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P2 MEMO

- 1.1 D ✓✓
- 1.2 B ✓✓
- 1.3 C ✓✓
- 1.4 B ✓✓
- 1.5 B ✓✓
- 1.6 B ✓✓
- 1.7 B ✓✓
- 1.8 D ✓✓
- 1.9 A ✓✓
- 1.10 C ✓✓

Question 2

- 2.1.1 SiO_2 ✓
- 2.1.2 PH_3 ✓
- 2.1.3 C_6H_{12} ✓
- 2.1.4 Kr ✓
- 2.1.5 KBr ✓
- 2.1.6 NH_4Cl ✓
- 2.1.7 Pt ✓
- 2.1.8 H_2O ✓

2.2.1 Weak forces of attraction between molecules, ions or atoms of noble gases ✓

2.2.2 I_2 has induced-dipole-dipole forces while H_2O has H-bonds. H-bonds are usually stronger than London forces if sizes of molecules are similar. ✓

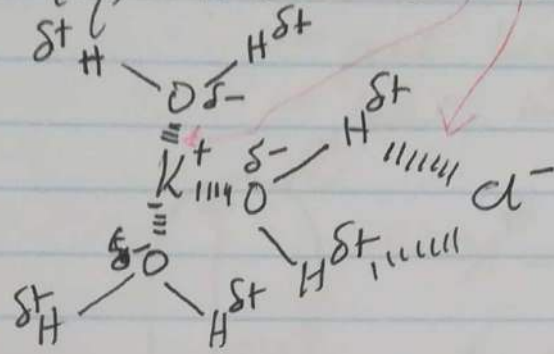
As London forces become stronger with size and more electrons, I_2 has stronger forces than H_2O hence more energy needed. ✓

2.3.1 A substance that is dissolved in the solution ✓

2.3.2 Potassium bromide ✓

2.3.3 KBr has ions, water has H-bonds (dipoles) ✓

∴ KBr(cg) has [Downloaded from eduresourceza.com](http://eduresourceza.com) ion-dipole interactions.



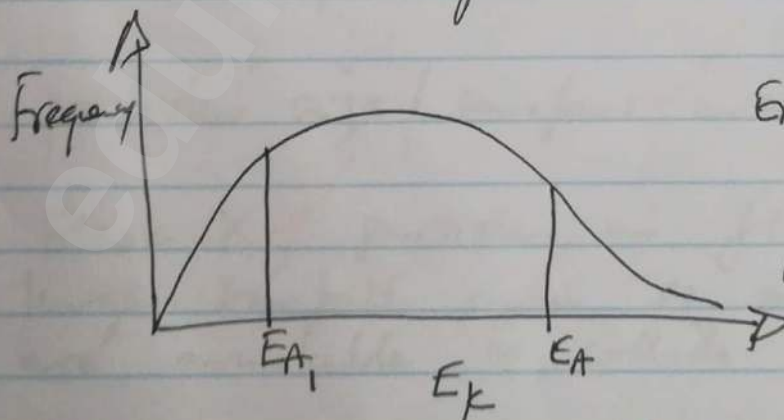
3.1.1 Change in concentration of products or reactants per unit time.

B.

3.1.2 A temporary high energy transition state in a reaction.

3.2.1 It provides an alternative reaction pathway which uses less activation energy/ it weakens bonds that need to be broken.

3.2.2 A catalyst provides an alternative pathway that lowers the E_A of the reaction, therefore more particles will have enough energy to react upon collisions. There will be more successful collision per unit time



