United States Patent [19]

Wiewiorowski et al.

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[54] **PRODUCTION OF ALUMINA FROM ORES**

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[52] **U.S. Cl.** ..... **423/126;** 23/305 A; 423/132; 423/483; 423/489

[51] **Int. Cl.**[2] **C01F 7/22**

[58] **Field of Search** 423/126, 132, 489, 483

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[57] **ABSTRACT**

An aluminum-containing ore such as a kaolin or montmorillonite clay is treated with a fluorine acid such as HF or H_2SiF_6 to produce aluminum fluoride (AlF_3) which is recovered from the liquid phase of the reaction mixture by crystallization as $AlF_3 \cdot 3H_2O$ crystals which are then dried and dehydrated to yield AlF_3. The crystallization mother liquor is recycled to the process to recover its AlF_3 values. The $AlF_3 \cdot 3H_2O$ crystals and separated solid phase of the reaction mixture are washed to recover AlF_3 values and the wash streams are recycled to the process. To produce alumina, the AlF_3 is pyrohydrolyzed to Al_2O_3 and HF. The HF is absorbed in the crystallization mother liquor and recycled with the mother liquor to the ore treatment step. All or a part of fluorine acid requirements can also be supplied from any suitable source such as, for example, a wet process phosphoric acid facility which is a plentiful source of inexpensive fluorine. The fluorine acid requirements can be supplied in a recycle stream of the process such as the crystallization mother liquor and/or a fresh make-up stream. The process converts the aluminum values in aluminum-containing ore deposits to a form (Al_2O_3) useful in the production of aluminum metal.

8 Claims, 3 Drawing Figures