RATE OF REACTION

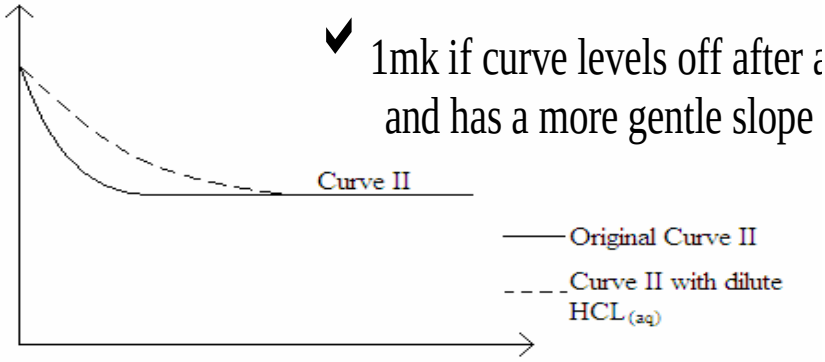
MARKING SCHEME

1. (a) Curve I (1mark)

(b) The reaction will have reached completion and the amount of reaction and products do not change further.

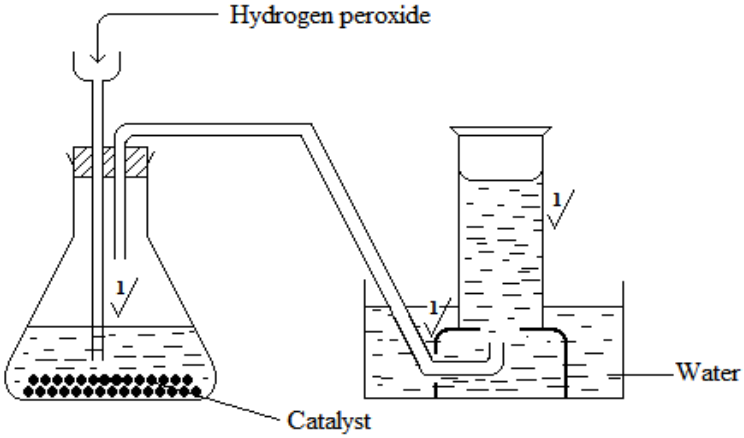
(1 mark)

(c)



2. (a) (i) bubbles / effervescence / hydrogen / gas pushes up / lifts metal [1]
(ii) does not react with acid / zinc and iron react with acid [1]
not just unreactive
(b) (i) with copper / first experiment [1]
(ii) copper acts as a catalyst [1]
(c) (i) smaller gradient [1]
not rate is slower
(ii) same final volume of hydrogen / same level (on graph) [1]
(d) temperature / heat [1]
increase temperature – reaction faster particles have more energy / particles move faster / particles collide more frequently / more particles have enough energy to react
not more excited
accept arguments for a decrease in temperature [1]
powdered
greater surface area
greater collision rate / more particles exposed (to acid)
any two [2]
not concentration / light / catalyst / pressure

3.(a) (i)



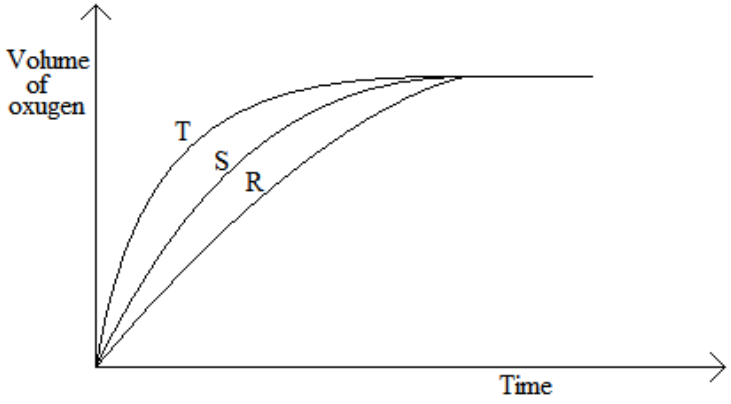
(ii) Manganese (IV) oxide ✔ 1/ MnO

(iii) $2H_2O_{2(l)} \longrightarrow 2H_2O_{(l)} + O_{2(g)}$ ✔

(b) (i) $4P_{(s)} + 3O_{2(g)} \longrightarrow 2P_2O_{3(s)}$

(ii) Phosphorus (iii) oxide (P_2O_3) dissolves in water to give phosphorus acid (H_3PO_3)

(c)



4. b) i) $Zn_{(s)} + 2Hcl_{(aq)} \longrightarrow Zncl_{2(aq)} + H_{2(g)}$ ✓1 *Kyo*

ii) Produces a 'pop' sound with a burning splint✓1

iii) To ensure that all the zinc reacted✓1

c) i) $166cm^3$✓1

ii) At 180^{th} minute✓1

e $Zn_{(s)} + 2Hcl_{(aq)} \longrightarrow Zncl_{2(aq)} + H_{2(q)}$ ✓ ½

1 1

65 g of zinc product 24 litres
∴ 13g " " x

$X = \frac{13 \times 24}{65}$ 1 ✓1
= 4.8 litres✓ ½