

The possibility of employing boron and boron compounds as substitutes for other substances that are less abundant, more costly, or promise better performance has inspired much research both in the producing and potential consuming sectors. This interest is expected to be sustained without added incentives.

Turkey produces the boron-containing mineral colemanite which can be used by the glass industry without additional processing. As a result it is in a very favorable position to compete with domestic borax production. It is believed that domestic production from bedded deposits and from Searless Lake brines when coproducts are recovered will be able to compete successfully.

BROMINE

World supply is, and will remain, a function of plant capacity and production economics. Brines and sea water promise a virtually inexhaustible supply. Desalinization plants promise a new commercial byproduct source of bromine incidental to the manufacture of potable water. In common with other substances, rejected in desalinization processes, potential markets for such byproducts materially affect the practicability of desalinization. Probably the processes for recovering commercial products from such rejects and, most significantly, finding ways to market them in presently satisfied trade patterns, merit increased attention—more from the standpoint of reducing desalinization costs than from the long-term mineral supply problem.

New or expanded volume uses of bromine would tend to facilitate the above relationship and the overall economics of operations where coproduct substances are affected (soda ash, salt cake, potash, borax, and lithium minerals).

The toxic properties of the element tend to restrain some potential volume applications and add to production, transportation and use costs. Among these the toxic aspects of emission traced to antiknock compounds in gasoline are not well understood.

Process wastes require extensive treatment prior to disposal, if pollution issues are to be avoided. Disposal practices have been improved but growing general concern with waste disposal and pollution practices may demand additional improvements and costs—unless new techniques are provided.

CADMIUM

The mineralogical association with zinc makes cadmium resources a function of zinc resources and the rate of cadmium production a function of zinc production. Output would not respond to cadmium price changes but would vary with the output of zinc. Accordingly, cadmium supplies are a direct function of the price of zinc. Demand tends to exceed supply and in such instances increased cadmium prices tend to reduce some applications and restore a balance. The result is a cyclic pattern of rapid reversals in trends of consumption, industrial stocks, and foreign trade. In this relationship there is little logic in seeking new applications for the commodity.

Cadmium sales are a measurable increment in the economics of slab zinc production (4 to 10 percent of the value). Current technology removes 70 to 80 percent of the cadmium as recoverable fume during roasting and sintering. Most of the remaining cadmium reports with the zinc when reduction is affected by retorting, electrothermic furnaces or blast furnaces. Exploratory research indicates almost complete elimination of lead, cadmium and germanium if zinc concentrates are roasted in an oxygen deficient atmosphere.

As in the case of some other commodities (see section on bismuth) the cadmium content of zinc ores is not a constant ratio and future supply could vary as old zinc sources are depleted and new sources developed. In this light, the cadmium content of ores likely to be commercially attractive in the future should be periodically appraised to gain lead-time to accommodate potential supply problems.

Considering the average price of cadmium and the inflexibility in supply, improvement in secondary recovery techniques would have future significance.

Considering the uncertainty of future supply, it would seem that other more abundant or less costly commodities might find some application in the use areas traditionally or potentially occupied by cadmium. The whole issue of corrosion retardation, for example, demands attention both from the standpoint of materials and techniques. Similarly, speculative research directed to