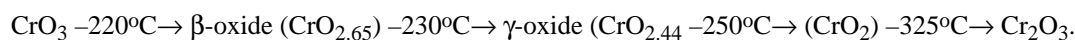


substance: higher oxides of chromium

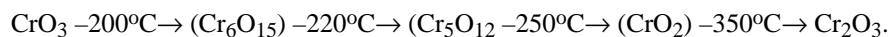
property: crystal structure, general characterization

phase diagram: see Fig. 1.

At oxygen pressures below ≈ 900 bar we have



Above 1 kbar oxygen pressure we have



Little data is available on the higher oxides of Cr:

CrO_3 is reported to be an n-type semiconductor, activation energy for conductivity $E_A = 1.98$ eV ($T < 500$ K) [68C]. It has an unusual chain structure: orthorhombic unit cell. $\text{C}_{2v}^{16} - \text{Ama}$, $a = 5.743$ Å, $b = 8.557$ Å, $c = 4.789$ Å [60H]. $d = 2.70$ g cm $^{-3}$ [83H].

Cr_5O_{12} is reported to be an n-type semiconductor, activation energy for conductivity $E_A = 0.82(11)$ eV ($T < 600$ K) [68C]. It has an orthorhombic structure, $\text{D}_{2h}^{14} - \text{Pbcn}$, $a = 12.04$ Å, $b = 8.21$ Å, $c = 8.18$ Å [65W]; $a = 12.044$ Å, $b = 8.212$ Å, $c = 8.177$ Å, $Z = 4$ [68W].

Cr_6O_{15} has been characterized as orthorhombic; $a = 8.47$ Å, $b = 12.90$ Å, $c = 10.08$ Å, $Z = 4$, space group $\text{D}_{2h}^{17} - \text{Cmcm}$ [68W].

CrO_2 is a ferromagnetic metal with the rutile structure [77C]; $a = 4.423$ Å, $c = 2.917$ Å [68W]; $a = 4.421$ Å, $c = 2.917$ Å [71B]; $a = 4.421$ Å, $c = 2.916$ Å [57T].

References:

- 57T Thamer, B. J., Douglass, R. M., Staritzky, E.: J. Am. Chem. Soc. 79 (1957) 547.
- 60H Hanic, F., Stempelova, D.: Chem. Zvesti 14 (1960) 165.
- 65W Wilhelmi, K. A.: Acta Chem. Scand. 19 (1965) 165.
- 68C Cojocaru, L. N., Costea, T., Nagoescu, I.: Z. Phys. Chem. (Frankfurt am Main) 60 (1968) 152.
- 68W Wilhelmi, K. A.: Acta Chem. Scand. 22 (1968) 2565.
- 71B Baur, W. H., Khan, A. A.: Acta Crystallogr. B27 (1971) 2133.
- 77C Chamberland, B. L.: CRC Critical Reviews in Solid State and Materials Science 1977 1.
- 83H Handbook of Chemistry and Physics, Weast, R. C., (ed.), 64th edition 1983, CRC Press.

Fig. 1.

Cr – O. Phase diagram in the region Cr_2O_3 -CrO [68W, 77C].

