intermediate. The resin is, therefore, formed structurally by small irregular relative displacements of the molecules from the crystalline formation and not by radical rearrangement of a random nature.

The size of the unit cell of *p*-cresol alcohol and the arrangement of molecules therein will be described in a more detailed communication.

This research has been carried out at the instigation of Sir Gilbert Morgan, director of the Chemical Research Laboratory, to whom thanks are due for permission to publish the results, and the X-ray work has been carried out under Dr. G. W. C. Kaye, superintendent of the Physics Department, National Physical Laboratory.

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Chemical Properties of the Rare Gases

IT is known that the rare gases argon, krypton and xenon give unstable chemical compounds with van der Waals bonds, namely, the hydrates. They have been obtained by compressing the gas over water at 0° C. In the case of argon, the crystals of the hydrate are formed at a partial pressure of argon of about 100 atm. I have already shown by an independent method[1] that radon, too, forms a hydrate which is much more stable than those of other rare gases. Radon is easily held by crystals of sulphur dioxide hydrates, when they are formed from snow and sulphur dioxide below the eutectic point or recrystallized. The radon hydrate is isomorphous with the hydrate $SO_2.6H_2O$, as its distribution between the gaseous phase and the crystal obeys the Berthelot-Nernst law: the ratio Rn/SO_2 in crystals is proportional to the corresponding ratio in the gas:

$$\frac{\text{Rn (crys.)}}{\text{SO}_2\text{(crys.)}} = D\frac{\text{Rn (gas)}}{\text{SO}_2\text{(gas)}},$$

where the constant D for Rn has the value 0·6.

I have also studied the possibility of an isomorphous 'seizure' of argon and neon by the crystals of sulphur dioxide hydrate, when formed from sulphur dioxide and snow at − 8° C. I found that argon is held by this hydrate, and could thus be transferred quantitatively from the gaseous phase into the crystals. The partition factor is constant and equal to 0·007. No neon hydrate (or any other compound of neon) is as yet known. Its dissociation pressure is presumably some thousands of atmospheres. Nevertheless, neon is also taken up by the crystals of sulphur dioxide hydrate, though with greater difficulty than argon. Only 1·2 per cent of neon goes into the crystals after passing ninety charges of sulphur dioxide into a tube containing snow and neon at − 8° C., each time about 80 per cent of the sulphur dioxide being deposited as hydrate. Under the same conditions only traces of helium, not more than 0·2 per cent, could be found in the crystals. Consequently neon, too, forms a hydrate, isomorphous with the sulphur dioxide hydrate, of the formula $Ne.6H_2O$; the constant D for neon is of the order of 0·00005.

Different stability of the rare gas hydrates makes it possible to separate them quantitatively by chemical means. After twelve depositions of sulphur dioxide as hydrate of the order of 60–70 per cent each, more than 99 per cent of radon is transferred into the crystals. By means of a current of sulphur dioxide more than 99·5 per cent of helium and neon, and about 90 per cent of argon, may be separated from crystals containing radon. For a quantitative separation of argon and radon, the hydrate must be decomposed and the separation repeated. For quantitative deposition of argon (98 per cent), 160 depositions of sulphur dioxide hydrate (80 per cent each) are needed. The whole operation lasts 8–9 hours. The depositing crystals seize, chemically and mechanically, no more than 0·5 per cent helium and about 3 per cent neon. Consequently, it is possible to separate chemically argon and radon from helium and neon, and radon from argon. It is interesting to note that the chemical properties of argon are nearer to those of radon than to neon.

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[1] Nikitin, B. A., *Z. anorg. allg. Chem.*, **227**, 81 (1936).

Proliferation-promoting Substances from Cells injured by Ultra-violet Radiation

As reported in this journal[1] and elsewhere[2], fractions which stimulate the growth, fermentation and respiration of yeast have been isolated in our laboratories from cells injured by ultra-violet irradiation, X-rays and other means. The following experiments by a new technique have confirmed the production of proliferation-promoting substances by cells injured by ultra-violet radiation.

Reader's medium solidified with agar was cut into blocks 3 mm. × 5 mm. × 5 mm. Dilute suspensions in Reader's medium from cultures of *S. cerevisiœ* grown on Saboraud's slants were applied to the tops of these blocks. Cover glasses were put over the inoculated areas and sealed to the blocks with agar. The materials to be tested for proliferation-promotion were added to the bottoms of the blocks, and the cover glasses and hanging blocks placed on culture slides ringed with 'Vaseline'. The cultures were incubated at room temperature for 24–48 hours. Areas of growth on the tops of the blocks were then recorded by photomicrographs. The proliferation-promoting materials diffused from the bottoms of the blocks to the cells on top, where they caused increased proliferation.

Effects of the following materials were compared: water, Reader's medium, unirradiated and irradiated yeast suspensions, cell-free fractions from unirradiated and irradiated yeast suspensions, and a highly potent bios preparation from malt combings. Yeast suspensions were prepared by adding 3·5 gm. of baker's yeast to 200 c.c. of Ringer's glucose-phosphate solution. Portions of these were irradiated in quartz test tubes, with constant stirring, by the full ultra-violet from a quartz mercury arc until about ninety per cent of the cells were killed. Cell-free fractions were usually prepared by centrifuging the suspensions for 15 minutes and decanting the supernatant fluid, occasionally by filtration through a Berkefeld filter.

In all experiments, growth on blocks to which ultra-violet injured cell suspensions or cell-free fractions from these had been added was much greater