



>>Entry Name: Ruthenium(VIII) oxide (RuO<sub>4</sub>), 10Cl

Synonym(s): Ruthenium tetroxide. Volatile ruthenium oxide

CAS Registry Number: 20427-56-9

RuO<sub>4</sub> (*T<sub>d</sub>*)

Molecular Formula: O<sub>4</sub>Ru

Molecular Weight: 165.068

Accurate Mass: 165.884008

Percentage Composition: O 38.77%; Ru 61.23%

Source/Synthesis: Most conveniently prepared by oxidation of RuO<sub>2</sub> with NaIO<sub>4</sub> in H<sub>2</sub>O

Use/Importance: Extremely important oxidising agent (esp. in org. chem.) and invaluable reagent for the synth. of many higher oxidation state complexes of ruthenium

Physical Description: Yellow cryst.; isostructural with OsO<sub>4</sub>

Melting Point: Mp 25.4°

Solubility: Spar. sol. H<sub>2</sub>O; sol. CCl<sub>4</sub>

Other Data:  $\Delta H_f^\circ(\text{g}) -181 \text{ kJ mol}^{-1}$ ;  $S^\circ 290 \text{ J mol}^{-1} \text{ K}^{-1}$ . Ir  $\nu_{\text{R=O}} 920 \text{ cm}^{-1}$

Hazard & Toxicity: Dec. explosively below its boiling point; extremely poisonous (attacks eyes, respiratory system and oxidises tissue) with a high vapour pressure at r.t.

Reacts explosively with many org. solvs. (e.g. EtOH, Et<sub>2</sub>O, C<sub>6</sub>H<sub>6</sub>)

Sigma: R8877

#### References:

- Nakata, H., *Tetrahedron*, 1963, **19**, 1959, (*synth*)  
Nikol'skii, A.B. *et al.*, *Russ. J. Inorg. Chem. (Engl. Transl.)*, 1965, **10**, 1, (*thermodyn*)  
Schäfer, L. *et al.*, *Acta Chem. Scand.*, 1967, **21**, 737, (*ed*)  
Tréhoux, J. *et al.*, *C. R. Hebd. Seances Acad. Sci. Ser. C*, 1969, **268**, 246, (*cryst struct*)  
Kaindl, G. *et al.*, *Z. Phys. Chem. (Leipzig)*, 1969, **226**, 103, (*Mössbauer*)  
McDowell, R.S. *et al.*, *J. Chem. Phys.*, 1972, **56**, 5712, (*ir, Raman*)  
Foster, S. *et al.*, *J.A.C.S.*, 1973, **95**, 6578, (*uv*)  
Lee, D.G. *et al.*, *Org. Chem. Ser. Monogr., B*, 1973, **5**, 177, (*uses, rev*)  
Bowman, A.H. *et al.*, *Chem. Phys. Lett.*, 1974, **29**, 140, (*mcd, synth*)  
Burroughs, P. *et al.*, *J.C.S. Faraday 2*, 1974, **70**, 1895, (*pe*)  
Brauer, G., *Handbuch Prap. Anorg. Chem.*, 3rd edn., Ferdinand Enke Verlag, 1975, **3**, 1750  
Ziegler, T. *et al.*, *Theor. Chim. Acta*, 1977, **46**, 1, (*theory*)  
Lam, K.W. *et al.*, *J. Electrochem. Soc.*, 1978, **125**, 1069, (*electrochem*)  
Brevard, C. *et al.*, *Inorg. Chem.*, 1983, **22**, 532, (*nmr*)  
Seddon, E.A. *et al.*, *The Chemistry of Ruthenium*, Elsevier, Amsterdam, 1984, 43, (*rev, uses*)  
Rard, J.A., *Chem. Rev.*, 1985, **85**, 1, (*thermodyn, rev*)  
*Compr. Coord. Chem.*, Pergamon, Oxford, 1987, **4**, 277, (*synth, use, rev*)  
Lewis, R.J., *Sax's Dangerous Properties of Industrial Materials*, 8th edn., Van Nostrand Reinhold, 1992, RSK000