orthorhombic unit cell with approximate lattice parameters of $a = 14{\cdot}60$ A., $b = 18{\cdot}40$ A., $c = 10{\cdot}02$ A. Based on the pycnometer density of 2·45 gm./c.c. the unit cell contains 42·7 molecules. These values confirm facial indices and axial ratios found from optical goniometer measurements. The structure appears to be quite complex, and further work using Weissenberg camera measurements will be necessary before an exact structure can be reported.

Electrical, hardness, and melting-point determinations indicate that the compound has interesting physical properties which are being investigated.

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Permeability and the Size Distribution of Pores

A RECENT communication by T. J. Marshall[1] directs attention to a formula for calculating the permeability of a porous medium from its pore-size distribution. This appears to be derived from an implicit model for a porous structure which is very similar to a model which we have found useful at the Gulf Laboratories. However, the formulæ which we derive are somewhat different from Dr. Marshall's.

The physical model, which we believe can be used advantageously to represent actual porous rocks, may be conceived in the following way. Consider a cylindrical bundle of straight capillary tubes the radii of which have a suitable range. Cut this bundle into thin slices, of equal thickness, perpendicular to its axis. Re-arrange randomly the pieces of tube in each slice and then reassemble the slices to form a cylindrical core. This structure of randomly interconnected capillary tubes of various radii forms the model which we have used for studying linear flow.

In any homogeneous porous body a plane section exposes a pore distribution the total area of which is a fraction φ of the area of the section, where φ is also equal to the volumetric measure of porosity. Hence, in any slice of the model the total area available for flow is φ times the area of the slice. Because of the random interconnexion between adjacent slices, however, the total area available for flow at the junctions is reduced to φ^2 times the area of a slice.

Based essentially on this idea, we have worked out formulæ relating capillary pressure, absolute and relative permeabilities, electrical resistivity index and formation factor. We have also set up a theory for the displacement of a fluid from a porous medium by a miscible fluid. Details will be published elsewhere.

It is noteworthy that the expressions we get for permeabilities are essentially the same as those derived empirically by Burdine[2]. A comparison with some of the available experimental work can be found in his paper. In view of the simplicity of the model, the general agreement between predicted and observed results is surprisingly good. It cannot be said, however, that an unequivocal conclusion has been reached.

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FROM the preliminary information and the reference given by Dr. Wyllie and Dr. Gardner, it appears that the difference in their permeability equations may arise from their use of a term for tortuosity. I have avoided this mainly by allowing for the effect of imperfect fit and dead ends and the effect of the smaller pore in a sequence on the average size of the necks connecting the pores. Further details are given in a paper[1] which is to appear shortly.

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Effect of Plastic Deformation on the Electrical Resistivity of Chromium

THE presence of a transition in the electrical resistivity and temperature coefficient of resistance of chromium in the region of 40° C. has been reported by several investigators[1]. In studying the influence of plastic deformation (at 150° C.) on high-purity chromium an anomaly has been found, in that below the transition temperature the deformed material had a lower resistivity than the annealed. Curves of resistivity versus temperature are shown in Fig. 1, together with the respective temperature coefficients of resistance. No hysteresis was observed in these measurements. A positive deviation in the temperature coefficient of resistance of the deformed material is observed both below and above the transition temperature. A minimum in the curve of resistivity versus temperature for the annealed material (Fig. 1) occurs at 41° C. and is in close agreement with other workers. Particulars of the specimen material are recorded in Table 1. As shown in Fig. 2, a change in the sign occurs, from negative to positive, in the value of $\Delta\rho$ (the difference in resistivity between the deformed and the annealed material) on increasing temperature through the transition region, namely, $-40°$ C. to $+40°$ C.

Table 1. RELEVANT HISTORY OF THE SPECIMEN

Analysis of chromium* (per cent)		Analysis of chromium* (per cent)	
Mg	< 0·0002	Ag	0·0001
Pb	0·0002	Ti	trace
Si	< 0·0005	C	< 0·0015
Al	0·0005	O_2	< 0·013
Fe	< 0·0005	N	< 0·0005
Cu	0·0002	H_2	< 3·0 ml./100 gm.

* All metallic elements determined spectrographically. (*a*) Specimen dimensions: 0·027 in. (0·073 cm.) diameter, 8·3 in. (20·7 cm.) length. (*b*) Specimen history: arc melted electrolytic chromium ingot (1·5 in. diameter) → extruded bar (0·5 in. diameter) → swaged rod (0·2 in.) diameter) → wire drawn to 0·027 in. diameter at 300° C. final 3 per cent reduction at 150° C. Total reduction in area 98 per cent. (*c*) Annealing treatment: 700° C. for 15 min. *in vacuo* (2×10^{-4} mm. of mercury); specimen completely recrystallized after this treatment.