

The SOLUTION to SOLUBILITY is the SOLVENT.

PRE-LAB DISCUSSION

Before beginning this lab, it is important to understand the terms *solution*, *solvent*, and *solute*. A solution is a homogeneous, liquid mixture of two or more substances. A solvent is the dissolving agent, e.g. water. A solute is a substance that is dissolved in a solution.

Water is a polar molecule. It has a positive and a negative side. It will dissolve IONIC COMPOUNDS. It will also dissolve some MOLECULAR COMPOUNDS that have covalent polar bonds.

Xylene [(CH₃)₂C₆H₄], toluene [C₇H₈] and oils are non-polar molecules. They will dissolve MOLECULAR COMPOUNDS that have non-polar covalent bonds.

Methanol [CH₃OH], ethanol [C₂H₅OH] and propanol [C₃H₇OH] are the most common form of alcohols. Their ability to dissolve common substances varies somewhat but they can often show "intermediate" polarity.

OBJECTIVES: To determine the solubility of three general types of common solvents.

CHEMICALS/EQUIPMENT: small test tubes, test tube rack, electrical conductivity tester, alcohol, distilled water, xylene or toluene [found in hardware or paint store], salt crystals, sugar crystals, paradichlorobenzene or naphalene crystals [moth flakes].

PART I

Procedure:

- 1) Place ½ inch of each solvent in separate test tubes. Label the test

so that you know which solvent is in each tube.

- 2) Test each solvent for electrical conductivity. If any of these pure solvents show conductivity, you have contamination.
- 3) Place a moth crystal in each tube and swirl gently to determine if the crystal will dissolve. Record your results.
- 4) Then test each tube for electrical conductivity. Remember to clean the electrical contacts between the three tests. Record your results.
- 5) Repeat steps 1-5 using salt as the solute.
- 6) Repeat steps 1-5 using sugar as the solute.

PART II

Procedure

- 1) Place 1/2 inch of water in each of two small test tubes.
- 2) Place an equal volume of alcohol in the first tube and mix. Does it dissolve? Record your observations
- 3) Place an equal volume of xylene or toluene in the second tube and mix. Record your observations
- 4) Place a 1/2 inch of alcohol in a test tube and add an equal amount of xylene or toluene and mix. Does it dissolve? Record your observations.

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Part I
DATA

Solubility

	moth crystal	salt crystal	sugar crystal
water	_____	_____	_____
alcohol	_____	_____	_____
xylene/toluene	_____	_____	_____

Part II
DATA

conductivity

	moth crystal	salt crystal	sugar crystal
water	_____	_____	_____
alcohol	_____	_____	_____
xylene/toluene	_____	_____	_____

Part III
DATA

solvent-solvent solubility

water-alcohol _____

water-xylene _____

alcohol-xylene _____

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Thinking Scientifically

1. If you were painting using an oil-based paint, what common liquids could you use to remove paint from your hands? [hint-don't overlook liquids in the kitchen]

2. Why are alcohols used in window washing products?

Extra

When clothes are *dry-cleaned* does this mean that they are not placed in a liquid?

Visit your local dry cleaning store and find out how clothes are dry-cleaned and what chemicals are used in the cleaning process.

The term **Hydraulics** means *moved by water*. We use hydraulic brakes to stop our cars and hydraulic jacks to lift heavy objects. The hydraulic systems that we use today do not use water. What properties of today's hydraulic fluid make it superior to water for use in these systems?

Why is oil or grease placed in pans before cooking or baking foods? [Hint-are foods usually water or oil systems?]