Physical and Chemical Properties of Organic Compounds

Introduction

Often, a chemist is asked to determine the identity of a substance. In this situation, a wide range of physical and chemical properties must be examined. Sometimes, the results of a single test may identify the substance. Frequently, several tests are required to determine its identity.

In this experiment, the chemical names have been removed from four dropper bottles containing ethanol, cyclohexane, cyclohexene, and propan-2-ol, and replaced with W, X, Y, and Z (not in that order!). Cyclohexane, cyclohexene, ethanol and propan-2-ol are commonly used solvents. Your task is to develop a procedure to identify these compounds and then conduct the experiment(s).

Safety

1. Wear safety goggles.
2. Cyclohexane, ethanol, and cyclohexene are flammable. Do use these substances near open flame.
3. Cyclohexane and cyclohexene vapors are harmful. Keep their containers stoppered.
4. Bromine is corrosive. Avoid skin contact. Flush any contacted area with running water for several minutes. If the chemical comes in contact with your eyes, hold your eyelids open and flush your eyes under a gentle stream of water for 20 minutes. Call for assistance.
5. Cyclohexane and cyclohexene are toxic. Avoid skin contact. Keep your hands away from your face. Wash your hands thoroughly at the end of the experiment.
6. Cyclohexane, ethanol, and cyclohexene are water pollution hazards. Do not pour them into the sink. Dispose of all solutions as directed by your teacher.

Time: You will be given ***one*** class period to perform the experiment, so come prepared.

Materials

You will be provided with the following materials:
Propan-2-ol, Cyclohexane, cyclohexene, ethanol, Bromine dissolved in a solvent, such as trifluorotrichloroethane, (TTE), acidified $KMnO_{4(aq)}$, acidified $K_2Cr_2O_{7\ (aq)}$, 2,4-dinitrophenylhydrazine

Prelab Assignment

1. From the Introduction, formulate a problem statement.
2. From the Introduction, and Materials lists, develop a procedure.
3. Prepare an observation table.
4. **All procedures must be approved for safety and materials before experimental begins.**

Analysis

Use your knowledge of the physical and chemical properties of the organic compounds used in this experiment to write an analysis based on the data you have collected. This analysis should support your conclusion.

Conclusion

Respond to the problem you proposed in the Prelab Assignment.

Marking: You will be tested on all of the 8 criteria:
Planning (a), Planning (b), Data Collection, Data Processing and Presentation,
Data Evaluation and Conclusion, Manipulative skills, Personal skills (a), Personal skills (b)
(0 to 3 grading)

Extension

1. What types of substances are present in gasoline?
2. Explain how gasoline is separated from crude oil.
3. Why was tetraethyl lead added to gasoline?
4. Why has the use of lead additives in gasoline been banned?