THE MANUFACTURE OF ANTIMONY METAL IN INDIA.

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Antimony metal is one of the most important secondary metals and is used in a large number of valuable alloys. Before the war most of the requirements of this metal were met by foreign countries and the annual consumption was approximately 400–500 tons. Owing to the manufacture of war materials in India, the need for the manufacture of this metal in the country began to be felt. Rich ores of this metal are available in Chitral State on the borders of India, about 200 miles from Peshawar and before the war the ore was exported to foreign countries, mostly to Germany. The selling price in India of antimony metal was about Rs.600 per ton before the war, while it is now nearly Rs.2,000 per ton.

Antimony, as is well known, is used in the preparation of alloys like type-metal, hard lead, bearing alloy and special steels for the manufacture of bullets. It will, therefore, be realised that any country that wants to develop its metal industries, and especially the war industry, must not be dependent on outside sources for its supply of antimony.

The Star Metal Refinery of Bombay decided to take advantage of the conditions produced by the war and start the manufacture of antimony metal from the Chitral ore, which is mainly 'Stibnite', the sulphide of antimony. The factory is situated in the vicinity of Bombay and the cost of transport is necessarily heavy. Even up to the rail-head in Peshawar the transport by mules and other animals is a very troublesome affair, while the cost of rail transport from Peshawar to Bombay is not negligible.

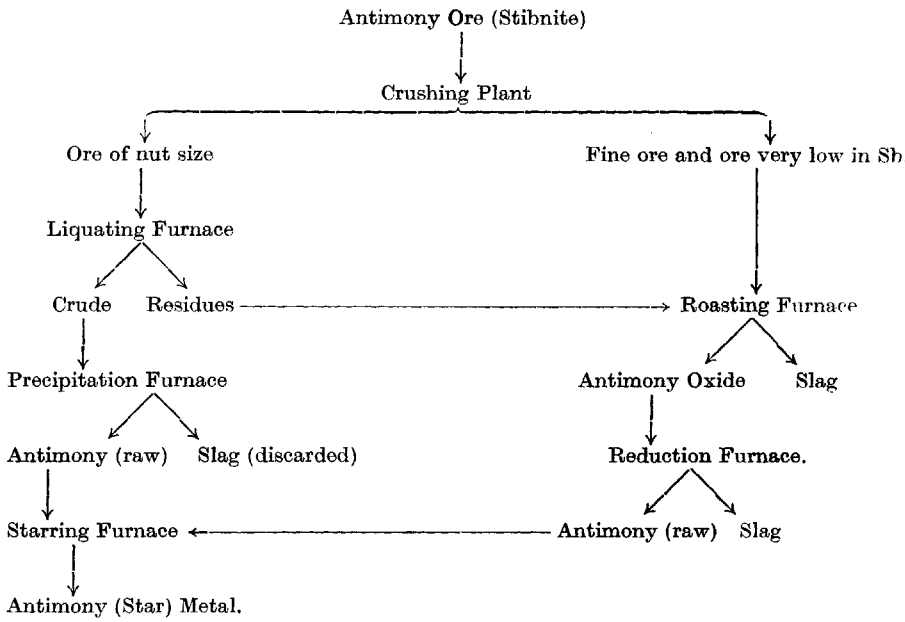
The ore contains from 20 to 65% sulphide. This is crushed and then submitted to the 'liquating' process, which consists of heating the same to about 550°C., when the antimony sulphide begins to fuse and to separate from the gangue or stone. Pure antimony sulphide containing 71·5% of the metal is called 'Crude'. This process is carried out in the 'Liquating Furnace'. The stone or gangue, remaining behind, still contains about 10 to 15% antimony and is called 'Residues'. These are later treated in the 'Roasting Furnace' for final recovery of all the antimony.

In order to recover the metal from the 'Crude', *i.e.* purified antimony sulphide, it is heated in the 'Precipitating Furnace' with iron scrap and soda ash. The iron combines with the sulphur with the formation of iron sulphide and the antimony is liberated in the form of molten antimony and collects at the bottom of the furnace. It is then tapped and cast into moulds. This impure metal is called 'singles' and has to be further refined or 'starred' (so called because the crystals of pure antimony have a star-like appearance).

This last operation is carried out in the 'Starring Furnace'. Here fluxes are added to remove the last impurities in the form of slag and the ingots obtained show the characteristic star-like crystals on the surface.

The recovery of the antimony, still remaining in the 'residues' referred to above, is based on the fact that when antimony metal or 'Crude' is heated to about 800°C., it is oxidised to antimony oxide, which appears like white smoke and can be condensed to a white powder. The oxide can then be reduced to the metal by heating it with a suitable reducing agent in the reduction process.

The following scheme will make the process easily understandable:—



It is expected that the annual Indian consumption of star antimony will go up to 1,000 to 1,500 tons and the factory will be able to meet that demand. It is to be hoped that, once this important chemical industry is firmly established, it will make India independent of outside sources even after the abnormal conditions of the war have disappeared.

I have given the above sketch in the hope that the manufacture of other secondary metals may also be thought of as likely objects of attack by the budding chemical industry of India.