Short Communications

Contributions intended for publication under this heading should be expressly so marked; they should not exceed about 1000 *words; they should be forwarded in the usual way to the appropriate Co-editor; they will be published as speedily as possible. Publication will be quicker if the contributions are without illustrations.*

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Crystallographic data for some ditertiary arsine–metal carbonyl complexes of Group VI elements.

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Crystallographic data are reported for three complexes of the type M(CO)$_4$(diarsine), where M = Cr, Mo, or W and diarsine = *o*-phenylenebisdimethylarsine $C_6H_4[As(CH_3)_2]_2$, the preparation of which has been described (Nigam, Nyholm & Stiddard, 1960). Single crystals were obtained by slow evaporation of solutions in sodium-dried benzene, the solutions being kept in an atmosphere of dry nitrogen. Unit-cell dimensions were measured from Weissenberg and oscillation photographs (Cu $K\alpha$ radiation, $\lambda = 1{\cdot}542$ Å), the crystals being sealed in thin Formvar envelopes during the exposures to prevent possible hydrolysis by atmospheric moisture. Crystal densities were measured by flotation in mixtures of carbon tetrachloride and trimethylene dibromide.

Cr(CO)$_4$(diarsine)

Monoclinic, $a = 17{\cdot}4$, $b = 9{\cdot}0$, $c = 12{\cdot}9$ Å, $\beta = 117{\cdot}6°$. Measured density 1·67 g.cm^{-3}, 4 molecules in the unit cell, calculated density 1·67 g.cm^{-3}. Systematic absences of X-ray reflexions: *h*0*l* when *h* is odd, 0*k*0 when *k* is odd. Space group $P2_1/a$.

Mo(CO)$_4$(diarsine)

Orthorhombic, $a = 17{\cdot}1$, $b = 16{\cdot}3$, $c = 12{\cdot}8$ Å. Measured density 1·80 g.cm^{-3}, 8 molecules in the unit cell, calculated density 1·84 g.cm^{-3}. Systematic absences of X-ray reflexions: *hk*0 when *h* is odd, *h*0*l* when *l* is odd, 0*kl* when *k* is odd. Space group *Pbca*.

W(CO)$_4$(diarsine)

Isomorphous with Mo(CO)$_4$(diarsine) with same unit-cell dimensions. The only detectable differences in the X-ray photographs of W(CO)$_4$(diarsine) and Mo(CO)$_4$(diarsine) were in the intensities.

No further work on these substances is contemplated.

I thank Dr H. L. Nigam for providing samples of the three substances.

References

Nigam, H. L., Nyholm, R. S. & Stiddard, M. H. B. (1960). *J. Chem. Soc.*, p. 1803.

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Properties of the small angle X-ray scattering from rods.

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The diameter of the cross section of elongated colloidal rods has been obtained from the position of the maximum of the quantity $\theta^2 I(\theta)$, where $I(\theta)$ is the relative intensity of the small angle X-ray scattering from an assembly of identical, independent, randomly oriented rods with uniform electron density at a scattering angle θ (Fedorov & Ptitsyn, 1963). In their calculation Fedorov & Ptitsyn assumed that the rods had a circular cross section. However, this maximum in $\theta^2 I(\theta)$ occurs not only for a circular cross section but is a general property of the small angle X-ray scattering from elongated rods.

Miller & Schmidt (1962) expressed the scattered intensity from an assembly of identical independent, randomly oriented rods with uniform electron density as the sum of terms proportional to different negative powers of the axial ratio $\nu = H/L$, where H is the length of the rod, and L is the maximum diameter of the cross section — tnat is, the length of the longest straight line that can be drawn inside the cross section. For elongated rods, $\nu \gg 1$, and for sufficient elongation, only the term proportional to ν^{-1} need be retained. The resulting approximate expression for $I(\theta)$ is

$$I(\theta) = \frac{\pi}{h\nu L}\, i_c(hL) \qquad (1)$$

where

$$i_c(hL) = \frac{2\pi L^2}{A}\int_0^1 ds\,.\,s\beta_0(s)J_0(hLs)$$

and where $h = 4\pi\lambda^{-1}\sin(\theta/2)$, λ is the X-ray wavelength, $J_0(X)$ is the zero-order Bessel function of the first kind, A is the area of the cross section, and $\beta_0(s)$ is the characteristic function for the cross section. This approximate form of the scattered intensity has also been obtained by Porod (1948) and by Stokes (1957). Luzzati (1960) developed an expression which is equivalent to (1) when hL is not large.

Since $\beta_0(s)$ is never negative, $i_c(hL)$ will have its largest value for $hL = 0$. Also, because of the properties of $\beta_0(s)$, for $hL \gg 1$, $i_c(hL)$ is proportional to $(hL)^{-3}$. Therefore, one can expect at least one maximum in $hLi_c(hL)$ and consequently in $\theta^2 I(\theta)$.

The location of the maximum depends on the shape of the cross section. When there is sufficient information about the scattering sample, reasonable assumptions can be made