

Investigating

 $\blacksquare \checkmark$

Communicating



Knowledge and understanding



An experimental investigation: How is the solubility of a common substance in water affected by the temperature of the water?

Learning outcomes in focus

Students should be able to:

NS3 design, plan and conduct investigations; explain how, accuracy, fairness, safety and selection of suitable equipment have been considered

NS4 produce and select data (qualitatively/ quantitatively), critically analyse data to identify patterns and relationships, identify anomalous observations, draw and justify conclusions

CW6 investigate the properties of different materials including solubilities, conductivity, melting points and boiling points

Learning intentions

We are learning to:

- design, plan and conduct an investigation
- produce quantitative data in relation to solubility
- investigate the effect of temperature on solubility
- identify relationships between solubility and temperature
- use results to draw valid conclusions

Teaching and learning context

The First Year mixed ability students have designed, planned and conducted experiments on states of matter, solutions and separating

mixtures with teacher guidance. This the first time the students have designed, planned and conducted their own investigation. The students have used PHET to investigate solubility, concentration and saturation. The students have through investigations and "The Simpsons scientific method" worksheets engaged with variables and controls.

Task

Investigate the following question **How is the solubility of a common substance in water affected by the temperature of the water?**Represent your work in a poster

Success Criteria

SC1: pose a testable hypothesis.

SC2: list appropriate variables.

SC3: select and list appropriate apparatus.

SC4: outline my method.

SC5: produce a labelled diagram.

SC6: produce quantitative data with appropriate units.

SC7: state a valid conclusion based on results.

SC8: state safety precautions taken in conducting their investigation.

SC9: review my investigation design, referring to errors, extensions and/or improvements.



How is the solubility of a common substance in water affected by the temperature of the water?: Example 1

P2

SC1: Poses testable

hypothesis which

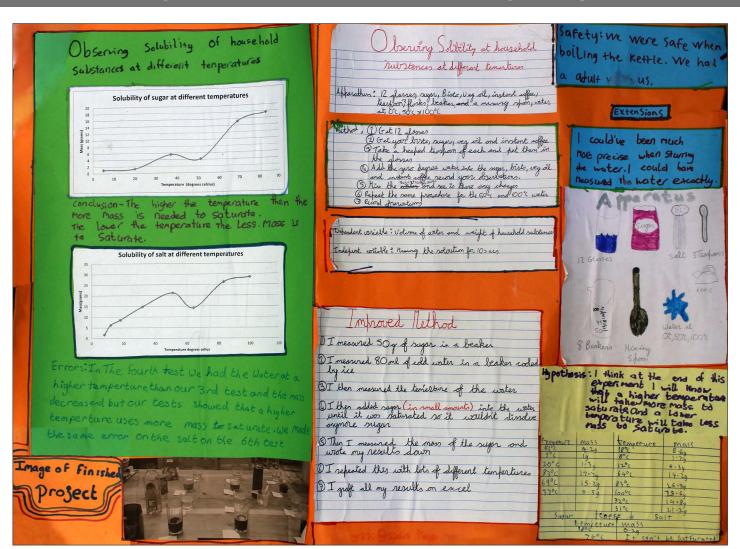
shows student

has considered

Mass, Temp and

Saturation of

solution.



SC2: Appropriate variables identified and correctly manipulated, however, inaccurately

> SC3: Listed apparatus.

labelled.

SC4: Method outlined.

SC5: Equipment drawn and photo included.

SC6: Quantitative data produced with correct units and displayed in table and graphical

SC7: Valid conclusion based on results.

SC8: Not enough consideration of safety precautions.

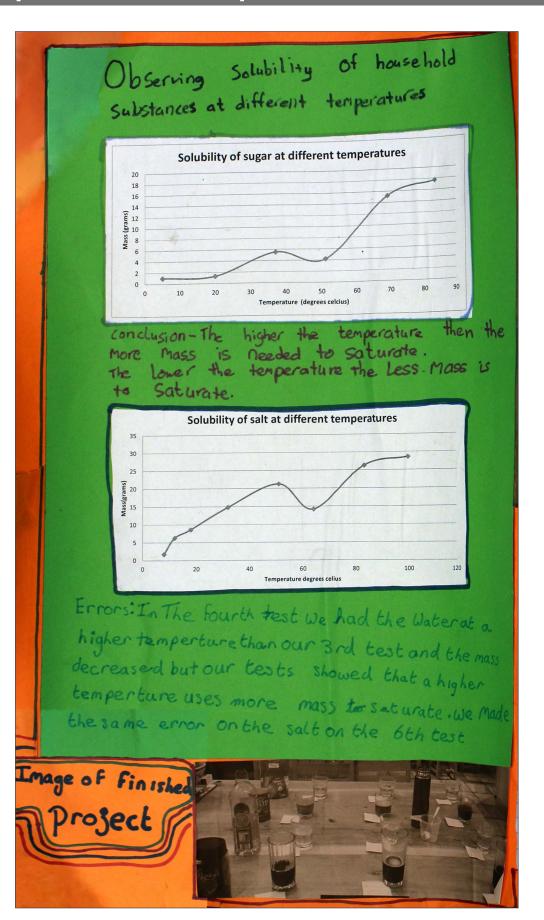
> SC9: Planned reviewed and redesigned improvements identified.

Overall judgement: In Line With Expectations



How is the solubility of a common substance in water affected by the temperature of the water?: Example 1

P3



SC6: Quantitative data produced with correct units and displayed in table and graphical form.

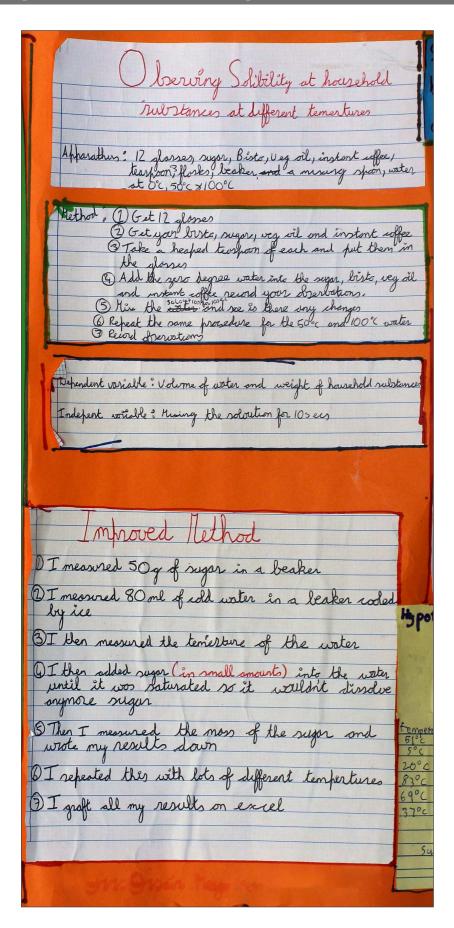
SC7: Valid conclusion based on results.

SC5: Equipment drawn and photo included.



How is the solubility of a common substance in water affected by the temperature of the water?: Example 1

P4



SC3: Listed apparatus.

SC4: Method outlined.

SC2: Appropriate variables identified and correctly manipulated, however, inaccurately labelled.

sc9: Planned reviewed and redesigned improvements identified.



How is the solubility of a common substance in water affected by the temperature of the water?: Example 1

P5

SC8: Not enough consideration of safety precautions.

SC5: Equipment drawn and photo included.

SC1: Poses testable hypothesis which shows student has considered Mass, Temp and Saturation of

solution.

SC6: Quantitative data produced with correct units and displayed in table and graphical form.