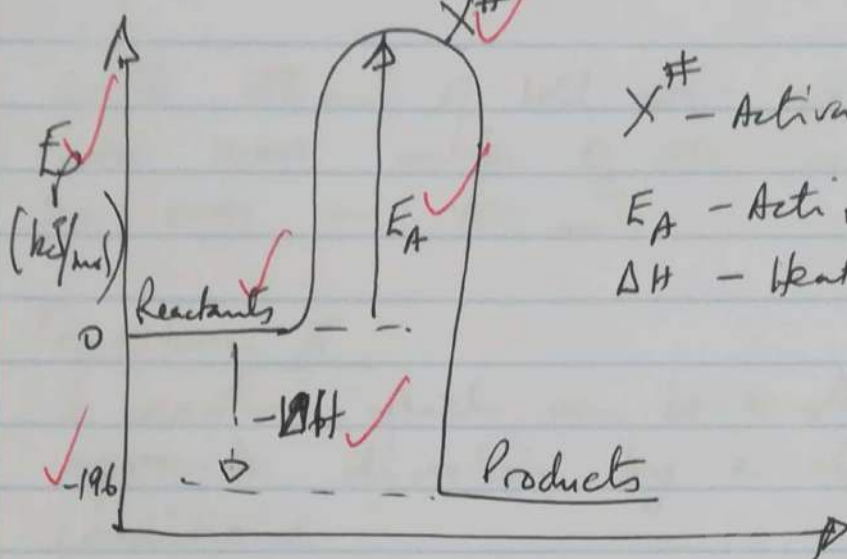
E_{A1} - activation energy in presence of catalyst

E_A - activation energy without catalyst.

"A catalyst provides an alternative reaction pathway which makes more collisions to be effective"

On answer sheet - peak moves to left -- (1)
 - peak higher --- (1) (3)
 - About same area --- (1)

3.4



$X^\#$ - Activated complex.

E_A - Activation Energy

ΔH - Heat of reaction.

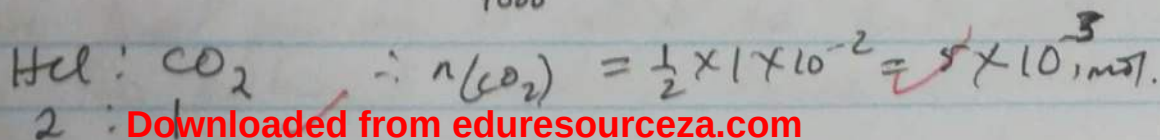
Question 4.

- 4.1 * measure time it takes for effervescence to stop / stop watch
 2 marks for method * measure change in mass of reaction
 1 mark for vessel against time - sensitive balance and apparatus stopwatch.
 * change in pH against time, pH meter and stopwatch.

4.2 particles size / surface area of CaCO_3 .

4.3 Flask X, particles in flask X have a large surface area so more particles are available to collide per unit time.

4.4 $n(\text{HCl}) = CV = 0.1 \times \frac{100}{1000} = 1 \times 10^{-2} \text{ moles}$.



$$V(\text{CO}_2) = nV = 5 \times 10^{-3} \times 22.4 = 0.112 \text{ dm}^3$$

4.5.1 Equal to γ

4.5.2 In 2 150 cm^3 of HCl are used $\therefore$ there are more moles of HCl reacting than the ones in 100 cm^3 .

Question 5

5.1 A reaction which can be made to go in the opposite direction by a change in conditions.

5.2 For a system in equilibrium if an external stress (temperature, pressure, concentration) is imposed the system will shift so as to minimise the stress that caused it.

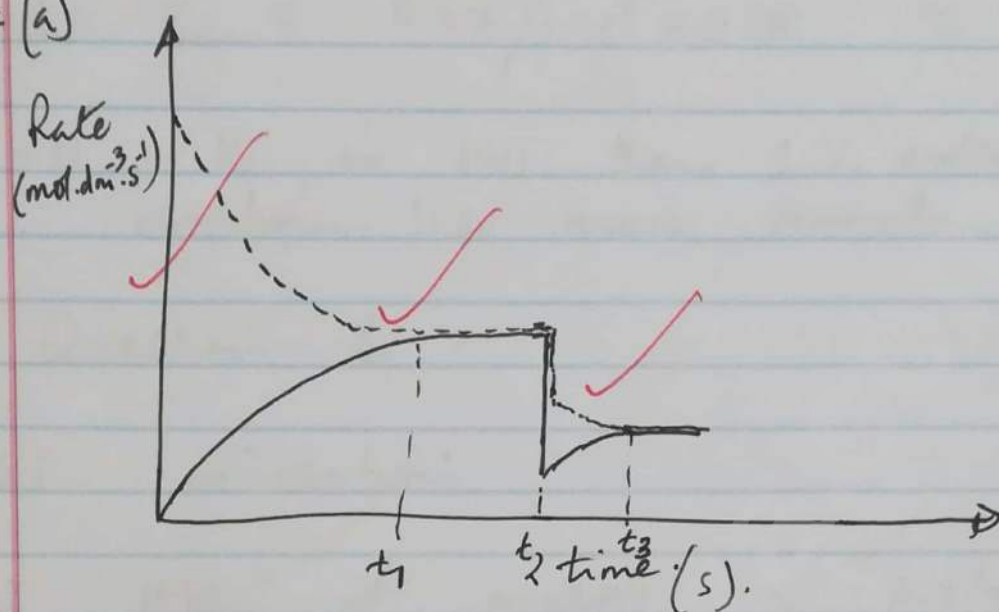
5.3.1 Forward reaction is exothermic, an increase in temperature favours the backward reaction so as to minimise the stress.

