Remote Learning Packet

There is no need to submit this packet at the end of the week. Enjoy your summer break!

Week 9: May 25-29, 2020

Course: 10 Chemistry

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Monday, May 25

Happy Memorial Day! No School!

Tuesday, May 26 - Friday, May 29

Welcome to our last week of remote learning! Remember that even though you are finishing your sophomore year of high school that science doesn't stop with the school year. The natural world has much to offer through careful observation and experimentation. It has been a joy to teach you all chemistry this year and I hope to see you all in the fall!

Choose one activity to complete this week and you are welcome to complete others over the summer.

Polarity and Density Demonstration

Background: If a substance floats in another substance, say an ice cube in water, then the ice cube in this case would be less dense than the water. The amount of matter in one square inch of an ice cube is much less than the amount of matter in one square inch of water. Polarity is the uneven distribution of electrons throughout a compound that gives it a unique set of characteristics. Polar substances dissolve in polar substances. This phenomenon is summarized in the phrase, "like dissolves like."

Materials: Glass cup, toothpick, water, liquid food coloring, vegetable oil

Methods:

1. Fill a glass cup ⅓ full with water.
2. Add oil to the cup so that there are equal amounts of water and oil.
    a. Record your observations. Which substance is less dense?
    b. Optional: try the first two steps again but in the opposite order. Is the result the same?
3. Add one drop of food coloring to the glass.
    a. If the drop is suspended in the oil, use the toothpick to move the drop downward.
    b. Record your observations. In which of the two substances did the food coloring dissolve? Is the food coloring polar or nonpolar?

Conclusion: Since the oil rested on top of the water, the oil is less dense than the water. When the food coloring was added, it did not mix with the oil but dispersed and dissolved into the water. Water is a polar substance and "like dissolves like" so the food coloring is also a polar substance.

Further Study (Optional): Using other liquids from around your house, compare their density to that of water. Determine if the liquid is polar or nonpolar using the food coloring test.

The Chemistry of Gardening

Background: Soil pH has a strong impact on the growth of some plant species. For example, the color of hydrangea flowers is dictated by soil pH. Acidic soils produce blue flowers and alkaline (basic) soils produce pink flowers. This experiment will help you determine the general acidity of a sample of soil.
Materials: Measuring cups, 2 cups or bowls, water, white vinegar, baking soda
Methods:

1. Gather 1 cup of soil from around your house or a nearby park.
2. Split the soil sample into two separate containers.
3. Create a mixture of ¼ cup water and ¼ cup baking soda. Add the mixture to one container of soil.
4. Add ½ cup white vinegar to the other container of soil.
5. Record your observations. Is your soil acidic or alkaline?

Conclusion: The mixture of baking soda and water is an alkaline (basic) solution. If your sample of soil reacts and bubbles when mixed with an alkaline solution, then the soil is acidic. If your sample of soil reacts and bubbles when mixed with the vinegar, an acidic solution, then the soil is alkaline.
Further Study (Optional): Research the plants found in your garden and see if they have any preference to certain soil acidities. If they do, run this experiment with soil from their plant beds and see if their behavior matches the soil acidity. For example, if the hydrangeas in my garden were pink and I tested the soil at their roots, I would expect it to react with the vinegar solution because the soil should be alkaline.

Factors that Affect Solubility

Background: Temperature, polarity, and agitation (stirring) are all factors that affect the amount of solute that will dissolve in a given amount of solvent. In this experiment, the methods for how to investigate the effect of temperature on solubility are provided. The methods for how to test the other factors will have to be designed by you.
Materials: Measuring cups and spoons, heat source (microwave or stove top), spoon, container (bowl or cup), instant drink powder (lemonade, hot chocolate, etc), water, additional materials may be required to test the other factors
Methods:

1. Measure one cup of lukewarm water into your container
2. Add one tablespoon of instant drink mix to the water and observe how well the mix dissolves. You may have to briefly stir the mixture. Record your observations.
3. Repeat steps one and two but with cold and hot water.
    a. In which temperature of water did the mix most easily dissolve? What is the effect of temperature on solubility?
4. Design and complete experiments testing the effects of polarity and agitation on solubility.

Conclusion: As the temperature of the water increased, so should the ease at which the mix dissolves. Therefore, the relationship between solubility and temperature is: As temperature increases so does solubility. In your experiments with polarity, you should find that polar substances will only dissolve in polar solvents. Stirring mixtures can also help to increase solubility.
Further Study (Optional): Molecular size is another factor that affects solubility. Try this experiment but with different kinds of drink powders to determine which mix has larger particles.