



## Likes dissolve Likes



Homemade Italian dressing, which is composed of oil and vinegar separates. Emulsifiers are important additives used in products such as mayonnaise and bottled salad dressings to reduce the separation of ingredients. In this lab activity you will investigate the solubilities of seven different solutes in two different solvents and determine what is meant by the expression “likes dissolve likes”.

### The Solutes

Urea [ $\text{CO}(\text{NH}_2)_2$ ]  
Iodine ( $\text{I}_2$ )  
Ammonium chloride ( $\text{NH}_4\text{Cl}$ )  
Naphthalene ( $\text{C}_{10}\text{H}_{18}$ )  
Copper (II) sulfate ( $\text{CuSO}_4$ )  
Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ )  
Sodium chloride ( $\text{NaCl}$ )

### The Solvents

Water  
Hexane

### **Procedure:**

1. Measure about 5 ml of water into each of seven test tubes (Can you think of a way that you would not have to use a graduated cylinder each time you add 5 ml of water to the test tube?)
2. Add a different solute to each of the seven test tubes (**Use a match-head size sample of each solid solute and 20 drops of each liquid solute**)

**\*IMPORTANT \* The Iodine Must Be Transferred Using A Wooden Splint!**

3. Gently mix each test tube's contents by firmly “tapping” the test tube.
4. Record your observations in a well-organized data table using this key:

Write **S** if the **solute was soluble**- write **SS** if the **solute was slightly soluble** and write **IN** if the **solute was insoluble**.

5. Discard waste in the waste containers located on the center table near your lab station
6. Wash and thoroughly dry test tubes
7. Repeat steps 1-6 using hexane as the solvent **for any solute that did not readily dissolve in water**.
8. Clean your lab station and wash your hands before leaving the lab

**Post lab:** Using a molecular model kit construct a water molecule and a hexane molecule. **Draw a sketch of the molecules.** What does the geometry of these molecules tell you about their polarity?

**For homework – Neatly record your observations from this lab on a data table and answer the following questions in complete sentences.**

**Questions:**

1. List each solute and solvent. (There should be nine substances listed.) Next determine which of these substances are molecular compounds and which are ionic compounds. **Record this information next to the substance.**
2. Which solutes are more soluble in water?
3. Which solutes are more soluble in hexane?
4. How do water and hexane differ?
5. Do ionic compounds dissolve more readily in water or in hexane? Why?
6. Did any solutes produce unexpected results? Explain.

**Summarize and explain your observations. What does the phrase “likes dissolve likes” mean?**

