

*Gmelin handbook of inorganic chemistry*, 8th edition, *W — Tungsten, Supplement Volume A2: Physical Properties*, Springer-Verlag, Berlin, Heidelberg, New York, Tokyo, 1987, xiv + 309 pages, DM 1388. ISBN 3-540-93552-5.

This is the ninth volume of the Gmelin Handbook to describe the chemistry of tungsten (System No. 54) since the main volume was published in 1933. Of these, six have dealt (five exclusively) with tungsten oxide species, and none have yet considered the vital areas of the coordination and organometallic chemistry of tungsten. The current supplement volume (A2) describes the physical properties of the element, and complements an earlier volume (A1; 1979) which described the metallurgy and technology of tungsten. It parallels Supplement Volume A2a for molybdenum.

The first section (11 pages) details the nuclear properties of the tungsten isotopes ( $^{158}\text{W}$ – $^{190}\text{W}$ ). The second section (86 pages) concentrates on the atomic properties of tungsten (71 pages), but also describes the ions  $\text{W}^-$  and  $\text{W}^{n+}$  ( $n = 1$ – $73$ ). This is followed by a brief description of the properties of tungsten clusters,  $[\text{W}_n]$  ( $n = 2$ – $12$ ), of which the dimer,  $[\text{W}_2]$ , is the most extensively studied. The thermodynamic functions for tungsten vapour are then tabulated, followed by the last (and longest) section: properties of bulk tungsten (206 pages). This final section includes subsections describing the electronic structure and bonding in metallic tungsten, its lattice dynamics, and its crystallographic properties (which contains a particularly lengthy, (125 pages) and detailed coverage of lattice imperfections).

The authors (E. Koch-Bienemann, L. Berg, G. Czack and J. Wagner) have produced a solid and detailed literature survey (up to the end of 1985). Moreover, although the volume is principally concerned with the physics of metallic tungsten, there are sections which will be of interest to the inorganic chemist. In particular, the discussions of the electronic structure of the atoms, the bulk metal, and the gaseous clusters, and the X-ray spectroscopic data for tungsten atoms are very useful. This volume meets the high standards which one expects from this series, and is particularly well illustrated. It should form a part of any chemistry or physics library collection.

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