

THE MINERALOGICAL MAGAZINE

AND

JOURNAL

OF THE

MINERALOGICAL SOCIETY OF GREAT BRITAIN AND
IRELAND

No. 19.

JANUARY, 1881.

Vol. IV.

X.—*On certain Crystallized products, formed in smelting operations.*

BY W. TERRILL, F.C.S.

COMMUNICATED BY J. H. COLLINS.

CRYSTALS have often been accidentally produced in the various processes of smelting, having the form and composition, or nearly so, of natural minerals; and have been from time to time described in the scientific journals. Some few, however, which have come under my notice have not been, so far as I am aware, previously described; and as the importance to mineralogy of a due regard to the nature of such crystals, as well as the conditions under which they may have been formed, is beyond question, I avail myself of this opportunity to lay before the Mineralogical Society specimens of the few products to which I allude, and to explain the circumstances of their formation:—

Specimen No. 1 contains some dark green crystals of arseniate of copper, resembling in appearance native olivenite. Before the blowpipe on charcoal these crystals melted easily, then, with a sort of deflugation, gave off copious arsenical fumes incrusting the charcoal, and yielded a button of metallic copper. An analysis of carefully selected crystals gave 62 % CuO, and 38 % As₂O₃, with no water; except for the absence of water and the slight excess of CuO, this is the composition of olivenite. The excess of CuO may be due to adhering particles of the associated black

oxide. This specimen was formed in the bed of a reverberatory furnace used for smelting copper ores (ore furnace making coarse metal).*

Specimen No. 2 was found in the bottom of the same furnace, and formed under the same conditions as the first mentioned—It is crystalline black oxide of copper, CuO .

Specimen No. 3 is a tin-white alloy of copper and arsenic. In hollow spaces dendritic crystals may be seen, resembling the ordinary artificial crystals of pure copper; an analysis of this specimen gave 76.9 % copper 22 % Arsenic with traces of FeS etc, or nearly Cu_4As .

This alloy was a co-product of a charge yielding a copper regulus of 77 % Cu . (white metal); it separated completely from the regulus, which retained but the merest trace of arsenic.

Specimen No. 4 is the same product as the last mentioned, but having escaped from below the regulus, was oxidized whilst hot, and is covered with a layer of green arseniate of copper.

Specimen No. 5. "Coarse metal" cooled very slowly: in hollow cavities black octahedral crystals have formed which are strongly magnetic. They have only been analysed qualitatively, and they contain copper, iron, and sulphur.

Specimen No. 6.—A piece of ordinary "white metal slag," which cooled and solidified upon a bed of "white metal." The surface which was in contact with the white metal below is beautifully crystalline in oblong patches, each patch being striated in two directions so as to form a cross. The striæ are so fine as to produce a remarkable iridescence.

No 6a. is the same slag showing the usual oblique pyramids.†

Specimen No. 7.—Thin lenticular crystals of a clear pale yellow color formed in the bed of a "test" used for cupelling argentiferous lead.

Chemical composition, pure oxide of lead. They were at first brilliantly transparent, but have become a little dull since.

Specimen No. 8.—Acicular crystals of molybdic acid, formed on the surface of a mass of melted regulus whilst cooling in the air, the regulus contained about 5 % molybdenum, and the dross, consisting chiefly of these crystals, was found on the surface when cold.

*The brick work around was considerably cracked, and the vault below contained water for a long time previous to the destruction of the furnace, so that steam could easily permeate the bed.

† This slag is very similar to that described by Mr. Arnold in the *Min. Mag.* vol. III. p. 114. J, H. C.