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Wythenshawe, Manchester. Sept. 23.

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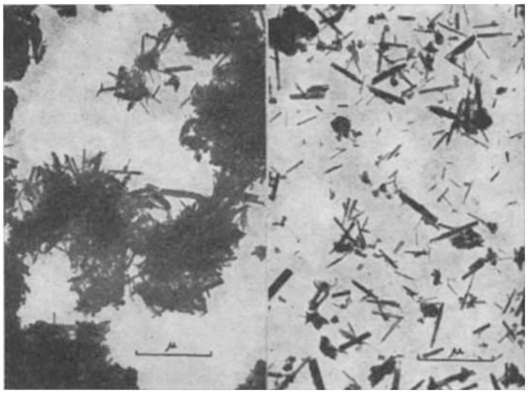
Petroleum Ether (80°-100° C.) used as a Dispersing Agent for the Examination of Particulate Matter by Electron Microscopy and Electron Diffraction

In these laboratories, many powders of electrochemical interest have been produced and their structural properties examined by electron microscopy and electron diffraction, using a Metropolitan-Vickers *E.M.*3 instrument.

Deposits obtained from aqueous suspension methods utilized initially for specimen grid preparation frequently resulted in the aggregation of the fine particles present so that it was found necessary to employ a dispersion technique. Specimens made for transmission electron diffraction have always been degreased by spraying with a fine jet of petroleum ether. It was the use of petroleum ether in this connexion which led to the idea of determining its efficiency as a dispersing agent. For most of the substances which have so far been studied here, satisfactory dispersions of fine particles have been obtained by employing the following simple method.

A small quantity of the powder is placed on to a clean glass microscope slide. From a wash bottle constructed using 'Quickfit' ground-glass joints and having a fine jet, a few drops of petroleum ether are directed on to the powder. This is then crushed to a very fine paste by means of a lancet-pointed dissecting needle. More dispersing agent is applied and the flat blade of the needle is moved across the slide, thus removing the larger particles and leaving a 'smear' of extremely fine particles. The 'smear' is moistened with a further small quantity of petroleum ether and the collodion film on a copper grid is drawn lightly over the dispersed material on the slide using a pair of forceps. After a few seconds (allowed for evaporation of any remaining liquid), the specimen grid is ready for insertion into the electron microscope.



(1) (2)

Fig. 1. Aqueous suspension deposit
Fig. 2. Petroleum ether dispersion

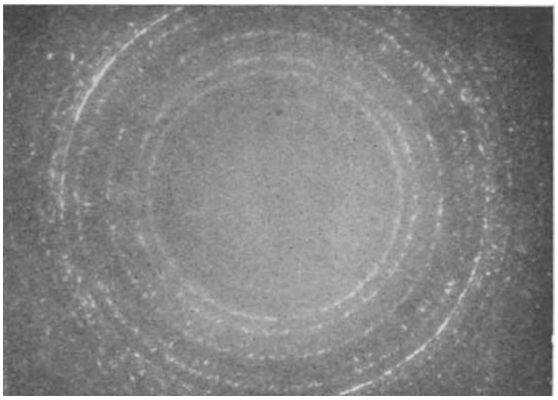


Fig. 3. Electron diffraction pattern from crystals similar to those shown in Fig. 2

The method has the following advantages: (*a*) It is suitable for the majority of inorganic and many organic materials which are insoluble in petroleum ether; (*b*) it is quick, as only one medium is used which rapidly evaporates; (*c*) the dispersed material is deposited on the membrane in such a way that it can be shadowed; (*d*) the dispersion is free from grease and is therefore suitable for electron diffraction.

Synthetic manganese oxides[1], oxides of lead, silver, nickel and vanadium, clay minerals, diatomaceous earth, pyranthrone and flavanthrone are some of the materials which have been investigated in this department by electron microscopy and electron diffraction after successful dispersion using the method described.

Figs. 1 and 2 show the rod-shaped crystals obtained from a sample of α-manganese dioxide (with potassium in the lattice) which had been heated at 400° C. in oxygen for 24 hr. The highly resolved transmission electron diffraction pattern of Fig. 3 was taken from crystals like those in Fig. 2.

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Determination of Arc Temperatures using Shock Waves

Some years ago, Suits[1] suggested and developed a method for the determination of the gas temperature of an arc discharge by the measurement of the velocity of a sound wave passing through the arc channel. The sound wave was obtained from the initiation of a spark discharge, and its propagation was observed by the increased brightness it produced in the channel. In his investigation, Suits observed that the original pressure disturbance created by the spark possessed abnormally high velocities which were rapidly attenuated with the propagation of the disturbance. However, since his experiments showed that for different spark-strengths, and hence for