

- [54] REMOVAL OF P₂O₅ FROM ALUMINUM FLUORIDE ENRICHED CRYSTALLIZATION MOTHER LIQUORS
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- [58] Field of Search **423/305, 126, 489, 87, 423/592**

[56] **References Cited**

UNITED STATES PATENTS

508,796	11/1893	Ackerman	423/126
1,391,172	9/1921	Doremus	423/132
1,403,183	1/1922	Milligan	423/126
1,797,994	3/1931	Morrow	423/489 X
2,780,524	2/1957	Gloss et al.	423/341
2,842,426	7/1958	Glocker	423/126
2,920,938	1/1960	Matoush	428/126
2,958,575	11/1960	Allen	423/489
3,056,650	10/1962	Matoush	423/126
3,057,681	10/1962	Gernes et al.	423/489
3,386,892	6/1968	Schmidt et al.	423/472 X

FOREIGN PATENTS OR APPLICATIONS

233,634	12/1971	U.S.S.R.	423/489
15,083	1892	United Kingdom	423/489
643,379	9/1950	United Kingdom	423/489

OTHER PUBLICATIONS

- J. W. Mellor's "A Comp. Treatise on Inorganic and Theoretical Chemistry", vol. 9, 1929 Ed., p. 711, Longmans, Green & Co., N.Y.
- Bureau of Mines Report of Investigations, No. 5997 "Methods For Producing Alumina From Clay" (1962) by F. A. Peters et al.
- Bureau of Mines Report of Investigations, No. 6133, "Methods For Producing Alumina From Clay" (1962) by F. A. Peters et al.
- Bureau of Mines Report of Investigations, No. 6229, "Methods For Producing Alumina From Clay" (1963) by F. A. Peters et al.
- Bureau of Mines Report of Investigations, No. 6290, "Methods For Producing Alumina From Clay" (1963), by F. A. Peters et al.

- Bureau of Mines Report of Investigations, No. 6431, "Methods For Producing Alumina From Clay" (1964), by Paul W. Johnson et al.
- Bureau of Mines Report of Investigations, No. 6573, "Methods For Producing Alumina From Clay" (1965), by F. A. Peters et al.
- Bureau of Mines Report of Investigations, No. 6730, "A Cost Est. Of The Bayer Process for Prod. Alumina" (1966), by F. A. Peters et al.
- Bureau of Mines Report of Investigations, No. 7758, "Methods For Producing Alumina From Clay" (1973), by P. J. Barrett et al.
- Bureau of Mines Report of Investigations, No. 6927, "Methods For Producing Alumina From Clay" (1967), by F. A. Peters et al.

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[57] **ABSTRACT**

Aqueous AlF₃ enriched crystallization mother liquors contaminated with P₂O₅ values and having less than 5% free acidity are treated with a material which provides bismuth ions in the mother liquor in amounts small enough to insure that the Bi/PO₄ mole ratio remains below about 1.05. Under these conditions, the bismuth and P₂O₅ react essentially quantitatively to form a BiPO₄ precipitate by which the P₂O₅ can be separated from the mother liquor. Bismuth can be regenerated from the BiPO₄ and recycled for further use in the process.

The invention finds utility in the preparation of AlF₃ by the reaction of an aluminum ore and P₂O₅ contaminated HF or H₂SiF₆ such as that available as a by-product of wet process phosphoric acid manufacture. The AlF₃ reaction product is recovered by a crystallization step which, because it is normally only about 70 to 90% efficient, produces a mother liquor containing substantial amounts of AlF₃. For economic reasons, this mother liquor is usually recycled to the process. However, the P₂O₅ introduced with the HF or H₂SiF₆ reactant appears in the AlF₃ enriched mother liquor and prevents recycle of the mother liquor for fear of contaminating the AlF₃ product with P₂O₅. The bismuth treatment of the present invention permits the recycle of the mother liquor to recover its AlF₃ content by reducing the P₂O₅ level, without leaving undesirably high levels of bismuth contaminants in the recycled mother liquor.

7 Claims, 1 Drawing Figure