

# A CARBONATO COMPLEX OF MOLYBDENUM $K_6Mo(CO_3)_5 \cdot 2H_2O^*$

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Mellor (1948, p. 659) states that no molybdenum carbonate has been reported and there appears to be nothing in more recent literature.

The carbonato complex reported in the present paper was formed when an attempt was made to produce an iodo complex with molybdenum(III).

## *Experimental*

Potassium molybdate solution was made acid with hydriodic acid and about 2 g of potassium iodide added. This solution was electrolysed using a mercury cathode and a carbon anode. The iodine liberated, markedly corroded the carbon anode and a carbon deposit formed which was filtered off. The carbon anode was replaced by a platinum anode and electrolysis was continued. The final reduced solution was a very light brown-red colour which was quite different from the more intense red coloured solutions of molybdenum(III), chloride or bromide.

The reduced solution was evaporated under suction at  $70^\circ C$  to about 50 ml; ethanol was added; two layers formed, the electrolysed solution and the ethanol layer. Carbon dioxide was bubbled through the reduced electrolyte and a white precipitate formed from the aqueous layer. The precipitate was filtered, washed with ethanol, and dried at  $100^\circ C$  (Found: Mo, 14.7;  $CO_3$ , 45.0; K, 35.4%). This is in agreement with  $K_6Mo(CO_3)_5 \cdot 2H_2O$  or  $K_4Mo(CO_3)_4 \cdot K_2CO_3 \cdot 2H_2O$ .

The molecular conductivity of M/1016 at  $25^\circ C = 680$  mhos. The conductivity increases slightly with time indicating that the compound undergoes some hydrolysis.

Magnetic susceptibility measurements showed this compound to be diamagnetic ( $\chi \times 10^6 = -0.052$ ) involving Mo(IV).

Heide and Hofmann (1896) reduced an acid solution of molybdenum trioxide with potassium iodide. The excess iodine was removed by electrolysis. To this

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solution they added potassium cyanide to obtain red crystals of the red cyanide to which they assigned the formula  $4\text{KCNMoO}_2 \cdot 10\text{H}_2\text{O}$ .

This process is comparable to that just described for the preparation of the carbonato complex. In both cases the solution was completely reduced to molybdenum(III) by means of potassium iodide; in one case potassium cyanide is added and in the other carbon dioxide; both additions producing complexes.

### *References*

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