

neighbouring transitions  $k_j$  and account is taken of these by using the experimental refractive index data in equation (2) and including the term under the summation. The various  $A_i^0$ ,  $A_j^0$  are found by an iterative method since they are all initially unknown. Details of the experimental method and calculation will be given elsewhere. Using our index data and some recently published values of the rotational constants<sup>5</sup> to calculate the  $k_i$  in equation (2), we find the values for the line strengths given in Table 1.

J. E. CHAMBERLAIN  
H. A. GEBBIE

Molecular Science Division,  
National Physical Laboratory,  
Teddington, Middlesex.

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### CRYSTALLOGRAPHY

#### X-ray Studies on Highly Pure Magnesium Oxide

HIGH-PURITY (99.999 per cent) magnesium oxide was prepared by the thermal decomposition of pure magnesium oxalate dihydrate. Details of the preparation, analyses and thermal decomposition of the magnesium oxalate have been given elsewhere<sup>1,2</sup>. Prior to the X-ray examination, the magnesium oxide was recrystallized by firing as a pressed disk at 1,500° C for 24 h. X-ray powder diffraction data were obtained by means of a 19 cm diameter camera using copper  $K_{\alpha}$ -radiation with a nickel filter, and standard procedures. The observed spacings are given in Table 1.

Table 1. X-RAY DATA FOR PURE MgO

hkl	I/I <sub>0</sub>	d (Å)
111	4	2.433
200	10	2.108
220	10	1.4899
311	4	1.2695
222	6	1.2155
400	3	1.0529
	2	1.0529
331	4	0.9662
	1	0.9661
420	4	0.9418
	2	0.9418
422	4	0.8594
	2	0.8594
511	2	0.8103
	1	0.8104

Table 2. COMPARISON OF THE LATTICE CONSTANTS OF MgO

Material	Lattice constant (Å)
MgO, data of Swanson and Tatge (ref. 4)	4.213
MgO, present study	4.2119 ± 0.0005

The accurate lattice constant of the cubic magnesium oxide was determined by the method of Nelson and Riley<sup>3</sup>, using sodium chloride as an internal standard. The result obtained is given in Table 2 together with the value given by Swanson and Tatge<sup>4</sup>, for comparison.

This work was supported by the Steelery Organization Research Department. I thank Dr. A. J. E. Welch for initiating and supervising the work.

R. A. BROWN\*

Inorganic Research Laboratories,  
Imperial College of Science and  
Technology,  
London.

\* Present address: Chemical and Physical Laboratory, Radio Corporation of America, Lancaster, Pennsylvania.

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### CHEMISTRY

#### Adsorption and the Differential Capacitance of the Electrical Double-layer at Platinum/Halide Metal Interfaces

MEASUREMENTS of the differential capacitance of the electrical double-layer at an LiCl-KCl eutectic melt/platinum interface at 450° C have been made by Laitinen and Roe<sup>1</sup> over a range of potentials from -0.34 V to -2.11 V versus a Pt/Pt<sup>2+</sup> (1 M) reference electrode. Their curve of capacitance versus potential can be roughly divided into two regions: an anodic region of comparatively high specific capacitance (~100 μF cm<sup>-2</sup>) and a cathodic region of low specific capacitance (~50 μF cm<sup>-2</sup>), the transition between them occurring at approximately -0.8 V to -1.0 V. The high values of capacitance were attributed<sup>1,2</sup> to the specific adsorption of chloride ions at potentials which are presumably anodic to the point of zero charge of this interface.

Double-layer capacitance versus potential curves for other metal/melt interfaces are quite unlike the previously published curves for platinum<sup>1,2,4</sup> in that they are symmetrical about a well-defined minimum at the potential of zero charge (silver, thallium and tin are exceptions to this rule in that they exhibit a step in the cathodic branch<sup>5</sup>). Although it appears that the halide ions are surface active, because, for example, the addition of iodide ions to a chloride melt produces an increase in double-layer capacitance<sup>6</sup>, the increase is the same in both the anodic and cathodic branches of the curve for a given |ε| (the magnitude of the rational potential).

The present work suggests that the double-layer capacitance of a platinum/melt interface is dependent on the well-known existence of oxide layers on platinum surfaces<sup>7</sup>, and on the specific adsorption of platinum ions at concentrations determined by the redox potential of the melt.

The capacitance of the double-layer at a flame-polished, platinum hemisphere microelectrode under certain well-defined conditions (see following) falls to a minimum at approximately -0.8 V versus a Pt/Pt<sup>2+</sup> (1 M) reference electrode (Fig. 1, curve a). In the region from -0.6 V to -0.8 V the capacitance varies with time so that it is

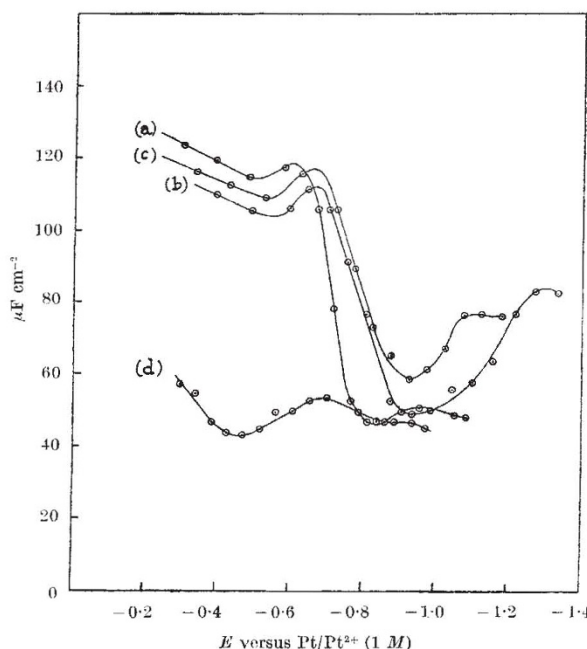


Fig. 1. The differential double-layer capacitance at platinum microelectrode/LiCl-KCl eutectic melt interfaces at 450° C. (a) Pure melt; (b) ~10<sup>-6</sup> M Pt<sup>2+</sup>; (c) ~10<sup>-3</sup> M Pt<sup>2+</sup>; (d) pure melt