Chemical properties of Matter Inquiry lab

Name: _____

What you need to do:

The purpose of this activity is to provide an opportunity for you to get you **thinking about the composition and properties of matter**. In this activity you will be visiting 8 stations around the laboratory by **yourself**.

At each station you will be asked to carry out a series of tasks and answer questions.

Record your answers to the lettered questions (A, B, C, etc.) on a paper. Try to ensure your answers are as complete as possible, especially making reference to the **Particle Nature of Matter. Draw pictures of what is happening at the molecular/particle level to explain what is happening in each activity in order to assist in your explanation**. **Clean up your station before you leave for the next station.**

The following words might assist you in your explanations:

Solid	**Evaporate**	**Condense**	**Expand**
Liquid	**Contract**	**Particles**	**Molecules**
Gas	**Sublimate**	**Melt**	**Solidify**
Bonds	**Intermolecular forces**	**Heat Energy**	**Movement**

Goals of science is for you to analyze, observe and interpret the best you can. It is *not* about getting the correct answer for the lab.

Procedure:

1. Go to the specific lab station when called and read the station procedure
2. Answer all of the questions in your lab book. If you don't have one, create a lab book with loose leaf and staple it together. Draw a simple picture of the station for each in your lab booklet.
3. Be sure to answer your questions to best of your ability. The purpose of the lab is for you to observe, analyze and interpret. You are graded on the depth of your analysis and thoroughness of your observations, not the correct answer.
4. Clean up or revert the station to its original state in how you found it.

Station 1: At this station are two small beakers. One has water in it, the other alcohol. Both have an eye dropper. DO NOT MIX THE EYE DROPPERS UP!

Using the appropriate pipette drop a drop of water on the back of your hand and one drop of the alcohol on your other hand.

Note any differences in observation and sensation.

A) What is happening to the alcohol at a faster rate than to the water?

B) Now try to do the same procedure with the alcohol but now place a drop of alcohol on a warm part of your hand (rinse with warm water or warm up by sitting on it) and another drop of alcohol on a cold part of the hand (rinse with cold water and dry). Record the sensation.

C) Explain at the particle level why this is happening at a faster rate?

D) Why does the alcohol make your skin feel cold?

Station 2: At this station are an empty flask, balloon and two beakers – one with ice cold water and the other with very hot water. If the water is not very hot ask, or warm it up by moving the beaker on top of the Bunsen burner with appropriate mitts.

Stretch the balloon over the mouth of the flask. Submerge the flask in the hot water to the point that the beake r does not overflow. What happens to the balloon on the flask? Next, move the flask to the ice cold water. What happens to the balloon as the flask rests in the cold water/ice.

A) What happens to the flask in hot water? Explain at the particle level why this happens?

B) What happens to the flask in cold water? Again explain at the particle level Why does this happen?

Station 3: At this station is a candle and a match.

1) Ignite the candle with the match noting how long it takes for the candle to light.

2) Light another match, blow out the candle and immediately try to re-ignite the candle. Does it re-ignite faster than when the first trial?

3) Light another match and another candle. This time blow out the candle but place the match in the white "smoke trail" coming off the extinguished candle.

A) Explain at the particle level why does the candle ignite faster in 2) than in 1)?

B) Why does the candle ignite even faster in the "smoke trail"?

Station 4: At this station are a thermometer and a beaker of hot water and a beaker of cold water.

Place the thermometer in the hot water. What is the temperature?

Place the thermometer in the cold water. What is the temperature?

A) What is happening to the liquid inside the thermometer to make the temperature level increase and decrease?

B) What is the role of heat in making the liquid level rise?

C) Why in terms of heat does the liquid level drop when the thermometer is placed in cold water?

Station 5: At this station, you are testing the properties of gas

In the beaker, mix roughly a teaspoon of baking soda and about 20ml of vinegar (the amount doesn't have to be exact, it just needs to generate enough carbon dioxide gas).

Light the candle, and slowly "pour" the contents of the beaker on to the lit candle without having the liquid come out.

A) What happened to the candle when the contents are poured onto the candle?

B) Explain at the particle level of where the gas particles went when they were poured from the beaker? (draw a picture)

C) Do gas particles take up the space of the container? Why or why not? What about solids and liquids?

Station 6: At this station are beakers with hot and cold vinegar and some baking soda. As well, there are several small empty beakers. DO THIS IN THE SINK!!! OR YOU WILL HAVE A HUGE MESS TO CLEAN UP!!!

Place 10 mL of cold vinegar in one small beaker. Add one spoonful of baking soda to the vinegar. Note the speed of the reaction.

Now place 10mL of hot vinegar in another small beaker. Again add one small spoonful of baking soda to the vinegar. Again note the speed of the reaction.

A) In which vinegar is the reaction faster?

B) Explain at the particle level why it is faster with this vinegar?

Station 7: At this station are two beakers with eyedroppers, one with normal water and the other with water and a liquid detergent and pennies.

Take one penny and ensure it is clean and dry. Fill the eyedropper that is the normal water. Drop drops of water onto the penny. Count the number of drops you add until the water bursts over the edge of the coin. You should note it builds up on the coin and then bursts over the edge.

Repeat this process with another clean, dry coin but this time add the soapy water.

A) Compare the number of drops required to burst the edge in the normal water as compared to the soapy water.

B) What does this activity tell you about the relationship between water molecules in a non-soapy environment?

C) What effect do you think soap has on water particles?