Thermal Processes

Mark Scheme 4

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	Thermal Physics
Sub-Topic	Thermal Processes
Paper Type	Alternative to Practical
Booklet	Mark Scheme 4

Time Allowed: **36 minutes**

Score: **/30**

Percentage: **/100**

1 **(a)** 23 (ºC) [1]

(b) s, ºC, ºC, words or symbols [1]
30, 60, 90, 120, 150, 180 [1]

(c) Uninsulated (owtte) OR no significant difference [1]
Justified by reference to temperature differences and time [1]

(d) Any two from:
initial temperature/starting temperature/temperature of hot water
(constant) room temperature/ correct named reference to environmental condition
tube size/same test-tube
thickness of glass
volume/amount/level of water
thickness of cotton wool
depth (of immersion) of thermometer
(rate of) stirring [2]

(e) Any two suitable insulators (that can be wrapped around tube) [2]

[Total: 9]

2 **(a)** 87 (^{o}C) [1]

(b) s, ^{o}C, ^{o}C [1]

(c) ecf allowed [1]
justified by reference to readings (up to 90s) with comparison of drops in temperatures (with numbers) given (ecf allowed) [1]

(d) Any two from:
starting temperature
room temperature
carry out at same time
same thermometer (words to that effect)
same position of thermometers
same time intervals [2]

[Total: 6]

3 **(a)** 22(.0) AND 88(.0) [1]

(b) units correct and consistent (symbols or words) [1]

(c) conclusion which matches the temperature changes [1]

(d) any two from: [2]
- volume / level of hot water
- initial temperature of hot water
- initial temperature of cold water
- same type of boiling tube
- room temperature / draughts / appropriate environmental condition

(e) any two improvements relating to apparatus: [2]
- lid on beaker
- insulation on beaker
- lid / cotton wool in boiling tube
- thinner / metal walls on tube
- all cold water in boiling tube below hot water level
- greater contact area of tube
- use of water bath

explanation matching first improvement, including: [1]
- reduces loss of thermal energy from beaker
- reduces loss of thermal energy from boiling tube
- better thermal conduction
- not affected by variation in hot water temperature

[Total: 8]

4 **(a** 78 °C c.a.o. unit needed [1]

(b)(c) both thermometer readings correct 69, 61 [1]
correct differences 9, 17 allow e.c.f. [1]

(d) order matches results (expect D, B, C, A) allow e.c.f. [1]

(e) any two from:
room temperature (or other environmental condition)
initial (hot) water / starting temperature (accept initial temperature)
volume / mass / amount / level of (hot) water
same type / thickness / material / size / volume of beaker
time delays during operations [2]

(f) same time of cooling for each experiment [1]

[Total: 7]