

## THE BOILING OF SOAPS

By K. O. LÖFFL

(Translated by A. P. Sachs)

At the Fall meeting of the Association of German Chemists held at Rostock, Germany, a new method for boiling soaps under pressure with agitation was announced, and the advantage was shown by figures. According to these figures the saponification costs of a boil of 62 per cent grained soap of about 40 hundredweight (M equals German marks\*) were:

1. Direct heating and stirring by hand or by steam, M 207 (\$49.30).
2. Indirect heating (steam) and stirring by hand or by steam, M 218 (\$51.90).
3. Indirect heating by the new method and stirring under pressure, M 123 (\$29.32).

The detailed figures given at the Rostock\*\* meeting can now be supplemented, as several pressure kettles are now in use by soap manufacturers. One saponification on plant scale was observed very accurately, and it showed that the operating figures were actually even more favorable to the new pressure saponification process as the saponification costs amounted to only M 106 (\$25.27) instead of the M 123 (\$29.32) previously estimated.

Saponification costs, old method, M 207 (\$49.30).

Saponification costs, new method, M 106 (\$25.27).

Not only are the saponification costs cut in half by the new method, but also the time required for saponification is cut down; that is, the time actually consumed in the conversion of a boil of soap. In the old open-kettle method, depending on the raw materials used and the details of the operation (such as plenty or scarcity of steam) 5 to 8 hours were necessary before the charge was ready for salting out, while the pressure saponification with stirring requires only 1 hour to 1 hour and 20 minutes. Therefore, we have:

Time of saponification, old method: 5 to 8 hours.

Time of saponification, new method: 1 hour and 20 minutes.

To separate the soap from the spent lye it is treated with salt, and in order to dissolve the salt it was necessary in the old process to continue the boiling for a time. In the new method the salt is added while the agitator is turning so that it is uniformly distributed and dissolved within several minutes. The rising of the soap and the separation of the spent lye required at least 6 to 8 hours by the old methods; generally it had to be allowed to settle out overnight. With the new process, separation occurs under pressure and the time required depends on the fat used as raw material for the soap. With good, rosin-free grain soaps 1 hour

\*Conversion into U. S. dollars is at the rate of 4.02 marks per dollar.

\*\*Refers to the previous meeting of this Association.

suffices. If the lower fatty acids, oxyfatty acids, resin-acids or materials containing gummy matter are used, setting out may require 2 to 3 hours.

### Working Up of the Soaps

Not only has the boiling of soap been perfected in recent years, but also the conversion of the boil of solid soaps to cakes for both grained soaps and toilet soaps.

*Grained Soaps:* Technicians have long been trying to improve the old working methods of drawing off the fluid soaps after the settling out of the spent lyes or of running the soap through the bottom outlet into forms after removing the spent lyes, and then allowing the soap to harden in the course of days. The soaps hardened in this manner had to be cut by hand into blocks and slabs and these in turn into bars. In the cutting process considerable waste occurred and much hand labor was required to obtain the plain cake of soap without any stamping. In recent years, in order to hasten the hardening, the well-known chill-processes have been designed, and improvements in the form of chilled screw-presses have been built. Pouring machines to produce strips have been constructed, but the latter have not yet come into common use. The Americans attempted to solve the problem of obtaining stamped cakes direct from the liquid soap in the kettle without the use of any manual labor by purely automatic equipment. The feeding machine used for this purpose consists of a large row of chaplet-shaped pouring-forms linked together, which are filled by a filling device fed directly from the soap kettle. The filled forms travel through a cold room where they harden. On leaving the cooling chamber they pass through a rotary press which stamps them to shape. The forms on the chaplet on the return trip travel with the free face of the cake downward and the hardened cake which has shrunk somewhat by cooling drops from the form and is carried by a conveyor to an automatic packing machine. This latter, without any manual labor, packs the cake in light paper or even in cartons. According to present production data it is possible with this equipment to run pre-warmed fats into the kettle at seven in the morning and to see the first corrugated case of 110 pounds of soap leaving the packing room in 1 hour and 4 minutes.

*Toilet Soaps:* Here also the old method is troublesome, as:

1. The soap taken from the form must be cut into blocks, slabs and bars.
2. The bars must be cut into flakes.
3. The flakes must be dried from a 60 per cent soap content to 80 to 90 per cent soap content on the bulky and clumsy hand driers. The drying is not uniform from the point of view of the entire flake, forgetting for the moment the other smaller disadvantages resulting from the use of a hand dryer.

4. The soap flakes are treated with color and perfume and are again granulated.

5. The material can now go through presses which expel the continuous bars and cut them into pieces.

6. The pieces are then pressed by hand or by machinery with much manual labor into cakes.

7. The completed cakes, at least in Germany and in the leading factories which the author saw in France and Italy, must be packed by hand by female labor.

The modern method which is used in America and which is gaining ground in Germany, at least so far as concerns drying, is briefly as follows:

The boiled soap is fed into a drum dryer, which is able to concentrate the soap to any desired percentage in one minute. The soap is thus exposed to the air only for this brief time, and all coloration and rancidity is avoided. The concentrated soap film is removed by scrapers and carried off by a belt-conveyor and cooled rapidly by any suitable device. The material is colored, perfumed, granulated and fed to the presses which cut the bars automatically and feed the cakes to a really automatic press which in turn feeds them to the packing machine.

Attempts are being made to simplify even this process by dehydrating the soap right in the kettle, and adding color and perfume to the fluid soap in the kettle and finally feeding to a chilled caking press with a rotary chilled table. When it is expelled from this press it is carried to the packing machine. Whether it is technically feasible to maintain this high percentage soap sufficiently fluid so that it can be poured is questionable. In an open kettle it is impossible.

*Soap Powders:* Soap powders are also prepared differently in America than with us. The process is very simple and consists in stirring soda ash into the liquid soap. The still liquid hot mass is then atomized in apparatus of the well known spray-dryer types commonly used in other industries, and collects on the bottom of the chamber as a fine dry powder similar to powdered milk. As the spray-dryers operate completely enclosed, the work is dust-free and represents a great advance in industrial hygiene, as irritations of the eye and mucous membranes which are common in German practice are entirely obviated.