**Unit 1-2 Chemistry SAC task: Reflective annotations**

**Title:** Properties of water

**Background**

Water is so much a part of everyday life that we forget that it is a chemical. For this task you will conduct a number of short experiments with water that highlight its properties. Many of these properties can be explained through an understanding of the structure of water.

**Task**

Over the next week you will conduct a series of small experiments with water. Each experiment is designed to highlight some aspect of the properties of water.

For each experiment,

* record your observations and results in your logbook but leave a very wide margin beside your work.
* The wide margin is provided for you to make commentary of what conclusions you can draw and what learnings you can make about water.

Once you have completed your experiments, you need to make a summary of what you have learnt about water. The summary must relate the properties of water to its structure. You may need to go back through your logbook to add more explanation to your initial comments.

**Annotations**

This task is an annotated report. You are asked to record all experimental observations in your logbook and to leave a wide margin where you can comment on the significance of your testing.

Your logbook will be collected by the teacher after each class.

After the final experiment, you will have a 30 minute session to summarise your understandings of water and its properties.

**Experiments**

**1. Melting and boiling of water**.

Add about 100 mL of ice and water to a 250 mL beaker.

Sit a thermometer in the beaker.

Heat on a Bunsen, recording the temperature every 30 secs.

Allow to boil for at least 2 minutes.

*Annotations: Draw a graph of your temperature readings.*

*What temperature did the water boil at?*

*Why is the temperature not increasing when the water is boiling?*

**2. Impact of salt on freezing point of water**.

Half-fill a 500 mL beaker with ice straight from the freezer. Add 100 mL of water.

Stir in half a cup of salt.

Record the lowest temperature the liquid reaches.

*Annotations*

*Does water freeze at 0 0C?*

*Why do you think salt affects the freezing point?*

**3. Density of ice compared to water**.

Weigh a 10 mL measuring cylinder.

Add 9.0 mL of water to a measuring cylinder.

Weigh again.

Sit the measuring cylinder in a freezer.

Record the volume of the ice once frozen.

*Annotations*

*Calculate the density of water.*

*Calculate the density of ice.*

*What conclusion can you draw?*

**4. Specific heat capacity of water compared to ethanol**.

Add 40 mL of water to a 100 mL beaker. Add a thermometer.

Add 40 mL of ethanol to a 100 mL beaker. Add a thermometer.

Sit both on a hot plate on low.

Record the temperature every 20 secs until the ethanol looks ready to boil.

*Annotations*

*Do all liquids heat at the same rate?*

*What is specific heat capacity?*

**5. Solubility of ethanol in water**.

Add exactly 50 mL of water to a 100 mL measuring cylinder.

Add exactly 50 mL of ethanol to a 100 mL measuring cylinder.

Pour the ethanol into the water.

Record the volume.

*Annotations*

*Is ethanol soluble in water?*

*Was the final volume 100 mL?*

**Summation**

1. List the properties of water that you have investigated in this series of experiments.
2. Explain what you have learnt about melting points and boiling points.
3. Is water a typical liquid? Refer to your data to address this question.
4. Draw four molecules of water and draw the dipoles on the molecules.

Use the diagram you have drawn to:

* explain why water has a relatively high boiling point.
* explain why ethanol is soluble (miscible) in water.
* explain why water has a relatively high specific heat capacity.