CHEMISTRY

Detergent Foam Nuisance

Legislation may soon control synthetic detergents which cause foaming in lakes, rivers and taps in the home and are a potential danger to public health, Ann Clarke reports.

➤ SYNTHETIC detergents which have proved themselves masters of cleaning in recent years are now in hot water with legislators and water experts. The detergents form 90% of household soaps.

A lather of public opinion against them has been worked up because they:

1. Foam in lakes, rivers and even up through water taps in homes.
2. Contaminate wells.
3. Damage fish.
4. May harm human beings with chemicals that find their way into drinking water.

A bill (H.R. 2105) introduced in Congress in January by Rep. Henry S. Reuss (D-Wis.) would ban synthetic detergents that do not degrade "quickly and completely." The situation has led to consideration of legislation against the detergents in 14 states. A law demanding specific breakdown qualities of detergents in West Germany will go into effect in 1964.

Key villain in the case is the highly branched chemical compound alkyl benzene sulfonate (ABS) or its sodium salt, which forms the base of most synthetic detergents. This petroleum by-product can only be broken down about 50% by bacteria in municipal sewage systems, Dr. Richard Woodward, chief of engineering at the Robert A. Taft Sanitary Engineering Center in Cincinnati, told SCIENCE SERVICE.

A British detergent, Dobane, is similar to the ABS compounds except for slight differences in part of the chemical compound. This detergent can be broken down (bio-degraded) about 80% by the oxygen-breathing bacteria. This figure is still not high enough to meet standards demanded by the German law.

Five million dollars are being invested by U. S. detergent industries into research on new detergent compounds and methods of breakdown, Charles Bueltman of the Soap and Detergent Association told SCIENCE SERVICE.

One of the major detergent research projects is investigation of ABS compounds which have what the chemists call a straighter alkyl chain on the soap base molecule.

The compound used now is made of lines of molecules breaking into each other rather than having them lined in a simpler single file.

A new laboratory method of bubbling detergents to the surface of the water can remove ABS 90% in laboratory tests. This process has not yet been tested in practical municipal sewage systems. If it performs as well in the field as in the laboratory the bubbling would leave approximately one part per million detergent in the water. The Public Health Service has recommended a detergent content in water of one-half part per million.

Other detergents in use include alkyl sulfates which come from tallow or coconut oil, used in shampoos, and non-ionic detergents from organic compounds that are used in automatic dishwashers and create less foam than the ABS compounds. The alkyl sulfates do not cause scum in water because they are soluble. Non-ionic detergents are not found as often in waste water because their main use is in industry.

The first ABS detergents were developed by German chemists during World War I when Germany could not obtain fats for soap-making, traditionally made from alkali and animal fat. These simple ABS detergents were based on coal tars, by-products of the coke industry. The German ABS compounds were called nekals. A number of U. S. companies used the nekals and also ABS detergents made from kerosene.

The modern ABS compounds are the result of research during World War II to develop anti-knock aviation gasoline. Olefins, highly branched alkyl benzene sulfonates, were economically produced in mass quantities. After the war when the demand for the special gasoline slowed down, a number of soap companies developed the compounds for making high-powered detergents.

Familiar detergents are known to have gone through many changes under the same name. Even today, the brand bought in New York may be different from the same brand bought in Peoria, Ill., because manufacturers design different detergents to suit the water of each locality.

• Science News Letter, 83:109 February 16, 1963

Do You Know?

A tantalum-tube resistance *furnace* capable of sustained, stable operation at temperatures as high as 2,200 degrees centigrade has been developed.

The ultra-small particles of a new *chemical,* hydrated aluminum oxide, having wide potential value to the rubber, plastics and other industries are so small it would take 10,000,000 of them to cover the head of a common pin.

Fire-resistant hydraulic *fluids,* now being used in many coal mines, are helping coal operators lower costs and improve safety.

Stress liberates certain hormones called *catecholamines* into the human blood stream which will promptly raise the blood pressure.

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