Simple Kinetic Molecular Model of Matter

Mark Scheme 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Thermal Physics
Sub-Topic	Simple Kinetic Molecular Model of Matter
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 6

Time Allowed: **49 minutes**

Score: **/41**

Percentage: **/100**

1 **(a** (a liquid evaporates) at any temperature / below the boiling point / over a range of temperatures / below 100 °C / at different temperatures / not at a fixed temperature B1

(during evaporation) vapour forms at / escapes from the surface of the liquid B1

(without a supply of thermal energy,) evaporation continues / occurs / doesn't stop
OR causes liquid to cool / is slower / reduces

(b) (i) (Q =) mL C1
OR $0.075 \times 2.25 \times 10^6$

1.7×10^5 J A1

(ii) (E =) VIt OR $240 \times 0.65 \times (20 \times 60)$ C1
OR $P = IV$ and $P = E/t$ OR energy / time

1.9×10^5 J A1

(iii) energy is transferred to the surroundings
OR in heating the surroundings / air / atmosphere / hot-plate

[Total: 8]

2 **(a** molecules OR atoms OR particles
speed OR velocity OR kinetic energy
molecules OR atoms OR particles
(Surface) area B2
any four correct gains 2 marks, two or three correct gains 1 mark

(b) (i) (when cap is screwed on) at top of mountain:
pressure of air in bottle = the low pressure of the air outside
OR is less than pressure at bottom of mountain
OR is low B1

(at bottom of mountain) bottle collapses because pressure outside (bottle) is greater than pressure inside B1

(ii) Boyle's law applies OR PV = constant OR $P_1V_1 = P_2V_2$ C1
$9.2 \times 10^4 \times V = 4.8 \times 10^4 \times 250$ C1
130 cm^3 A1

[Total: 7]

3	**(a)**	**(**	smaller because <u>area</u> smaller	B1
		(ii)	smaller because depth/height smaller	B1
	(b)	**(**	$h\rho g$ OR $12 \times 1000 \times 10$ 1.2×10^5 Pa OR 1.1772×10^5 Pa OR 1.176×10^5 Pa accept N/m^2	C1 A1
		(ii)	candidate's **(i)** + 1.0×10^5 Pa correctly evaluated with unit (correct value 2.2×10^5)	B
		(iii)	$p_1V_1 = p_2V_2$ in any form 1.1 cm^3 OR 0.5 × candidate's **(ii)**/10^5 correctly evaluated	C1 A1
		(iv)	value in **(iii)** too small OR volume larger o.w.t.t.e.	B1 [8]

4	**(a**	**(i)**	increases		B1
		(ii)	pV = const in any form $1.05 (\times 10^5) \times 860 (\times 10^{-6}) = p \times 645 (\times 10^{-6})$ 1.4×10^5 Pa		C1 C A1
		(iii)	F = pA in any form accept weight for F		C1
			EITHER	increase in pressure = 0.35×10^5 (Pa)	C1
				$0.35 \times 10^5 \times 5.0 \times 10^{-3}$	C1
				175 N (minimum 2 s.f.) c.a.o.	A1
			OR	$1.05 \times 10^5 \times 5.0 \times 10^{-3}$ or 525 N or $1.4 \times 10^5 \times 5.0 \times 10^{-3}$ or 700 N	(C1)
				700 – 525 N e.c.f. from **(a) (ii)**	(C1)
				175 N (minimum 2 s.f.) c.a.o.	(A1)
	(b)		increases		B1
		(ii)	no change		B1
		(iii)	extra weight (on tray/piston)		B1
		(iv)	increases		B1

[12]

5	**(a**	increase surface area of tank		B1	
		blow air over surface/put in windy place		B1	**2**
	(b)	**(i)**	capillary tube longer or liquid with lower expansivity	B1	
		(ii)	capillary tube thinner/finer or liquid with higher expansivity or bigger bulb	B1	**2**
	(c)	$p_1v_1 = p_2v_2$ or $1 \times 10^5 \times 150 = p_2 \times 50$		C1	
		$p_2 = 3 \times 10^5$ (Pa)		A1	**2**
					[6]