of glycerin, a fluid soap is formed, soap being soluble in that body, and such fluid soap has only feeble lathering properties. Soap containing small propor­tions of glycerin, on the other hand, forms a very tenacious lather, and when soap bubbles of an enduring character arc desired glycerin is added to the solution. Soaps are also prepared in which large proportions of fine sharp sand, or of powdered pumice, are incorpor­ated, and these substances, by their abrading action, powerfully assist the detergent influence of the soap on hands much begrimed by manufacturing operations.@@1

*Medicated soaps,* first investigated scientifically by Unna of Hamburg in 1886, contain certain substances which exercise a specific influence on the skin. A few medicated soaps are prepared for internal use, among which are croton soap and jalap soap, both gentler cathartics than the uncompounded medicinal principles. Medicated soaps for external use are only employed in cases of skin ailments, as prophylactic washes and as disinfectant soaps. Among the principal varieties are those which contain carbolic acid and other ingredients of coal tar, salicylic acid, petroleum, borax, camphor, iodine, mercurial salts, sulphur and tannin. Arsenical soap is very much employed by taxidermists for the preservation of the skins of birds and mammals.

*Miscellaneous Soaps.—*The so-called “ floating soaps ” arc soaps made lighter than water either by inserting cork or a metallic plate so as to form an air space within the tablet. The more usual method is to take milling soap, neutralize it with sodium bicarbonate or a mixture of fatty acids, and, after perfuming, it is aerated by mixing the hot soap with air in a specially designed crutcher. Shaving soaps, which must obviously be free from alkali or any substance which irritates the skin, are characterized by readily forming a permanent lather. This property is usually obtained by mixing soft and hard soaps, or, more rarely, by adding gum tragacanth to a hard soap. In the textile trades the wool scourer employs a neutral olive-oil soap, or, on account of its cheapness, a neutral curd or curd mottled brand ; the cotton cleanser, on the other hand, uses an alkaline soap, but for cleaning printed cottons a neutral olive-oil curd soap is used, for, in this case, free alkali and resin are objectionable; olive-oil soap, free from caustic alkali, but often with sodium carbonate, is also used in cleansing silk fibres, although hard soaps free from resin are frequently employed for their cheapness. Soaps of smaller moment are the pearl ash soaps used for removing tarry stains; ox-gall soaps for cleaning carpets; magnesia, rouge and chalk soaps for cleaning plate, &c.

*Soap Analysis.—*The most important points in soap analysis are (1) determination of the fatty matter, (2) of the total alkali, (3) of the substances insoluble in water, (4) of the water. The first is carried out by saponifying the soap with acid in the heat when the fatty acids come to the surface. If it fails to form a hard cake on cooling, a known weight of wax may be added and the product re-heated. The cake on weighing gives the free acid. The total alkali is de­termined by incinerating a weighed sample in a. platinum dish, dis­solving the residue in water, filtering and titrating the filtrate with standard acid. The residue on the filter paper gives (3) the sub­stances insoluble in water. The water in a soap is rarely directly determined ; when it is, the soap, in the form of shavings, is heated to 105o C. until the weight is constant, the loss giving the amount of

water. With genuine soaps, however, it suffices to calculate the fatty acids as anhydrides and add to this the amount of alkalis, and estimate the water by difference. The complete analysis involves an examination of the fatty matter, of the various forms in which the alkalis are present—free and combined glycerin, &c.

*Commerce.—*Marseilles has long been recognized as the most im­portant centre of the soap trade, a position that city originally achieved through its ready command of the supplies of olive oil. The city is still very· favourably situated for obtaining supplies of oils both local and foreign, including sesame, ground nut, castor oil, &c. In England, during the reign of Charles I., a monopoly of soap-making was farmed to a corporation of soap-boilers in London— a proceeding which led to serious complications. From 1712 to 1853 an excise duty ranging from 1d. to 3d. was levied on soap made in the United Kingdom, and that heavy impost (equal when 3d. to more than cost) greatly impeded the development of the industry. In 1793, when the excise duty was 2¼d. on hard and ιfd. on soft soap, the revenue yielded was a little over £400,000; in 1815 it was almost £750,000; in 1835, when the duty was levied at 1½d. and 1d. res­pectively (and when a drawback was allowed for soap used in manufactures), the revenue was almost £1,000,000; and in 1852, the last year in which the duty was levied, it amounted to £1,126,046, with a drawback on exportation amounting to £271,000.

