EXPERIMENT NUMBER	16
THE NAME OF THE EXPERIMENT	POTASSIUM TETRAPEROXOCROMATE(V)
FORMULA	$K_3[Cr(O_2)_4]$

REACTION EQUATION

$2K_2CrO_4 + 9H_2O_2 + 2KOH \rightarrow 2K_3[Cr(O_2)_4] + O_2 + 10H_2O$

EXPERIMENTAL PROCEDURE

Potassium tetraperoxochromate (V) is prepared by the reaction of potassium chromate with hydrogen peroxide in a strong basic solution.

2.0 g of K_2CrO_4 and 2.0 g of KOH are dissolved in 25 mL of water in 100 mL of the flask. The flask is immersed in an ice/salt bath and the cooled mixture is held until it solidifies (aqueous-solid). Then, 13 mL of 30% H_2O_2 solution is added dropwise to this mixture in the ice/salt bath and it is stirred continuously during the addition. It is waited for an hour in the ice/salt bath by stirring occasionally. After an hour, the mixture is removed from the ice/salt bath and all its contents are left to dissolve. The mixture is filtered in a vacuum, the red-brown salt is washed with 15 mL of ethanol and then dried in the air.

Qualitative determination of O_2^{2-} peroxide ion

Hydrogen peroxide forms blue colored solutions called "Chromium blue" in acidic solutions with chromates (VI) and can be drawn into the ether phase.

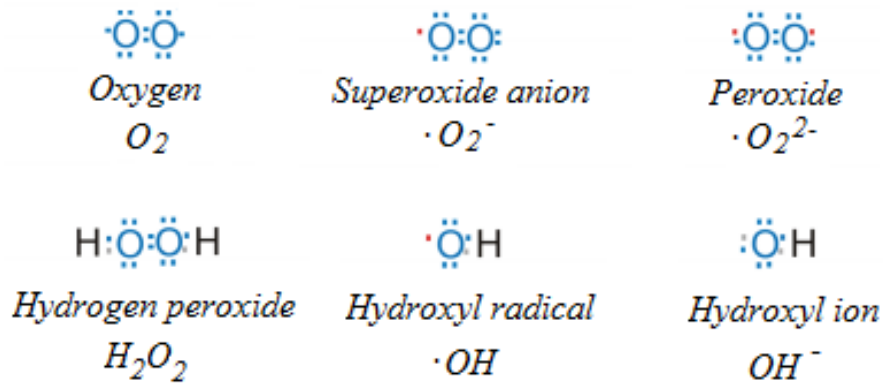
5-6 Crystals K_2CrO_4 are put in a test tube, dissolved in 2 mL of water. A few drops of H_2O_2 (3%) are added. A few drops of dilute sulfuric acid (3 mL of water + 1 mL of concentrated H_2SO_4) and 2 mL of diethylether are added. The test tube is gently shaken and the ether phase is observed.

QUESTIONS

1. *Balance the chemical equation.*
2. *Write the electron configuration of Cr^{5+} ion.*
3. *Determine the hybridization type of the complex, investigate the molecular geometries associated with this hybridization type.*
4. *What can you say about the magnetic properties of the complex?*
5. *Draw the Molecular Orbital Diagram of the O_2^{2-} peroxide ion and find the bond order.*

GENERAL INFORMATION

Types of Reactive Oxygen Species



Oxides have a formal oxidation state of -2..

Peroxides have a formal oxidation state of -1.

Superoxides have a formal oxidation state of ½.

Only alkali metals can form superoxide compounds. Examples include NaO_2, KO_2, RbO_2.

Metals (such as alkali metals) and nonmetals (such as hydrogen) can form peroxide compounds.

EXPERIMENT NUMBER	***17***
THE NAME OF THE EXPERIMENT	***BIS-DIETHYLAMMONIUM TETRACHLOROCOPPER(II)***
FORMULA	$[(CH_3\text{-}CH_2)_2NH_2]_2\,CuCl_4$

EXPERIMENTAL PROCEDURE

Approximately 15 mL of isopropyl alcohol is added to 0.02 mole of diethylammonium hydrochloride. Approximately 3 mL of pure ethanol is added to 0.01 mole of $CuCl_2$. Both solutions are slowly heated and mixed until dissolved. The solution is left to cool at room temperature. Then, it is slowly cooled in an ice bath. If the needle-shaped green crystals do not precipitate, some isopropyl alcohol is added and allowed to cool again. Although the product is very soluble in ethanol, it is less soluble in isopropyl alcohol. The green product is filtered, washed with isopropyl alcohol and dried in a desiccator.

QUESTIONS

1. *Draw the low temperature and high temperature structures of the compound.*
2. *Write the reaction equation.*
3. *Why does the structure of the compound change as the temperature rises? Explain.*

Working rate: 1/1