Planning an Experiment into Solubility **Answers**

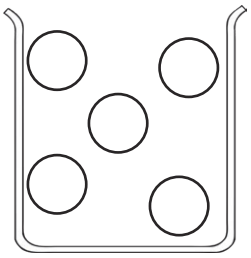
1. **Background Information:**
   When a substance is dissolved into a liquid, we call the substance dissolving a **solute**, the liquid a **solvent**, and the mixture formed is called a **solution**.

   We are going to plan an experiment to see how much solute dissolves at different temperatures, this is known as **solubility**. If we keep adding the solute and no more dissolves, then the solution is fully **saturated**.

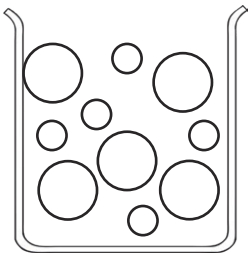
2. **Method:**
   a. Clear a suitable working area, tie long hair up and put on safety goggles.
   b. Fill a glass beaker with 25ml of sugar (solvent) at room temperature.
   c. Add 10g of sugar (solute) at a time, noting down how much you have added.
   d. Stir gently with a glass rod, applying the same amount of force each time.
   e. Keep adding the solute until no more dissolves and the solution is fully saturated and record the total amount of grams of solute added.
   f. Repeat steps b to d with hotter water. The temperatures we will use are 50°C and 100°C.
   Students completing the higher ability worksheet may have used different temperatures.

3. **How the Particles Look Inside**
   Draw two beakers showing the particles inside of them.

Beaker A (water only)



Beaker B (water and solute)



4. Risk Assessment

Complete the table to consider any safety issues in this practical. The first one has been given as an example.

Hazard	Harm	How You Will Prevent Injuries
glass beaker	Could break and cut skin.	Keep floor clear and hold beaker securely; place in middle of table; wear goggles.
hot water	Could scold or burn skin.	Keep floor clear and hold beaker securely; place in middle of table; cover arms if possible.
water	Could spill on floor and slip over.	Mop up any spillages straight away and inform others.
thermometer	Could break and cut skin.	Hold thermometer securely and return when not in use so it cannot roll off the table; use a glass stirring rod to mix the sugar.

5. **Variables:**

a. What are you changing (the independent variable)?

The temperature of the water (solvent).

What are the units?

degrees celsius (°c)

b. What are you measuring (the dependent variable)?

The mass of the sugar (solute).

What are the units?

grams (g)

c. What will you keep the same (the control variables)?

- **The volume of the solvent/water (25ml);**
- **the time and speed of stirring the solution;**
- **the type of solute and solvent being used.**

Prediction:

Students should predict that the hottest temperature they have planned to use will have the highest solubility of sugar into water. This will normally be 100°C in most plans.

This is because of the kinetic energy of the water particles at higher temperatures. These collide with the sugar at higher rates, therefore breaking the bonds between the bigger pieces and allowing them to dissolve.

Planning an Experiment into Solubility **Peer Feedback**

Effort: **1** **2** **3** **4** **5**

Name of person reading your work: _____

- **What Went Well? (WWW)**

_____

_____

_____

_____

- **Even Better If? (EBI)**

_____

_____

Signed by peer: **Dated:**

Planning an Experiment into Solubility **Teacher Feedback**

Effort: **1** **2** **3** **4** **5**

With **guidance**, you can write a background paragraph using **some** keywords correctly.	You can **independently** write a background paragraph using **most** keywords.	You can **independently** write a background paragraph using **all** keywords.
With **guidance**, you can write a basic plan to collect results safely.	You can **independently** write a plan to collect results safely.	You can **independently** write a plan to collect valid results safely.
You can identify **some** risks in an experiment and state how they could harm you.	You can identify **most** risks in an experiment, state how they could harm you and state some general prevention methods.	You can identify **all** risks in an experiment, state how they could harm you and state some personalised prevention methods.
With **guidance**, you can state the factor you are changing and what you are measuring.	You can **independently** state the independent and dependent variable and with **guidance** state some control variables.	You can **independently** state the independent, dependent and control variables and suggest how to monitor the controls.
With **guidance**, you can state a basic prediction.	You can **independently** write a prediction.	You can **independently** write a prediction and explain the science behind your idea.

Next Steps: