CCCCXXV.—*A New Oxide of Rhenium. Rhenium Pentoxide.*

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Noddack (*Z. anorg. Chem.*, 1929, **181**, 1) described two well-defined oxides of rhenium, the white Re_2O_8 and the yellow Re_2O_7, together with a third, a reduction product of indefinite composition subse-

quently shown (Briscoe, Robinson, and Stoddart, this vol., p. 666) to be due to $ReO_2,2H_2O$, from which substance a black dioxide was obtained. It is here shown that the reduction of the heptoxide with metallic rhenium gives rise to a purplish-red *pentoxide*, Re_2O_5, not previously described. This material is insoluble in water, perfectly stable in air, and may be heated in oxygen to about 300° or in sulphur to about 190° without change of composition but with darkening in colour. Above 300° in a vacuum sublimation takes place: a black residue of indefinite composition remains, and white, yellow, and violet films are formed on the cooler parts of the tube. Dry hydrogen chloride has no effect at moderate temperatures, but chlorine gives a greenish-yellow vapour which condenses to a brown solid.

The heptoxide is reduced by sulphur and also by carbon above 300° with the evident formation of some pentoxide, whilst the moist dioxide, when heated for a long time at 110°, acquires a superficial reddish film which is probably the new oxide.

Experimental.

Metallic rhenium and excess of rhenium heptoxide were sealed together in a Pyrex tube. The oxide was then vaporised, and the vapour allowed to remain in contact with the metal for a considerable period. The residue in the tube consisted of a red powder together with excess of the heptoxide, from which it was separated by washing with water. The washed material was a purplish-red powder, very uniform in colour from sample to sample and evidently finely crystalline in character. After drying, either in a vacuum over phosphoric oxide or at 110° in air, it was analysed by reduction to the metal in a current of pure hydrogen with the following results:

Wt. of oxide, g.	Wt. of Re, g.	Re, %.	Method of drying.
0·1908	0·1577	82·66	110°
0·1796	0·1490	82·94	110
0·1620	0·1326	81·85	P_2O_5
0·2165	0·1792	82·77	P_2O_5
0·1374	0·1136	82·68	P_2O_5
		Mean 82·58	

The material is obviously *rhenium pentoxide* (Re_2O_5 requires Re, 82·30%).

By transmitted light the pentoxide when in thin flakes is bottle-green and its streak is also green. It is insoluble in either dilute or concentrated sulphuric or hydrochloric acid and in caustic potash solutions, but dissolves in warm dilute nitric acid and in fused caustic potash.

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