

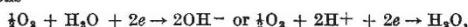
Fig. 1.

Fig. 2.

greater than i . In Fig. 2, the corresponding case for a zinc-magnesium couple is shown. Here, the much less easily polarizable (low-over-voltage) zinc cathode, curve C_{Zn} , causes a relatively large increase in magnesium corrosion.

In both the above cases, the anodic polarization curves representing the metal dissolution of mercury and zinc respectively—the positions of which depend on the single electrode potentials of the metals—do not need to be considered, because the corroding potential of magnesium is so much less noble (of the order of -1.2 to -1.5 v. on the hydrogen scale⁶) than even the equilibrium single potentials of mercury and zinc (E_{H^+} , $+0.799$ and -0.762 v. respectively). For metal couples where the two anodic curves are close together, we may sum these in the same way as the cathodic curves and obtain a graphical representation of the more complicated case where anodic and cathodic reactions occur on both metals simultaneously. We may also make allowance for the resistance of the circuit where this is not very small, as here assumed. These constructions and others showing (a) the conditions at a pore in a metal-on-metal coating, (b) the reason why cadmium ($E_{H^+} = -0.402$ v.) is usually anodic towards iron ($E_{H^+} = -0.440$ v.) under corrosive conditions, are given in my original paper. The yet more complicated case of trimetallic systems—important in practice where, for example, a zinc protector is used to counteract the harmful action of a cathodic metal in a couple—may also be usefully treated along the same lines; I hope to elaborate this matter elsewhere.

The remark by Messrs. Le Brocq and Cocks that presence of oxygen reduces hydrogen overvoltage may perhaps be more accurately stated: oxygen at a cathode diminishes the total cathodic polarization at any given current-density, by providing the alternative *net* cathodic reactions



which begin at more noble potentials than the reduction of H^+ to H_2 . At an oxygen-reduction cathode, there need be no intermediate formation of H or H_2 .

T. P. HOAR.

Metallurgical Laboratories,
Cambridge.
Nov. 16.

- ¹ Le Brocq, L. F., and Cocks, H. C., *Nature*, **156**, 536 (1945).
² Hoar, T. P., *J. Electrodepos. Tech. Soc.*, **14**, 33 (1938). *Met. Ind.*, **51**, 649 (1937); **52**, 87 (1938).
³ Evans, U. R., *J. Franklin Inst.*, **209**, 45 (1929).
⁴ Pourbaix, M., *Chim. Ind.*, **41**, 110c (1939).
⁵ Wagner, C., and Traud, W., *Z. Elektrochem.*, **44**, 391 (1938).
⁶ Gatty, O., and Spooner, E. C. R., "The Electrode Potential Behaviour of Corroding Metals" (O.U.P., 1938).

3 : 4-Benzoxanthene

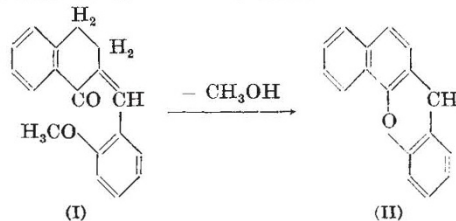
o-METHOXYBENZALDEHYDE condensed with α -tetralone in alcoholic potassium hydroxide to give 2-(*o*-methoxybenzylidene)- α -tetralone¹ (I) in faint yellow plates, m.p. 110–111°. When (I) was refluxed with phosphorus pentoxide in xylene for twenty hours, it gave in a poor yield a colourless product (II), m.p. 91–92°, thought to be 8-methoxy-3 : 4-benzofluorene. (II) gave in absolute alcohol a red picrate, m.p. 125–126°.

This compound (II) can be obtained in a much better yield by heating (I) with a fused mixture of potassium hydrogen sulphate and sodium sulphate at 260–270° for three-quarters of an hour.

