

Name: _____ Date: _____

Activity: Determining Polar Nature

Chemists say that “like dissolves like,” meaning that polar solvents tend to dissolve polar solutes, and nonpolar solvents tend to dissolve nonpolar solutes, while nonpolar and polar substances are immiscible (do not mix).

You may have noticed solubility problems in your everyday life. If you get bike chain grease on your pants, sap from a coniferous tree on your shirt, or wax from a surfboard on your wetsuit, these substances are hard to remove with water. Why do you think this demonstrates a solubility problem, what is the polarity of these substances, and how do you eventually get the stain out of your clothes?

Knowing that “like dissolve like”, it is possible to determine the polar nature of various substances. Polar substances show obvious signs of dissolving in water (a polar solvent), while nonpolar solutes do just the opposite.

Sand Test 1

1. Take one plastic cup and fill it half-way with tap water from the sink.
2. Take your colored sand and put 3 scoops into the water. DO NOT USE ALL OF THE SAND. Set a small amount for the second test.
3. Use the spatula to manipulate the sand in the water.
4. Record your observations.

Sand Test 2

1. Take a small amount of sand and pour it into a weigh boat.
2. The teacher will come around and place a few drops of oil onto the sand.
3. Record your observations.

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Questions:

1. How is the colored sand in your experiment different from the sand you would find at the beach?

The sand at the beach does not float on top of the water. Sand at the beach gets wet but this colored does not.

2. Why did the colored sand NOT get wet in the water?

The colored is NONPOLAR and water is POLAR.

3. What conclusion can be made about the polarity of the water and the colored sand?

They have different polarities so they did not mix.

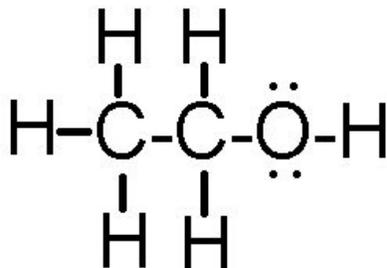
4. What conclusion can be made about the polarity of the mineral oil and the colored sand?

Both the colored sand and oil are NONPOLAR.

5. Please examine the molecules of the liquids below and indicate if the colored sand would get wet or remain dry in the liquid:

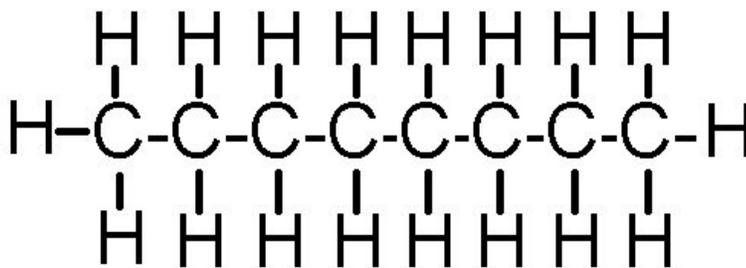
A. Ethanol
C₂H₅OH (l)

polar molecule



B. Octane
C₈H₁₈ (l)

nonpolar



Sand test

prediction:

*Non-soluble
(not get wet)*

Sand test

prediction:

*Yes it would
get wet.*

6. Which of the above liquids would be soluble in water? Explain your answer in terms of molecular polarity.

Ethanol would be soluble in water since it is a polar molecule like water.