Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

(a) molecules have negligible volume
collisions are elastic
the gas cannot be liquified
there are no interactions between molecules (except during collisions)
the gas obeys the (ideal) gas law / obeys Boyles law etc.
at all temperatures/pressures
any two lines ✓ ✓

a gas laws may be given as a formula

2

(b) (i) $n\ (= PV / RT) = 1.60 \times 10^6 \times 0.200 / (8.31 \times (273 + 22))$ ✓
$= 130$ or 131 mol ✓ (130.5 mol)

2

(ii) mass = $130.5 \times 0.043 = 5.6$ (kg) ✓
(5.61kg)

allow ecf from bi

density (= mass / volume) = $5.61 / 0.200 = 28$ ✓ (28.1 kg m^{-3})
kg m^{-3} ✓

a numerical answer without working can gain the first two marks

3

(iii) $(V_2 = P_1 V_1 T_2 / P_2 T_1)$
$V_2 = 1.6 \times 10^6 \times .200 \times (273 – 50) / 3.6 \times 10^4 \times (273 + 22)$ or $6.7(2)$ (m^3) ✓

allow ecf from bii

[reminder must see bii]
look out for

mass remaining = $5.61 \times 0.20 / 6.72 = 0.17$ (kg) ✓ (0.167 kg)
or
$n = (PV / RT = 3.6 \times 10^4 \times 0.200 / (8.31 \times (273 - 50)) = 3.88(5)$ (mol) ✓

mass remaining = $3.885 \times 4.3 \times 10^{-2} = 0.17$ (kg) ✓
2 sig figs ✓

any 2 sf answer gets the mark

3

[10]

Q2.

(a) $\Delta T = \left(\frac{\Delta Q}{mc} =\right) \frac{8.5 \times 10^3}{4200 \times 0.12}$ ✓

17 K ✓

2

(b) $\left(\frac{\Delta T}{\Delta t} = \frac{\frac{\Delta Q}{\Delta t}}{mc}\right) = \frac{100 - 26}{\Delta t} = \frac{8.5 \times 10^3}{0.41 \times 4200}$ ✓

t = 15 s ✓

2

[4]

Q3.

(a) (i) $n = PV/RT = 3.2 \times 10^5 \times 1.9 \times 10^{-3}/8.31 \times 285$

n = 0.26 mol ✓ (0.257 mol)

1

(ii) $P_2 = \frac{T_2}{T_1} \times P_1 = \frac{295}{285} \times 3.20 \times 10^5$ ✓

3.31×10^5 Pa ✓ (allow 3.30-3.35 $\times 10^5$ Pa)

3 sig figs ✓ sig fig mark stands alone even with incorrect answer

3

(b) similar -(rapid) **random** motion

- range of speeds

different - **mean** kinetic energy

- root **mean** square speed

- **frequency** of collisions

2

[6]