**Name of the Student**:_____
**Max. Marks : 22 Marks** **Time : 22 Minutes**

Mark Schemes

## Q1.

(a) reasons:
α particle has much more mass/momentum than β particle
α particle has twice as much charge as a β particle
α particle travels much slower than a β particle any **two (1) (1)**

**2**
**QWC 1**

(b) (i) energy absorbed per sec (= energy released per sec)
$= 3.2 \times 10^{9} \times 5.2 \times 10^{6} \times 1.6 \times 10^{-19}$ **(1)**
$= 2.7 \times 10^{-3}$ (J) **(1)** ($2.66 \times 10^{-3}$ (J))

(ii) temperature rise in 1 minute $\left(= \frac{\text{energy absorbed in 1 minute}}{\text{mass} \times \text{specific heat capacity}}\right)$

$= \frac{2.7 \times 10^{-3} \times 60}{0.20 \times 10^{-3} \times 900}$ (for numerator) **(1)** (for denominator) **(1)**

= 0.90 K (or °C) **(1)**

(allow C.E. for incorrect value in (i))

**5**

**[7]**

## Q2.

(a) (i) a collision in which kinetic energy is conserved **(1)**

(ii) molecules of a gas are identical
[or all molecules have the same mass] **(1)**
molecules exert no forces on each other except during impact **(1)**
motion of molecules is random
[or molecules move in random directions] **(1)**

volume of molecules is negligible (compared to volume of container)
[or very small compared to volume of container or point particles] **(1)**
time of collision is negligible (compared to time between collisions) **(1)**
Newton's laws apply **(1)**
large number of particles **(1)** (any two)

**3**

(b) (i) the hot gas cools and cooler gas heats up
until they are at same temperature
hydrogen molecules transfer energy to oxygen molecules
until **average k.e.** is the same
(any two **(1) (1)**)

(ii) (use of $E_k = \frac{3}{2} kT$ gives) $E_k = \frac{3}{2} \times 1.38 \times 10^{-23} \times 420$ **(1)**

$= 8.7 \times 10^{-21}$ J ($8.69 \times 10^{-21}$ J)

**4**

**[7]**

## Q3.

(a) (i) energy = $800 \times 60 = 48 \times 10^3$J **(1)**

(ii) (use of $\Delta Q = mc \Delta \theta$ *gives)* $48 \times 10^3 = 60 \times 3900 \times \Delta \theta$ ***(1)***
$\Delta \theta$ *= 0.21 K* ***(1)*** *(0.205 K)*
*(allow C.E. for value of energy from (i))* *3*

(b) $\Delta Q = ml$ gives $500 \times 60$ **(1)** $= m \times 2.3 \times 10^6$ **(1)**
$m = 0.013$ kg **(1)**

**3**

(c) not generating as much heat internally **(1)**
still losing heat (at the same rate)
[or still sweating] **(1)**
hence temperature will drop **(1)**

**lmax 2**

**[8]**