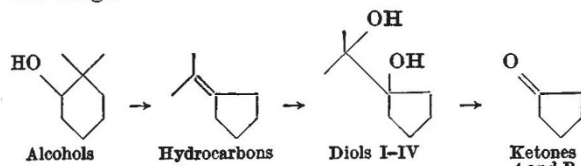


Iso-agnostadiene, when oxidized with osmium tetroxide, gave a mixture of two diols of formula $C_{30}H_{50}O_2$, which differ only in the steric configuration of their hydroxyl groups and were separated by chromatographic analysis. Both *diol I*, $C_{30}H_{50}O_2$, m.p. 140–142° (found: C, 80.97; H, 11.47 per cent; $C_{30}H_{50}O_2$ requires: C, 81.45; H, 11.31 per cent), and *diol II*, $C_{30}H_{50}O_2$, m.p. 128–130° (found: C, 80.68; H, 11.20 per cent), gave, on oxidation with lead tetra-acetate, the *ketone A*, $C_{27}H_{42}O$, m.p. 85–87° (found: C, 84.51; H, 10.59 per cent; $C_{27}H_{42}O$ requires: C, 84.82; H, 10.99 per cent), while acetone (isolated as the 2-4-dinitrophenylhydrazone) was obtained in almost theoretical yields. The same series of reactions was carried out with *iso*-lanostadiene, yielding diols III and IV, $C_{30}H_{50}O_2$, and the corresponding ketone *B*, $C_{27}H_{44}O$ (Ruzicka's substance V), the constants of which were in essential agreement with the values given by Ruzicka *et al.* (*loc. cit.*). *Iso*-agnostadiene and *iso*-lanostadiene were further subjected to ozonolysis, when acetone and the respective ketones *A* and *B* were obtained in one stage.



The loss of acetone with formation of a ketone, when the diols obtained by osmium tetroxide oxidation of *iso*-agnostadiene and *iso*-lanostadiene are further oxidized with lead tetra-acetate, indicates the presence of a terminal *iso*-propylidene grouping in these hydrocarbons. The retro-pinacol rearrangement occurring when triterpenoid alcohols are dehydrated with phosphorus pentachloride³ thus takes place also in the analogous formation of *iso*-agnostadiene and *iso*-lanostadiene, and establishes the location of the hydroxyl group in the lanosterol molecule in the terminal ring, in a position adjacent to the *gem*-dimethyl group. A detailed account of this work will appear elsewhere in due course.

C. DORÉE
J. F. MCGHIE
F. KURZER

Chelsea Polytechnic,
London, S.W.3.

King's College of Household and Social Science,
London, W.8.

July 26.

¹ Dorée, McGhie and Kurzer, *J. Chem. Soc.*, 1467 (1947).

² Ruzicka, Montavon and Jeger, *Helv. Chim. Acta*, **31**, 818 (1948).

³ Ruzicka *et al.*, *Helv. Chim. Acta*, **28**, 767, 942, 1628 (1945).

Specific Solvents for Lower Rank Bituminous Coals

IN the course of recent studies of the effect of solvents on bituminous coals, a number of solvents have been found to share with pyridine and with ethylene diamine¹ the property of extracting a considerable quantity of coal at atmospheric temperatures. The difference between these and other solvents is sufficiently marked to warrant their designation as specific solvents for coal. The main types of specific solvent appear to be: (1) aliphatic compounds containing at least one primary amino group; (2) aromatic

compounds containing at least one primary amino group attached to an aliphatic side-chain; (3) certain heterocyclic nitrogen compounds, such as pyridine, piperidine, morpholine (but not piperazine or pyrrole).

The specificity of the interaction is emphasized when piperazine and dioxan (inactive) are compared with morpholine and piperidine (active). Slow diffusion of the solvent through the solid often tends to obscure the issue, especially with solvents of high viscosity.

Sufficient solvents have not yet been tested to enable a hypothesis to be formulated. It is already evident that the effect is complex, depending probably upon a suitable combination of at least two properties, one promoting swelling and loosening of the structure, the other solution. At room temperature many compounds (for example, phosphorus oxychloride and ethylene oxide) cause pronounced swelling, but little or no solution; the reverse combination has not been observed. The apparent dependence of solution upon swelling has also been noted by Losikov²; a general connexion between the two phenomena, as regards different ranks of coal, was found by several earlier investigators³.

It is of interest to consider the extraction¹ of lower rank coals with ethylene diamine at its boiling point in the light of Kiebler's generalization⁴ that the percentage of bituminous coals extracted by a number of different solvents at a given temperature is correlated with the internal pressure of the solvent better than with any other physical property. There are many conspicuous exceptions to this rule (for example, water), which give too low a yield. Direct comparison is not possible since Kiebler's results are expressed in the form of four correlation lines representing experiments at 150° C., 200° C., 150° C. and 300° C. respectively, whereas ethylene diamine boils at about 117° C. However, if points taken from Kiebler's lines (extended where necessary) at the appropriate internal pressure (117 cal./c.c.) are plotted against temperature, and the resulting curve is extended to 117° C., the expected yield appears to be less than one-third of that obtained experimentally.

Pyridine, which extracts coal at room temperature, and aniline, which is effective only at higher temperatures, both occupy similar relative positions (above the average) in Kiebler's correlation. The differences between these classes probably tend to decrease at higher temperatures. But it seems reasonable to treat the specific solvents (such as ethylene diamine) as a class distinct from those of intermediate solvent power, and from those which are exceptionally inactive, like water.

It is clear that whereas, in such solvents as water and the glycols, hydrogen bonds linking hydroxyl groups contribute largely to the latent heat of vaporization (and therefore to the internal pressure), their presence does not impart the power of functioning as a solvent for coal.

I. G. C. DRYDEN

Experimental Station,
British Coal Utilisation Research Association,
Leatherhead.
Aug. 17.

¹ Dryden, I. G. C., *Nature*, [162, 959 (1948)].

² Losikov, B. V., *Izvest. Vsesoyuzn. Teplotekhn. Inst.*, **14**, 26 (1941).

³ For example, Bakes, Fuel Research Technical Paper No. 37 (H.M. Stationery Office, 1933). Usznetsov, 1935 (see *Fuel*, **18**, 114; 1937). Agde and Hubertus, *Braunkohlen Archiv*, No. 46, 3 (1936).

⁴ Kiebler, M. W., *Indust. Eng. Chem.*, **32**, 1389 (1940). See Lowry, "Chemistry of Coal Utilisation", **1**, 737.