*Medicine.—*Two preparations of hard soap (sodium oleate), made by acting on olive oil with caustic soda, are used in medicine: (1) *Emplastrum saponis,* made with lead plaster; (2) *Pilula saponis composita,* which contains one in five parts of opium. Soft or green soap (potassium oleate), made by acting on olive oil with caustic potash, is also used ; its preparation *(Linamentum saponis)* is known as opodeldoc. Curd soap is also used, and is chiefly a stearate of sodium. The chief use of hard soap is in enemata, and as a suppository in children suffering from constipation ; it also forms the basis of many pills; given in warm water it forms a ready emetic in cases of poisoning. Soft soap is used by dermatologists in the treatment of chronic eczema, and opodeldoc is a domestic remedy for stiffness and sprains. Medicated soaps are made by adding the drug to either hard soap or curd soap in the desired proportions. Useful com­binations are: borax 10%, carbolic acid 5%, ichthyol 5%, sublimed sulphur 10%, thymol 2½%, &c.

See L. L. Lamborn, *Modern Soaps, Candles and Glycerin* (1906); W. H. Simmons and H. A. Appleton, *The Handbook of Soap Manu­facture* (1908) ; also J. Lewkowitsch, *Oils, Fats and Waxes.*

**SOAP-BARK,** the inner bark of *Quillaja saponaria,* a large tree which grows in Chile. Reduced to powder, it is employed as a substitute for soap, since it forms a lather with water, owing to the presence of a glucoside saponin, sometimes distinguished as *Quittai saponin.* The same, or a closely similar substance, is found in soapwort *(Saponaria officinalis)*,in senega root *(Polygala senega)* and in sarsaparilla; it appears to be chemically related to digitonin, which occurs in digitalis. The saponins (with few exceptions), have the general formula (CnH2n-8O10, and by the action of dilute acids they are hydrolysed into sugars and sapogenins, which are usually inert pharmacologically. An alternative name for them, and especially for those which are pharmacologically active, is *sapotoxins;* on this nomenclature the hydrolytic products are termed saponins. Applied as a snuff to the mucous membrane of the nose, saponin (either in soap­bark or in senega root) promotes a violent sneezing. Solutions injected under the skin are violent local irritants and general depressants.

**SOBAT,** a river of N.E. Africa, the most southerly of the great eastern affluents of the Nile. It is formed by the junction of various streams which rise in the SAV. of the Abys­sinian highlands and N.W. of Lake Rudolf. The length of the Sobat, reckoning from the source of the Baro, the chief upper stream, to the confluence with the Nile is about 460 m. The Baro rises in about 36° 10' E., 7° 50' N. at an altitude of some 7000 ft. It has a general W. direction with a slight N. tendency. It is joined by numerous other streams which also rise on the Abys­sinian plateau. These mountain torrents descend the escarpment of the plateau between great walls of rock, the Baro dropping 3000 ft. in 45 m. It then flows through a narrow gorge at an altitude of about 2000 ft., the mountains on either side towering 3000 to 4000 ft. above the river bed. Just east of 35' E. the Birbir, descending from the plateau, joins the Baro and brings with it a large volume of water. Some 40 m. lower down the hills are left behind, the rocks and rapids in the bed of the Baro cease, and the river flows W. across a vast plain with many windings and several divergent channels. From Gambela, a town on its N. bank 20 m. below the Birbir junction, the river is

@@@1 "Soap powders ” and “ soap extracts ” are powdered mixtures of soaps, soda ash or ordinary sodium carbonate.