

silica. Extraction of tin was negligible.

Further experimental work demonstrated that the fluoride extracted could be readily converted to aluminium fluoride. The only impurity detectable in this product by X-ray diffraction was aluminium sulphate. Since the presence of this compound was partly attributed to the small scale of the preparation, a larger scale experiment (300 g ore) was carried out. In order to improve the extraction of fluoride, the ratio of reagent; ore was increased by 33%.

Fluorine determinations indicated the following distribution:

Expt. No.	Reaction Time (hr)	% F in residue	Residue wt. (g)	% of Total F in		
				Residue	Produce	Wash
4	2	2.3	471.5	30	36	17

The fluoride content of the above product was again converted to aluminium fluoride, after a silica removal step. The aluminium fluoride was spectrographically analysed for selected impurities, with the results shown in Table 2. The sulphate content of the aluminium fluoride was also determined, and is included in Table 2.

Typical maximum limits specified by aluminium smelters are also included in Table 2.

The residue from the fluoride extraction step was further leached, to determine whether the aluminium content of the ore could be dissolved as aluminium sulphate without dissolving too much iron. On the contrary, atomic absorption spectroscopic analyses indicated that the ratio of iron:aluminium in the leach solution was about 17:1, with a low extraction efficiency for aluminium.

#### 4. DISCUSSION

In the 300 g scale experiment, 83% of the total fluorine was accounted for, with the balance explained by mechanical losses and incomplete washing, which would be easier to avoid on a larger scale. The extraction of fluoride, based on the residue analysis, was 70%, a substantial improvement on the 56% extraction achieved in the first three experiments, but still well below the 89% extraction achieved with another ore. However, the limited experimental work to date certainly has not yet optimised reaction conditions for the Moina 1 ore, which has a much higher fluorine content than the previous ore. Furthermore, it should be recognised that in a continuous process, the wash liquor could be recycled and its fluoride content recovered as product.

The aluminium fluoride products produced from the larger scale experiment appear to satisfy the specifications for aluminium smelting.

The copper content of product S1 was relatively high, but this is explained by the use of an item of copper apparatus at one point, which could be avoided.