5.3.2. • Increasing the pH is the same as reducing $[\text{H}^+]$.
• Increase in pH favours the forward reaction to produce more H^+ ion hence lowering pH.

5.3.3 As $[\text{H}^+]$ is decrease by increasing pH there frequency of collision (effective) as there are fewer particles to collide so that rate of the backward reaction decreases while the

of the forward reaction is not affected initially hence forward reaction is favoured.

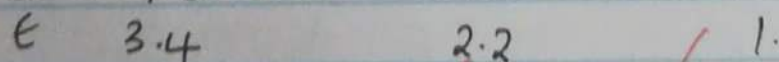
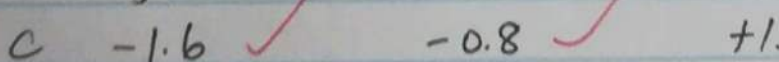
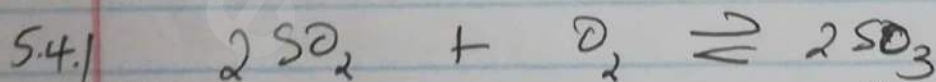
5.3.4 (a)



(b) $k_a @ t_1 < k_c @ t_3$

The forward reaction is favoured so [products] increases while [reactants] decreases.

(c) When temperature is decrease E_a decreases (of particles) so fewer particles have enough energy to overcome E_a $\therefore$ Both rates decrease. Using LCP decrease in temperature favours exothermic reaction $\therefore$ decrease in rate of fwd reaction is not that pronounced.



$C = \frac{n}{V} [E] \frac{3.4}{2.5} = 1.36 \text{ mol/dm}^3$ 0.88 mol/dm^3 0.64 mol/dm^3

5.4.2 $K_c = \frac{[SO_3]^2}{[SO_2]^2 [O_2]}$

5.4.3 $K_c = \frac{0.64^2}{1.36^2 \times 0.88} = 0.25$

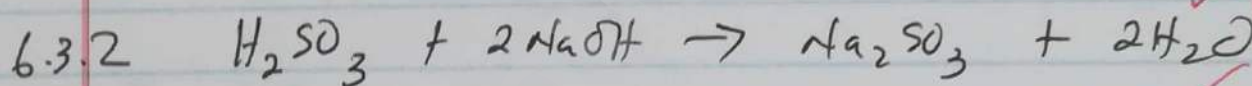
5.4.4 K_c is less than 1 $\therefore$ extent of the reaction lies more towards the reactants.

Question 6

6.1 ionisation

6.2 HSO_3^- it accepts a proton.

6.3.1 a proton donor that partially ionises in water.

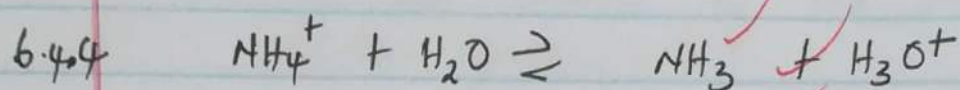


1 mole of H_2SO_3 reacts with 2 moles of $NaOH$ $\therefore$ it is dibasic.

6.4.1 A substance in which H^+ of an acid is replaced by another cation.

H_2SO_4 and NH_3 (or NH_4OH)

6.4.3 ammonium ion, NH_4^+



It is an acidic as its hydrolysis produces H_3O^+ giving an excess of H_3O^+ ions.

