

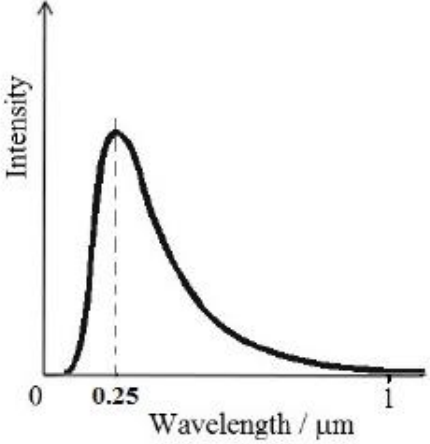
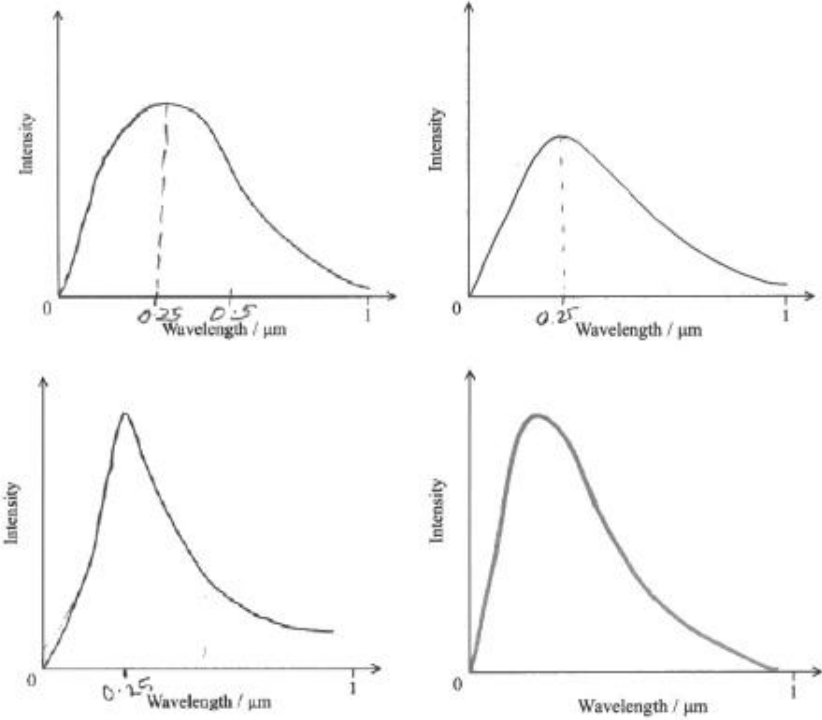
Name of the Student: _____

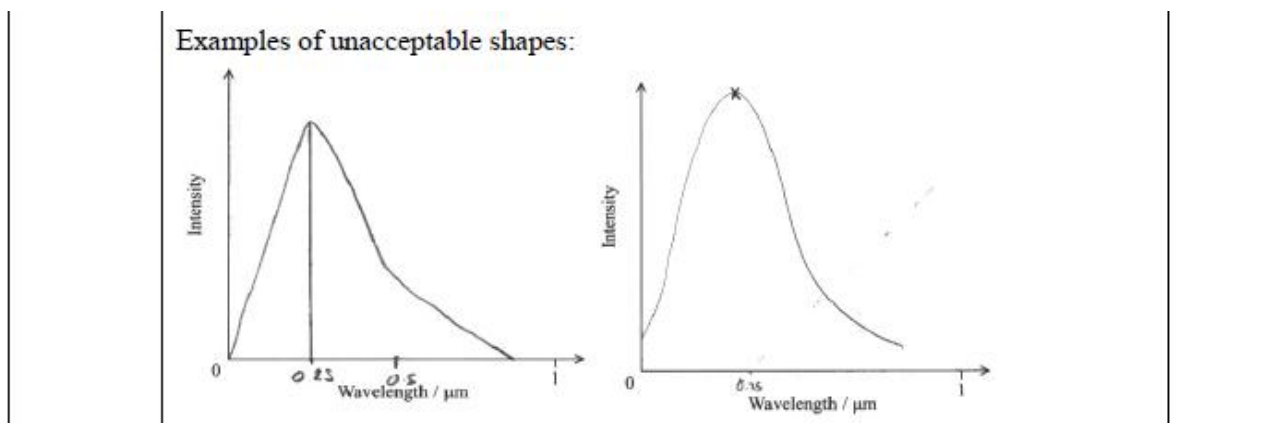
Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

Q1.

Question Number	Answer	Mark
	<p>Curve with peak at $0.25\mu\text{m}$ (labelled or in correct position) (1)</p> <p>Shape must be an asymmetric curve and must not have intensity at $\lambda = 0$ (1)</p>  <p>Examples of acceptable shapes:</p> 	<p>2</p>



Q2.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> To bring tubing up to temperature (of steam) (1) So steam only condenses in the cup (1) <p>Or steam doesn't condense in the tubing</p>		2
(ii)	<ul style="list-style-type: none"> Thermal energy will be transferred from the steam/tubing to the surroundings (1) Lagging/insulating/shortening the tubing (1) 	<p>Accept:</p> <ul style="list-style-type: none"> Thermal energy is transferred to the cup/probe These should have a small a heat capacity 	2

Q3.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	<ul style="list-style-type: none"> Change in temperature and corresponding time (1) Use of $P = \Delta E / \Delta t$ and $\Delta E = mc\Delta\theta$ (1) $c = 950 \text{ J kg}^{-1} \text{ K}^{-1}$ (1) 	<p>Example of calculation:</p> $\frac{\Delta\theta}{\Delta t} = \frac{(36 - 16) \text{ K}}{(500 - 0) \text{ s}} = 0.04 \text{ K s}^{-1}$ $37.5 \text{ W} = 0.986 \text{ kg} \times c \times 0.04 \text{ K s}^{-1}$ $c = 951 \text{ J kg}^{-1} \text{ K}^{-1}$	3

(ii)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • In 240 s the temperature of the block rose by only 9.6 °C Or It took 250 s for the temperature of the block to rise by 10 °C. (1) • Hence there must have been energy transfer to the surroundings (by heating) (1) 	<p>For MP1 accept 9.5 °C Accept it took 10 s longer</p> <p>For MP2 accept energy dissipated to the surroundings</p>	2
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Q4.

Question Number	Answer	Mark
(a)	The water molecules will have a greater average K.E. Or the water will be hotter Or less energy transferred to teapot (1)	1
(b)(i)	Use of $\Delta E = mc\Delta\theta$ $\Delta E = 15\,000\text{ J}$ <u>Example of calculation:</u> $\Delta E = mc\Delta\theta = 0.26\text{ kg} \times 4200\text{ J kg}^{-1}\text{ K}^{-1} \times (95 - 81)\text{ K} = 15\,300\text{ J}$	(1) (1) 2
(b)(ii)	Assumption: no heat is lost to the surroundings Or all energy goes to the teapot Use of ΔE value from (i) in $\Delta E = mc\Delta\theta$ $c = 600\text{ (J kg}^{-1}\text{ K}^{-1})$ <u>Example of calculation:</u> $c = \frac{\Delta E}{m\Delta\theta} = \frac{15300\text{ J}}{0.43\text{ kg} \times (81 - 22)\text{ K}} = 603\text{ J kg}^{-1}\text{ K}^{-1}$	(1) (1) (1) 3
(b)(iii)	(The calculated value for the specific heat capacity has been overestimated) because energy is transferred to the surroundings (by heating) so the energy gained by the teapot has been overestimated (1) (1)	(1) (1) 2
Total for question		8