



>>Entry Name: Ruthenium(III) chloride (RuCl<sub>3</sub>), 10Cl

Synonym(s): Ruthenium trichloride. Ruthenium chloride. Insoluble ruthenium(III) chloride

CAS Registry Number: 10049-08-8

Related CAS Registry Numbers(s): 12648-62-3

Extra CAS Registry Numbers(s): 13815-94-6

RuCl<sub>3</sub>

Molecular Formula: Cl<sub>3</sub>Ru

Molecular Weight: 207.428

Accurate Mass: 206.810904

Percentage Composition: Cl 51.27%; Ru 48.73%

of ruthenium(III) chloride

Other Data: At temps. >450°, β-RuCl<sub>3</sub> is irreversibly transformed to α-RuCl<sub>3</sub> ( $\Delta H < 12.5 \text{ kJ mol}^{-1}$ )

Aldrich: 20852-3

Fluka: 84040

>>Variant: α-form

Molecular Formula: Cl<sub>3</sub>Ru

Molecular Weight: 207.428

Accurate Mass: 206.810904

Percentage Composition: Cl 51.27%; Ru 48.73%

Source/Synthesis: Synth. by heating Ru metal in Cl<sub>2</sub>/Co mixt. at 600-700°, or heating β-RuCl<sub>3</sub> in Ar (<500°) or Cl<sub>2</sub> (550-650°)

Physical Description: Purif. by subl. in Cl<sub>2</sub> at 730°; black, lustrous crystalline solid; hexagonal unit cell

Solubility: Insol. H<sub>2</sub>O, EtOH

Other Data: Antiferromagnetic ( $T_N = 13\text{K}$ ).  $\nu_{\text{RuCl}}$  315 cm<sup>-1</sup>; Ru-Ru 346, Ru-Cl 240 pm.  $\mu_{\text{eff}} = 2.14\mu_B$

>>Variant: β-form

Molecular Formula: Cl<sub>3</sub>Ru

Molecular Weight: 207.428

Accurate Mass: 206.810904

Source/Synthesis: Synth. by heating dispersed Ru sponge in a stream of CO/Cl<sub>2</sub> (1/3) at 330-360°, grinding product, and repeating procedure; sometimes contaminated with oxide chlorides

Physical Description: Bulky dark-brown powder with a low tap-density and high surface area; hygroscopic; hexagonal unit cell

Solubility: Sol. EtOH

Other Data: Antiferromagnetic below 600 K. Ir  $\nu_{\text{RuCl}}$  376, 286 cm<sup>-1</sup>; Ru-Ru 283, Ru-Cl 230, 239 pm. Upon heating, α-RuCl<sub>3</sub> → Ru(s) + 3/2 Cl<sub>2</sub>(g);  $\Delta H_f^\circ -253 \text{ kJ mol}^{-1}$ ,  $\Delta S^\circ -236 \text{ J K}^{-1} \text{ mol}^{-1}$

>>Variant: Commercial-form

Synonym(s): Ruthenium(III) chloride (commercial). Hydrated ruthenium(III) chloride. Soluble ruthenium(III) chloride

CAS Registry Number: 14898-67-0

Molecular Formula: Cl<sub>3</sub>Ru

Molecular Weight: 207.428

Accurate Mass: 206.810904

Percentage Composition: Cl 51.27%; Ru 48.73%

often containing nitrosyl complexes too

Use/Importance: Commercially available. This heterogeneous, ill-defined mixt. is by far the most common starting material used for making Ru compds. It is also a commonly used catalyst in its own right

Physical Description: Purple-black solid

Solubility: V. sol. H<sub>2</sub>O, EtOH

Aldrich: 20622-9

Fluka: 84050

Sigma: R8259

References: