

PREPARATION OF MANGANESE DIOXIDE FROM LOW GRADE MANGANESE ORES—PART I

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A number of hydrometallurgical processes have been proposed for the beneficiation of low grade manganese ores to yield products for metallurgical use. A great deal of information on this subject is contained in the U.S. Bureau of Mines reports and in Patent literature. These basic leaching processes that have been used with experimental success on low grade manganese ores are the ammonium sulphate,¹ the sulphuric acid, the sulphur dioxide and the nitrogen dioxide processes.²

In India, the expansion of the electrolytic alkali industry has been limited³ due to the few outlets for chlorine and hydrochloric acid. With a view to finding out more uses for these products, hydrochloric acid digestion studies, employing manganese minerals have been undertaken. Results of some preliminary experiments on the effect of roasting and leaching the low grade ore with hydrochloric acid are given below. A low grade ore from Shimoga District, Mysore, containing 34.14% Mn and 27.18% Fe was used for these studies.

The ore was roasted at 900° C. for one hour and the roasted product was leached with conc. hydrochloric acid at room temperature for different intervals of time. The results are given in Table I and graphically presented in Fig. 1.

Next, the ore was roasted at different temperatures and the roasted samples were leached with conc. hydrochloric acid for 20 minutes. The results are given in Table II and presented in Fig. 2.

The results indicate that preferential extraction of manganese by hydrochloric acid can be achieved by roasting the sample initially at 800° C. From an ore roasted at 800° C. containing 36.6% Mn and 30.4% Fe, nearly 70% of the manganese could be recovered by leaching with hydrochloric acid for 20 minutes. Hydrolysis of the leach solution with 10 times its volume of water gave a precipitate of manganese dioxide containing 85% MnO₂ and practically free from iron. The residue after leaching the roasted ore contained 55.54% Fe and 9.25% Mn. Further work is in progress.

TABLE I

Effect of Leaching Period on the Fe : Mn Ratio

(5 gm. roasted ore plus 25 c.c. conc. hydrochloric acid)

Time in Mins.	Composition of the Extract		Fe : Mn
	% Fe	% Mn	
5	1.98	17.87	1: 9.0
10	2.05	28.09	1: 13.7
15	2.08	29.53	1: 14.1
20	2.09	30.43	1: 14.5
35	2.15	30.53	1: 14.2
45	2.51	30.99	1: 12.3
60	4.24	32.5	1: 7.7

TABLE II

Effect of Temperature of Roasting on Fe : Mn Ratio

(5 gm. roasted ore plus 25 c.c. conc. hydrochloric acid for 20 minutes)

Temperature of roasting ° C.	Composition of the Extract		Fe : Mn
	% Fe	% Mn	
0	1.14	5.042	1: 4.4
500	3.52	5.17	1: 1.4
600	1.95	23.4	1: 12.0
700	1.47	28.62	1: 19.4
800	1.09	25.23	1: 23.1
900	2.92	30.43	1: 14.5
1000	3.47	25.33	1: 7.3