Analysis showed that (II) contains neither methoxyl nor hydroxyl groups. This was supported by the fact that it was insoluble in alkalis and was recovered unchanged on being refluxed with hydriodic acid (d., 1.96) in glacial acetic acid for five hours. It was easily oxidized by different oxidizing agents (selenium dioxide, cold or hot sodium dichromate or potassium permanganate in acetic acid, alkaline potassium ferricyanide and cold chromic acid in acetic acid) to give the same colourless product, m.p. 161–162° (III). This cannot be a 3 : 4-

benzofluorene, as all these compounds are coloured. On drastic oxidation of (II) with a boiling solution of chromic acid in glacial acetic acid, an orange-red compound, m.p. 348°, insoluble in most organic solvents, was obtained; this compound is under investigation.

We found that the melting point and the physical properties of (III) resembled those of 3 : 4-benzoxanthone. This identity was ascertained by the fact that no depression of the melting point was observed on admixture with an authentic specimen².



This shows that ring (I) closed under the influence of phosphorus pentoxide or the pyrosulphate, with the elimination of methyl alcohol, to give 3 : 4-benzoxanthene (II), which gave on oxidation 3 : 4-benzoxanthone (III).

This new method is now applied for the synthesis of substituted 3 : 4-benzoxanthenes.

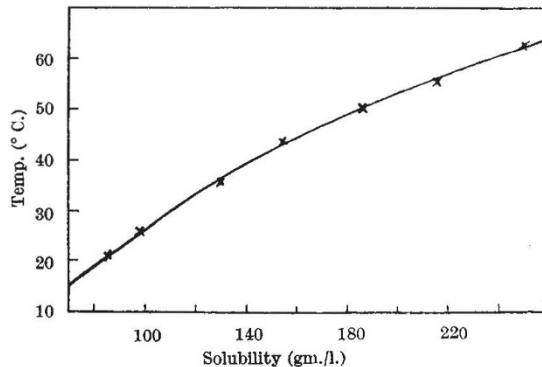
FAWZY GHALI BADDAR.
MUNIR GINDY.

Fouad I University,
Abbassia, Cairo.
Nov. 11.

- ¹ Rapson, W. S., and Shuttleworth, R. G., *J. Chem. Soc.*, 638 (1940).
² Knapp, W., *J. Prakt. Chem.*, **146**, 116 (1936).

Solubility of Pyrocatechol in 1, 2, 4-Xylenol

LOCAL deposits of lignite were worked up under the Germans by low-temperature carbonization and subsequent hydrogenation of tar by means of converted water gas. The water which formed in the course of this process was extracted for phenols and other organic substances by means of isobutyl acetate and the extract worked up by distillation. Phenol and the cresols were obtained in an impure state, the heavier phenolic substances being returned to the hydrogenation process.



In an attempt to obtain pyrocatechol in a pure form it was found that it could only be recrystallized with considerable loss from benzene, but that we had at hand a more efficient solvent in the mixture of xylene constituting the fraction which distilled before pyrocatechol.

The solubility of pyrocatechol in 1,2,4-xylene (Merck) was measured and expressed in the accompanying graph. The presence of homo- and isohomo-pyrocatechol does not interfere. Pyrocatechol crystallizes in small plates of a melting point of 102–103° C.

A paper on the composition and separation of the above-mentioned mixture of phenols is in preparation.

W. LOWENSTEIN.

Czechoslovak Works for the Manufacture of Synthetic Fuels,
By-products Department,
Zaluzi, near Most,
Czechoslovakia.
Dec. 1.

Rh Blocking Antibodies

THE detection of *Rh* sensitization in a patient often depends on the detection of *Rh* antibodies. *Rh* agglutinins are most commonly sought, but in certain cases where *Rh* sensitization is anticipated they are not found. In some of these sera, 'incomplete' or 'blocking' antibodies are found.

A mother received 1,000 c.c. of *Rh*-positive blood and was subsequently delivered of a stillborn child affected with congenital hydrops. Samples of blood were first obtained on the fifth day after transfusion. The mother was *Rh*-negative. The maternal serum was examined