

potassium of about equal size is then placed with it, and both strongly heated in the reducing flame; globules of tin will immediately appear if the metal was present in the ore, which by a little skillful manipulation may be made to coalesce into one, or the assay may be cut out of the charcoal with a knife, and ground with water in an agate mortar, when the beads will flatten into small disks under the pestle, and may be separated by washing.

To be sure that the metal is really tin, the following experiment may be made: Place the bead on clean charcoal without fluxes, and heat first in the reducing and then in the oxidizing flame. If tin it will lose its metallic character and become a white oxide, which it will be found very difficult to reduce again to metallic globule. This may be effected by the addition of a small piece of cyanide of potassium. Observe that no distinct coating is formed on the charcoal, which would be the case if the metal were lead; remove the bead to a small anvil and strike it with a hammer until flattened out (antimony and bismuth are brittle). The button boiled in a test tube with nitric acid does not dissolve, but is changed into a white insoluble powder.

Antimony gives a similar reaction, but is brittle and on charcoal would have burned and given off thick white fumes of oxide of antimony. These tests will serve to distinguish tin from other metals which it resembles, but another still more characteristic test may be made, as follows: Reduce the bead of tin from the ore by the method above described, hammer it out very thin, place it in a clean test tube and pour hydrochloric acid over it; action takes place and the metal dissolves. Before solution is complete (a portion of the metal remaining undissolved) pour a few drops of the solution into a vessel containing a dilute solution of perchloride of gold; a purple color will be produced which leaves no doubt that the metal is really tin. These tests are described with considerable attention to detail, because tin is liable to be found in new localities, and it is desirable to furnish the prospector with information by which he can test the ores he may find supposed to contain tin. It is very important to concentrate a considerable quantity of the ore as described, for experience has shown that tin may exist in small quantities in minerals and ores not indicated by the appearance.