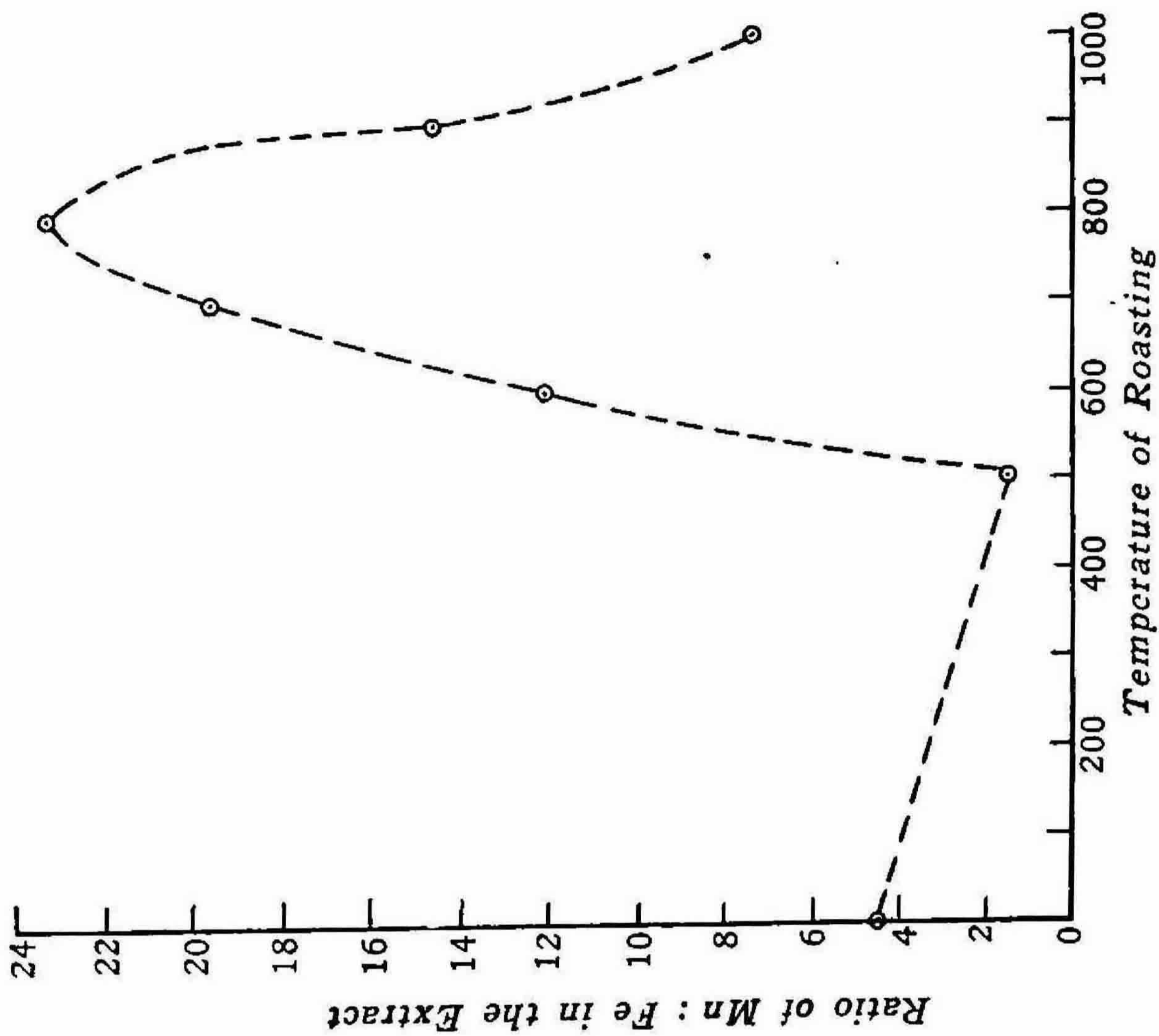


FIG. 2

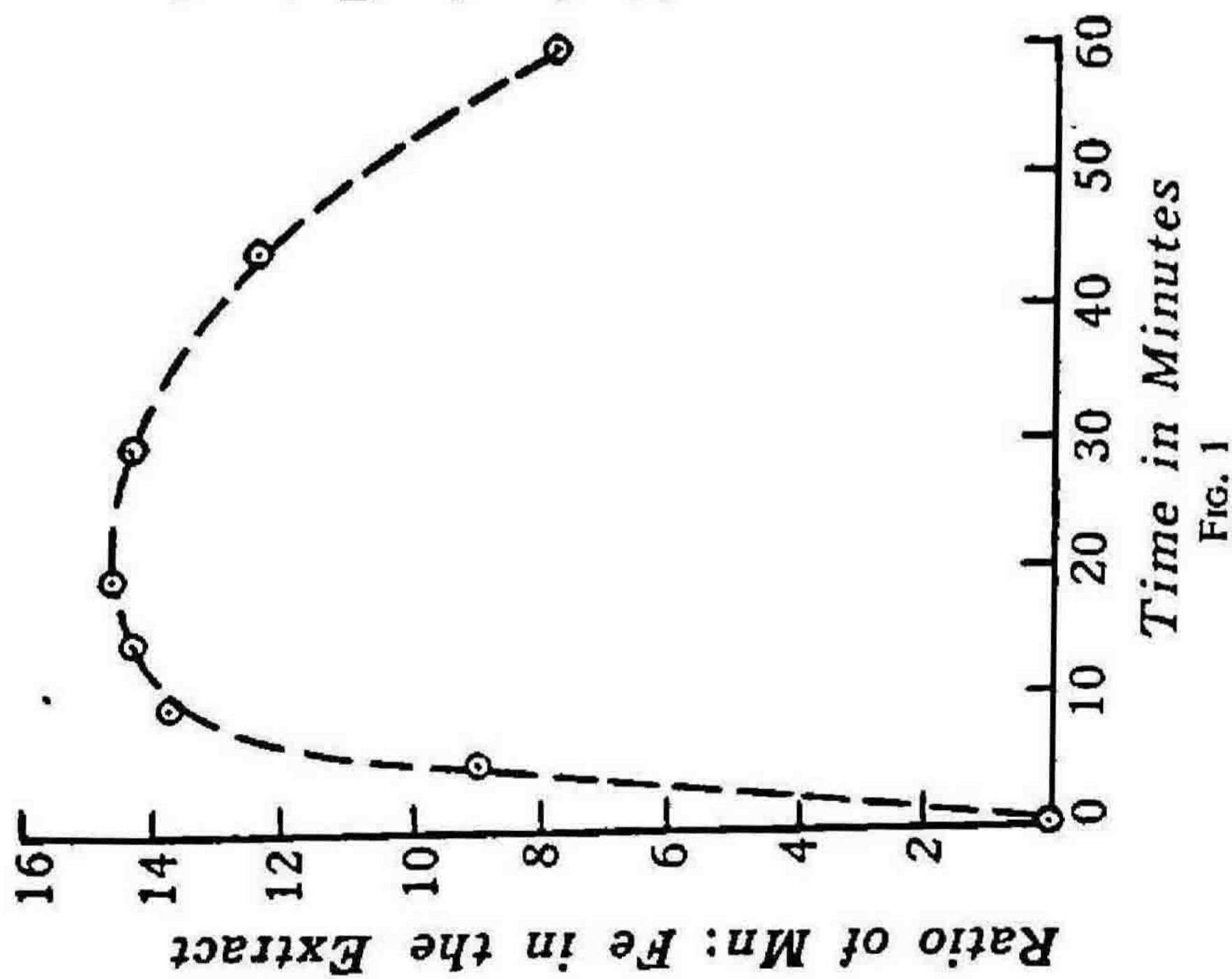


FIG. 1

Grateful thanks of the author are due to Prof. K. R. Krishnaswami and to Dr. M. R. A. Rao for interest and advice during the investigation.

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