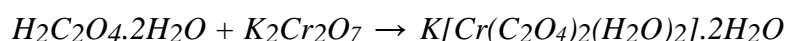


PROF. DR. SELEN BİLGE KOÇAK

CHM356 INORGANIC CHEMISTRY LABORATORY

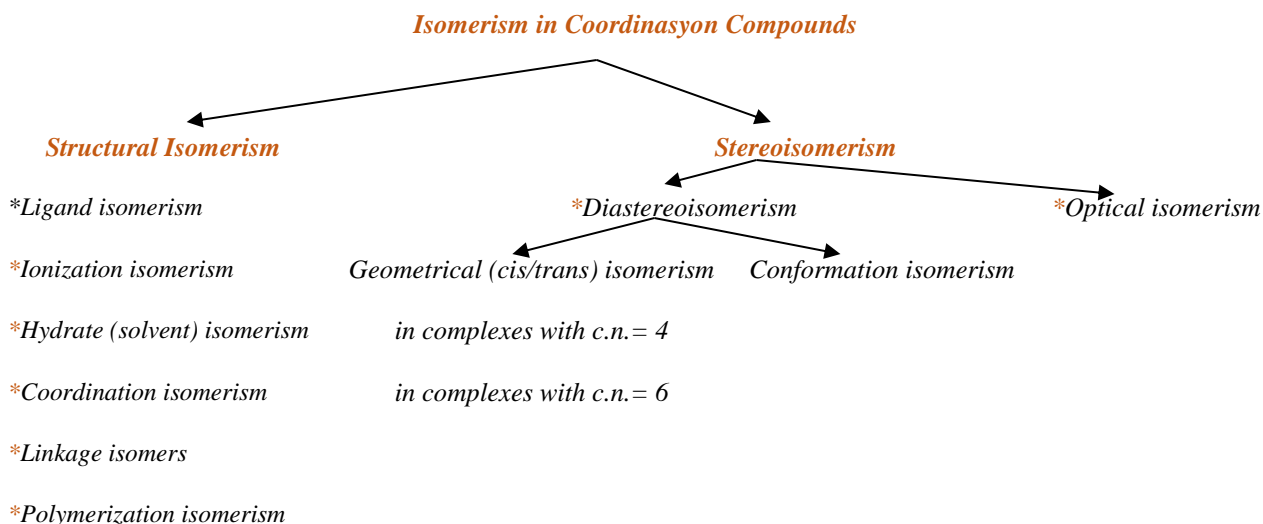
EXPERIMENT NUMBER	10
THE NAME OF THE EXPERIMENT	TRANS-POTASSIUM DIOXALATO DIAQUACHROMATE(III)
FORMULA	$K[Cr(C_2O_4)_2(H_2O)_2] \cdot 3H_2O$

REACTION EQUATION



GENERAL INFORMATION

Compounds having the same molecular formula (closed formula) but different structures or spatial arrangements are called isomers and the phenomenon is referred as isomerism. The physical and chemical properties of the isomers are different. Coordination compounds often have a variety of isomeric forms:



PROF. DR. SELEN BİLGE KOÇAK

CHM356 INORGANIC CHEMISTRY LABORATORY

STRUCTURAL ISOMERISM

Structural isomers are molecules which have the same molecular formula but have different connectivities.

Ligand Isomerism

The binding of ligands is different, although the isomeric structures all have the same metal-ligand bonds.

Ionization Isomerism

Ionization isomerism arises from the displacement of ions in the primary valency with ions in the secondary valency. Ionization isomers afford different anions and cations in solution.

Hydrate (Solvent) Isomerism:

Hydrate isomerism occurs when water (or other solvent) can appear within the primary or secondary valency of a metal ion.

Coordination Isomerism

In the coordination compounds that both anion and cation are complex ions, coordination isomerism occurs when ligands can be distributed differently between two or more metals.

Linkage Isomerism

Linkage isomerism occurs when a ligand can bind in different ways to a metal.

PROF. DR. SELEN BİLGE KOÇAK

CHM356 INORGANIC CHEMISTRY LABORATORY

Polymerization Isomerism

Although complexes have the same empirical formula, the formula masses of them are different from each other and the ratio of formula mass to empirical mass is 2,3,4 , ...

STEREoisomerism

Stereoisomers are the compounds in which closed formulas and chemical bonds are the same as the order of bonding of the atoms according to each other, but the arrangement of the atoms in space is different in each isomer.

Geometrical Isomerism

The ligands may originate from different configurations around the central atom (Square planar, tetrahedral), but they originate from the different order of the ligands (cis, trans) in the same geometrical shape.

Optical Isomerism

Isomers that convert the vibration plane of the polarized light in different directions (right or left) are called optical isomers.

Conformation Isomerism

When a part of a molecule is rotated around a bond axis relative to the remainder of the molecule, the isomeric structures turning into each other are called the conformational isomer.

PROF. DR. SELEN BİLGE KOÇAK

CHM356 INORGANIC CHEMISTRY LABORATORY

EXPERIMENTAL PROCEDURE

12 g of oxalic acid dihydrate is dissolved in a small amount of boiling water. Since the reaction is severe, smaller than 300 mL beaker should not be used. The solution prepared by dissolving 4 g of potassium dichromate in very little water is added to the oxalic acid solution in small portions. In the meantime, the top of the beaker should be covered with a watch glass to prevent the substance from spilling around. The solution is evaporated to half volume and left at room temperature to evaporate up to one third of its first volume. The crystals formed are separated by filtration, washed with cold water and alcohol, and then dried in the air. There is a balance between cis- and trans-isomers in the solution. Since the trans-isomer has low solubility, it is separated from the cis-isomer. Evaporation at room temperature should not be fast. Otherwise, cis-isomer may also be present in the product. The product is a dark green-gray crystal.

To check the isomer purity, take a few crystals from the product and place it on the filter paper and add a few drops of dilute ammonia solution. The cis-isomer is a dark green stain, while the trans-isomer forms a light brown solid without dissolving.

QUESTIONS

- 1. Balance the chemical equation.*
- 2. Write the electron configuration of chromium and explain the structure of the complex.*
- 3. Define cis and trans isomerism.*
- 4. trans-Isomers have lower solubility than cis-isomers, why?*
- 5. What is the role of oxalate ion in this reaction other than being a bidentate ligand?*

Working rate: 1/4