6.5.1 A solution of known concentration.



6.5.3 $n(KOH) = CV = 0.2 \times 15/1000$

$$n(H_2SO_4) = \frac{1}{2} \times 0.2 \times 15/1000 = 0.1 \times 15/1000 = 1.5 \times 10^{-3} \text{ mol.}$$

$$C = n/V = \frac{1.5 \times 10^{-3}}{20 \times 10^{-3}} = 0.075 \text{ mol/dm}^3$$

Question 7

7.1.1 It is an electron acceptor.

7.1.2 Cl_2 is a better oxidising agent than Ni^{2+} and has better oxidising ability: it is reduced instead of Ni^{2+} .

7.2.1 Electrode on which oxidation occurs.

7.2.2 Ni

7.3 Cl_2/Cl^- electrode.

7.4 $Ni(s) | Ni^{2+}(1M, 298K) || Cl_2(1atm) | Cl^-(1M, 298K) | Pt$

- 7.5.2 Ni electrode dissolves or decreases in mass and the colour of the solution turns darker green. ✓
- 7.5.3 Completes the circuit / separates cathode and anode compartments. ✓
- 7.5.4 As oxidation occurs there is an increase in positive charge $\therefore$ salt bridge releases anions into this cell to balance the charge. ✓
- 7.6. Increases. ✓

Question 8

8.1 electrolytic cell. ✓

8.2 To make Cl₂ and H₂ released at different potential and prevent them reacting; to make sure OH⁻ don't flow to the half with Cl₂ hence avoiding their reaction ✓

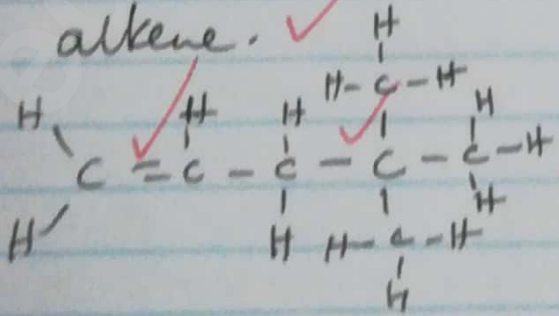
8.3 A - NaCl(aq) ✓ B - Cl₂(g) ✓ D - NaOH(aq) ✓

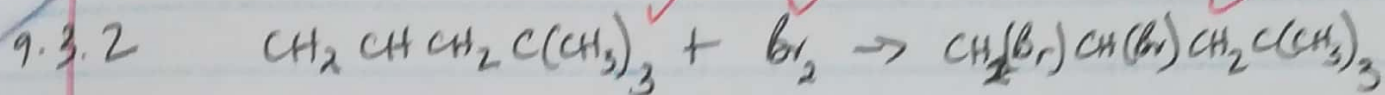
8.4 $2H_2O + 2e^- \rightarrow 2OH^- + H_2$ ✓✓

8.5 H₂O is more oxidising than Na⁺ $\therefore$ it is reduced first. Cl⁻ is negatively charged therefore not attracted to cathode also it is least oxidising. ✓
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- Cell use less energy, faster NaOH is produced as Cl^- ions cannot pass through cellulose membrane.
- 8.7 It is not spontaneous, it converts electrical energy to chemical energy.
- 8.8 pure copper
- 8.9 $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$

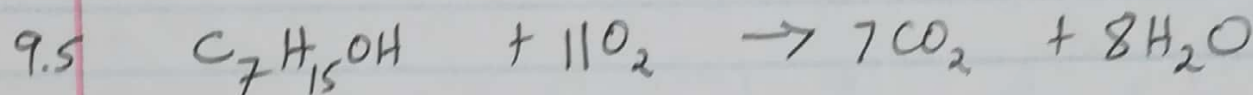
Question 9.

- 9.1.1 The atom or group of atoms that form the centre of activity of the compound.
- 9.1.2 hydroxyl group
- 9.1.3 4,4-dimethylpentan-1-ol.
- 9.2.1 A family (series) of compounds with same functional group, general formula and differ from each other by CH_2 -group.
- 9.2.2 alkene.
- 9.2.3 
- 9.3.1 bromination / halogenation



9.4.1 Elimination / dehydration

9.4.2 Esters.



9.7.1 Addition / hydrogenation.

9.7.2 alkane.