never exceeded that of hydrogen. The rates of adsorption were slightly lower in every case, but, above 218° C. after a period of two or three hours, the rates became identical. Apparently the factors influencing the adsorption differences of the hydrogen isotopes are: (1) surface area of the adsorbent for Van der Waals' adsorption, and (2) the chemical constitution of the adsorbent in the case of activated adsorption.

The high-temperature heats of adsorption for hydrogen on zinc-molybdenum oxide, cobalt-molybdenum oxide and nickel-molybdenum oxide were 21,400, 31,400 and 21,600 cal. respectively, compared with the corresponding values of 30,100, 34,200 and 31,125 cal. for deuterium. These values were calculated from the adsorption isotherms at 400° C. and 444° C. Differences in activation energy have also been found.

These results are to be published in greater detail in the near future.

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Aug. 17.

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¹ Taylor and Smith, *J. Amer. Chem. Soc.*, **60**, 367 (1938).

² Maxted and Moon, *J. Chem. Soc.*, 1542 (October 1936).

³ Taylor and Pace, *J. Chem. Phys.*, **2**, 578 (1934).

⁴ Klar, *Naturwiss.*, **22**, 822 (1934); *Z. phys. Chem.*, **27**, B, 319 (1935); **174**, A, 1-14 (1935).

⁵ Beebe *et al.*, *J. Amer. Chem. Soc.*, **57**, 2527-32 (1935); **58**, 1703-6 (1936).

Raman Spectra of Compounds with Three Benzene Rings

In this investigation we have succeeded for the first time in obtaining the Raman spectra of *o*-diphenyl benzene and *m*-diphenyl benzene. We have studied these compounds with the view of obtaining some evidence about the nature and symmetry of their benzene rings and also to record their Raman lines and to assign their frequencies correctly. These

a, *o*-DIPHENYL BENZENE; *b*, *m*-DIPHENYL BENZENE

two substances are solid at the ordinary temperature and they present the difficulty of showing such powerful fluorescence under the total radiation of the mercury arc that the Raman lines are almost all completely masked, leaving scarcely any trace of such lines on the plate. Using these substances in the molten state and taking other great precautions, we have been able to suppress, as the accompanying

photographs show, a good deal of the continuous fluorescent background, which was found to be even more marked in the case of *m*-diphenyl benzene.

O-diphenyl benzene has yielded 33 new lines not recorded before, at frequencies 3196, 3059, 1608, 1595, 1577, 1503, 1471, 1430, 1288, 1247, 1180, 1158, 1059, 1032, 1005, 993, 874, 839, 774, 744, 708, 708, 615(br.), 558, 521, 501(?), 406, 359, 319, 253, 238(br.), 144(br), 112(br) and 73(br) cm^{-1} .

In addition to these frequencies, *o*-diphenyl benzene shows on our plates seven anti-Stokes lines not recorded before, at frequencies 993, 708, 615, 406, 359, 238 and 144 cm^{-1} .

M-diphenyl benzene, in spite of very marked fluorescence observed on the plates, has also yielded 27 new lines not recorded before. The frequency shifts observed in this case are: 3062, 1607, 1597, 1566, 1494, 1453, 1403, 1345, 1309, 1279, 1241(br), 1153, 1098, 1039, 1000, 964, 901, 838, 801, 766, 707, 611, 406, 275(diff.), 238(diff.), 151(diff. and br.) and 80(diff. and br.) cm^{-1} .

Further investigation is proceeding on these very interesting results, and we hope to give all the details and discussions in a paper which we are offering for publication very soon.

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July 8.

Electrolytic 'Polishing' of Zinc

P. A. JACQUET has described a process whereby 'polished' copper surfaces, resembling in smoothness and brightness those yielded by ordinary mechanical polishing, could be obtained by anodic treatment in a suitable electrolyte, under prescribed conditions of current and E.M.F.¹ He has since extended his method to lead and tin² and to aluminium³, and the same principle has been applied to the polishing of nickel⁴, but no work appears to have been published on the electrolytic 'polishing' of zinc.

Recently, in the course of an investigation on the oxidation of zinc sheet, we have sought a method of preparation which would avoid production of a flowed or disturbed surface layer such as results from mechanical polishing, and at the same time be free from possible objections of chemical etching, notably the risk of traces of reagent remaining in crevices produced by the etching process itself.

Employing a similar electrical circuit to that used in the earlier work, we have obtained quite smooth and bright surfaces from the following procedure. The specimen receives a preliminary abrasion with emery paper followed by de-greasing in benzene or other suitable solvent. It is then made the anode (a strip of copper serving as cathode) in an electrolyte consisting of a 25 per cent solution of potassium hydroxide; this is used at room temperature, and is agitated by the passage of a stream of air or nitrogen as an alternative to the rotating anode recommended by Jacquet. Electrical relationships (E.M.F./current-density) are shown in the accompanying graphs for electrode distances of 2.5 mm. and 15 mm. respectively. The shape of the curve is similar to the typical curve established by Jacquet for other metals and electrolytes. 'Polishing' occurs characteristically, without evolution of gas, in the range represented by the nearly horizontal portion of the curve, that is, at a current density of approximately 16 amp./dm.², the effective E.M.F. being spread over a wider range at the shorter distance.