



NANYANG GIRLS' HIGH SCHOOL
2021 Sec 4 Physics Practical 06
Rate of Cooling of Water

Suggested Markscheme (Total = 15 marks)

Results

[2]

t / s	Temperature, θ / °C	
	of beaker	of Styrofoam cup
0		
30		
60		
90		
120		
150		
180		
210		
240		
270		
300		

- labeling of temperature, units [1]
- temperature recorded to precision of 0.5 °C [1]

Graphs of θ against t

[4]

- **Scales** are suitable, spaced out points
- **Points** are correctly plotted
- **Lines** are sharp/uniform, best fit line
- **Axes** θ against t, correct labelling, intersection labelled
- Two cooling curves are suitably labelled to differentiate them clearly

Conclusion

[2]

- Rate of cooling in the styrofoam cup is **lower** than the rate of cooling in the beaker.
- For both containers, the rate of cooling at the start of the experiment is **higher / greater** than the rate of cooling at the end of the experiment,
- since the graph is **steeper** at the beginning of the experiment as compared to that at the end.

Questions

1. Explain why the cooling rate of water is greater or smaller at the beginning of the experiment than that at the end of the experiment. [1]

- The cooling rate is greater at the beginning of the experiment because the temperature difference between the water and the surroundings are higher at the beginning.

2. Briefly describe **one main way** (through which hot water may lose heat to the environment) which is investigated in this experiment. [1]

- By conduction through the walls of the (beaker and Styrofoam) cup.

3. Briefly describe **two** other ways in which the hot water may lose heat to the environment. [2]

State any two:

- By convection currents in the air above the container
- By radiation to the environment, as infra-red waves
- By vaporisation of water, such that latent heat is lost

4. State **one** possible source of error in this experiment and explain how it may affect your conclusion. [2]

State any one:

- The container with a larger surface area will have a higher rate of heat loss through radiation.
- The rate of heat loss by evaporation would be higher for the container which has a larger exposed surface area.

5. Suggest **one** improvement to reduce the source of error stated in your answer to **Question 4**. [1]

State any one:

- Use containers of the same shape and size.
- Cover each container with a cover of the same material to minimize the rate of evaporation.