Selected Bibliography of Talc in the United States

By CELINE W. MERRILL

CONTRIBUTIONS TO ECONOMIC GEOLOGY

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SELECTED BIBLIOGRAPHY OF TALC IN THE UNITED STATES

By Celine W. Merrill

INTRODUCTION

The following bibliography presents a list of both general and specialized references on talc in the United States that are available in either the library of the U.S. Geological Survey or of the Department of the Interior in Washington, D.C. A few foreign articles of general interest are also included. This bibliography is not exhaustive, but it is an attempt to provide the basis for research on the mineralogy, geology, and industrial uses of talc. The entries are arranged alphabetically by author and are indexed by subject.

The term "talc" is used in a mineralogical sense as a mineral name and in an industrial sense as a general term for a wide variety of rocks having a broad range of industrial uses. In the mineralogical sense, talc is a hydrous magnesium silicate having the general structural formula $Mg_6[Si_8O_{20}]OH_4$; in terms of the oxides, the formula is commonly written as $3MgO \cdot 4SiO_2 \cdot H_2O$. By the industrial definition, the name "talc" is applied to rocks ranging in composition from those composed mainly of talc through those containing tremolite, serpentine, magnesite, and other essential minerals in addition to talc to those relatively uncommon rocks composed mostly of tremolite or serpentine. Where uncertain from the context, the intended usage will be made clear by such phrases as "the mineral talc," "talc rock," and "industrial talc."

Talc is a white, pale-green, or gray-white mineral having a pearly luster and greasy feel. It is extremely soft (1 on the Mohs scale), has a perfect basal cleavage, and has a specific gravity of 2.75–2.83. Most industrial talcs can be distinguished by their softness and slippery feel, but the more impure varieties vary widely in hardness and texture.

In both industrial and geologic usage, varieties of talc rocks are known by specific names, and often the industrial and the geologic terms differ in usage; furthermore, neither usage is entirely consistent. "Steatite," as a geologic term, denotes a rock composed chiefly of talc, whereas, when used in industry, it depicts a talc rock of high purity, suitable for the manufacture of electronic insulators, but for which the specifications vary for different uses and among different manufacturers. "Soapstone" is a massive variety of talcose rock suitable for the manufacture of sawed and shaped slabs. It varies widely in mineral composition, from steatite (in the geologic sense of the term) to talcose rocks containing abundant magnesite, serpentine, amphibole, pyroxene, chlorite, and mica. "Grinding talc" is a term applied to all varieties of talc suitable for grinding into powdered form. Other commonly used terms include "grit," a talc-magnesite rock; "fibrous talc," a variety of industrial talc having abundant fibrous or acicular minerals such as tremolite; and "lava talc" and "block talc," both industrial types of massive steatite.

Most commercial talc deposits are associated with ultramafic igneous rocks or dolomitic marbles. The deposits are worldwide in distribution and range from Precambrian to Tertiary in age. Both types of deposits vary in size, form, and geologic relations. Minable deposits of pure talc rock are rare and are generally small or constitute only a small proportion of larger deposits of talc-magnesite rock, talc-tremolite-sepentine rock, and other talcose rocks.

The properties requisite for particular talcs vary greatly and depend upon the manufacturing process and intended use. The more critical properties include the particle size and shape, the chemical composition of the mineral talc, and the identity and proportion of contaminant minerals. Particle shape is of particular importance in industrial steatites and in other talcs for some industrial uses. The chemical composition of the mineral talc is of importance only in industrial steatite and in talcs for a few other ceramic uses. Though oxides, sulfates, sulfides, and many other minerals restrict the use of commercial talcs, the presence of some silicates is desirable for certain uses. For example, fabricators often require a small percentage of CaO in steatite, and tremolitic talc is in demand for some paints because of its white color and low oil-absorption property.

There are few substitutes for talc, and, because of its abundance, there is little demand for them. Pyrophyllite, a hydrous aluminum silicate, has properties very similar to those of talc and competes with talc for some uses.

Of the total talc consumed in the United States in 1960, more than 35 percent was used in ceramics, for which talc is especially suitable. Almost 19 percent was used in the paint industry, as an extender and a pigment in certain paints. More than 29 percent was used in roofing, insecticides, rubber, paper, and asphalt, both as a filler and a dusting agent. The rest went into many diverse products such as talc crayons, foundry facings, plaster products, polishing agents, textiles, tile, cements, toilet preparations, and miscellaneous other products.

The purer and whiter grinding grades of talc are used principally for steatite (in the fabrication of electronic insulators), pharmaceuticals, cosmetics, paper manufacture, and ceramics. Lower grades of talc are suitable for most other uses.

The United States leads in world production of talc and in recent years has produced about 25 percent of the world total. New York, California, Texas, Georgia, Montana, Vermont, Virginia, and Maryland lead in production; other producing States include North Carolina, Nevada, Alabama, Arkansas, and Washington. Most of Virginia's production is soapstone; she is the leading producer in the United States. Much of the "talc, soapstone, and pyrophyllite" recorded for North Carolina and California is pyrophyllite, in which these two States lead. Montana and California have been principal producers of steatite in recent years; these two States, plus North Carolina and Nevada, are the chief domestic sources of cosmetic talc. Texas has recently become a principal sourse of ceramic talc for tileware. Much of the best cosmetic talc and the highest grade steatite has long been imported from Italy and India.

Most of the talc exploited in New York, California, Montana, North Carolina, and Nevada is associated with metamorphosed carbonate rocks; that in Vermont, Virginia, Maryland, and Washington is associated chiefly or entirely with ultramafic igneous rocks, and large deposits of such talc also occur in California and other States. The deposits of Texas, Georgia, Alabama, and Arkansas include both types of associations or are of unknown or doubtful origin.

The following table shows a comparison between the United States and world annual total of talc, soapstone, and pyrophyllite production for the period 1949–60. The data are from the U.S. Bureau of Mines.

	Thousands of short tons	
Year(s)	*United States*	*World*
1949–53(avg)	590	1,550
1954	619	1,620
1955	726	1,790
1956	739	1,930
1957	684	2,080
1958	718	2,030
1959	792	2,260
1960	734	2,450

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