

# STATION 1

Do not write on this page

Wet three paper towels with 10 drops of water, methanol, and acetone. Use one towel for each. Use your hands to check continually for drying of the towels.

1. Which towel dried first? Second? Third?
2. What is the process of drying called?
3. When drying occurs, what happens at the molecular level?
4. Why did the towels dry at different rates? Use the concept of intermolecular forces in your answer.

# STATION 2

Wrap a small piece of tissue around the bulbs of three different thermometers. Use tape to secure the tissue. Wet the first thermometer with 10 drops of water, the second with 10 drops of methanol, and the third with 10 drops of acetone. Record the temperature on each thermometer every minute for five minutes.

5. Construct a data table to show your data.
6. Why did you observe a change in temperature?
7. Since energy cannot be destroyed, where is this 'lost' energy?
8. Why are the temperature changes different for each liquid tested?
9. Explain, in terms of molecules and energy, how sweating is used as a cooling system by your body.

# STATION 3

Part A: Combine a few drops of ammonia solution and one drop of 'solution A' in a beaker.

10. Record your observations.

Part B: Pour approximately 10 mL of ammonia solution in one beaker and 10 mL of water in a second beaker. Place three drops of 'solution A' in the second beaker. Cover the two small beakers with the large, 1000 mL beaker by placing upside down over them. Observe for 1-3 minutes.

11. What do you observe?

12. Explain your observations (how/why it happened).

13. What does "volatile" mean?

14. Describe how a plug-in type air freshener works.

# STATION 4

Place ice and water in a beaker jar (fill approximately  $\frac{1}{3}$  of the beaker). Place in the bell jar and attach the vacuum pump assembly and turn on the pump.

15. What do you observe?
16. What is the common name for what you observed?
17. What is the approximate temperature of the water in the jar? How do you know?
18. How can your observation occur if the water is at the temperature, which you recorded in #17?
19. Why does food take longer to cook at high altitudes?

# STATION 5

Wear goggles and carry out this experiment in the fume hood. Take the flask that contains the iodine and heat it gently on a hot plate. Warning: Iodine will burn skin on contact.

20. What do you observe?

21. What is this phase change called?

Remove the flask from the hot plate and allow it to cool.

22. What do you observe?

23. What is this phase change called?

24. Explain why ice cubes in your freezer get smaller if they are not used for a long period of time.

25. Give an example of a household product that uses the phase change from question #21.

# STATION 6

Observe the paper clip in the water. **DO NOT TOUCH!!!**

26. Which is more dense, a paper clip or water?
27. With your answer to #26 in mind, explain your observation of the paper clip in the water (why/how?).

Add 4 drops of soap to glass B then fill both glasses to the rim with water. (It is important that the glasses be filled to the *exact* same level before adding pennies.) Begin adding pennies, one at a time to glass A. Count the number of pennies that can be added before the glass overflows. Repeat with glass B.

28. How many pennies did you add to A? To B?
29. Explain why the maximum number of pennies for A was different than for B.
30. Do you think you could “float” a paperclip on the surface of the water in glass B? Why or why not?

# STATION 5

The sealed tube contains solid iodine. Iodine will burn the skin, so be careful with the tube. Place the tube in the flask of boiling water.

20. What do you observe?

21. What is this phase change called?

Remove the flask from the hot plate and allow it to cool.

22. What do you observe?

23. What is this phase change called?

24. Explain why ice cubes in your freezer get smaller if they are not used for a long period of time.

25. Give an example of a household product that uses the phase change from question #21.

Teacher Notes:

Station One.

Three small beakers with acetone, methanol and water and three pipets. Paper towel.

Station Two.

Three small beakers with acetone, methanol and water and three pipets. Paper towel, rubber bands and three thermometers.

Station Three.

Two 100 mL beakers, one 1000 mL beaker, ammonia (or 10% ammonium hydroxide) and phenolphthalein

Station Four.

Vacuum pump, 600 mL beaker, ice and water.

Station Five.

Iodine tube, hotplate, 1000 mL beaker and water.

Station Six.

Small paper clip, three cups or glasses (beakers don't work well), liquid soap and 100 pennies.