

**CHEMISTRY
PAPER II**

Question I

1. Table 1.1 shows a part of Periodic Table

Table 1.1

Na	Mg														Cl	Ar
K	Ca						Fe				Zn				Br	Kr

- a. Describe the trend in atomic size down the Group 1. **[1]**

- b. Explain why is chlorine more reactive than bromine. **[2]**

- c. Name the transition element that is used as catalyst in Haber process. **[1]**

--	--

2. A student investigates two colourless solutions, P and Q, using aqueous sodium hydroxide and records the observations as shown in Table 1.2.

Table 1.2

Solution	Observation with aqueous NaOH	Observation in excess NaOH
P	blue precipitate	insoluble
Q	white precipitate	dissolves to form a colourless solution

- a. Identify the metal ion present in P and Q. **[2]**

- b. State the name of the white precipitate formed. [1]

--	--

- c. State the change in colour of the precipitate, if solution P is replaced by salt solution of iron (II). [1]

- d. Explain why the compounds of transition elements are coloured. [2]

Question II

1. Dilute sulphuric acid is added to a conical flask containing potassium hydroxide solution, as shown in Figure 2.1.

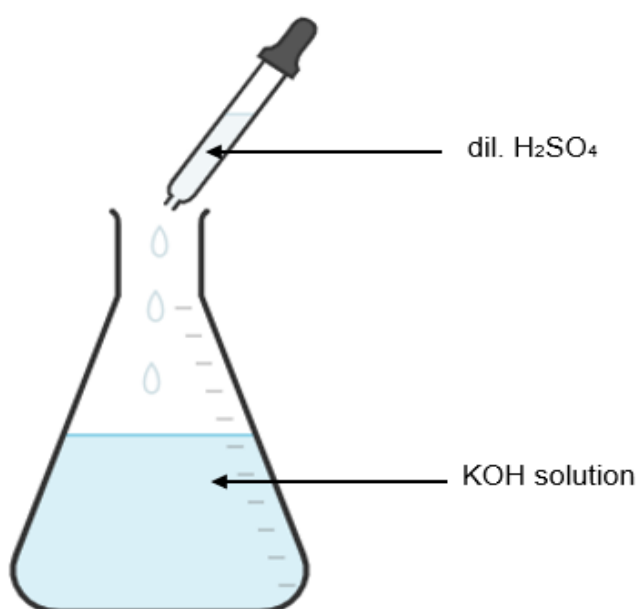


Fig. 2.1

- a. Write a balanced chemical equation for the reaction taking place in the conical flask. [2]

--	--

- b. Identify the thermochemical reaction represented by the chemical reaction. [1]

- c. Draw a graph to show the reaction pathway of the reaction. [2]

--	--

- d. State the colour change of the solution, if methyl orange is added to it before dil. H_2SO_4 . [1]

--	--

- e. Explain what happens to the salt obtained if it is separated and left in the open air. [2]

- f. Compare the behaviour of sulphuric acid, H_2SO_4 and ethanoic acid, CH_3COOH when dissolved in water. Explain the reason for the difference in their behaviour. [2]

Question III

1. Figure. 3.1 shows the displayed formula of ethylene glycol.

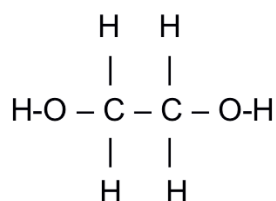


Fig. 3.1

- a. Identify the functional group present in ethylene glycol. [1]

--	--

- b. Deduce the molecular formula of ethylene glycol. [1]

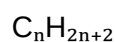
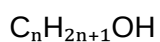
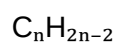
--	--

- c. State the IUPAC name of ethylene glycol. [1]

--	--

- d. Ethylene glycol and ethanol are both derived from ethane by replacing hydrogen atoms by hydroxyl groups. State **two** conditions required for the manufacture of ethanol by the fermentation of aqueous glucose. [2]

- e. Circle the general formula of ethanol. [1]



2. Ethanol reacts with ethanoic acid in the presence of concentrated sulfuric acid to produce an ester.

a. Represent the formation of the ester with the help of a chemical equation [2]

--	--

b. State the name of the ester formed. [1]

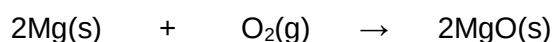
--	--

c. State **one** use of ester. [1]

--	--

Question IV

1. Magnesium reacts with oxygen to form magnesium oxide as shown in the chemical equation below:



a. Calculate the number of moles of magnesium oxide produced when 10 g of magnesium burns completely in air. [2]

--	--

- b. Calculate the percentage composition by mass of oxygen in MgO. [1]

--	--

- c. Determine the gram atomic mass (GAM) and gram molecular mass (GMM) of oxygen. [2]

GAM:	
GMM:	

- d. State the electronic configurations of magnesium and oxygen atoms [2]

- e. Show the formation of magnesium oxide, using a dot-and-cross diagram. [2]

--	--

- f. Explain why magnesium oxide is an ionic compound whereas oxygen exists as a covalent molecule? [2]

Question V

1. A student performed an experiment to investigate the production of oxygen gas by an aquatic plant during photosynthesis, as shown in Figure 5.1.

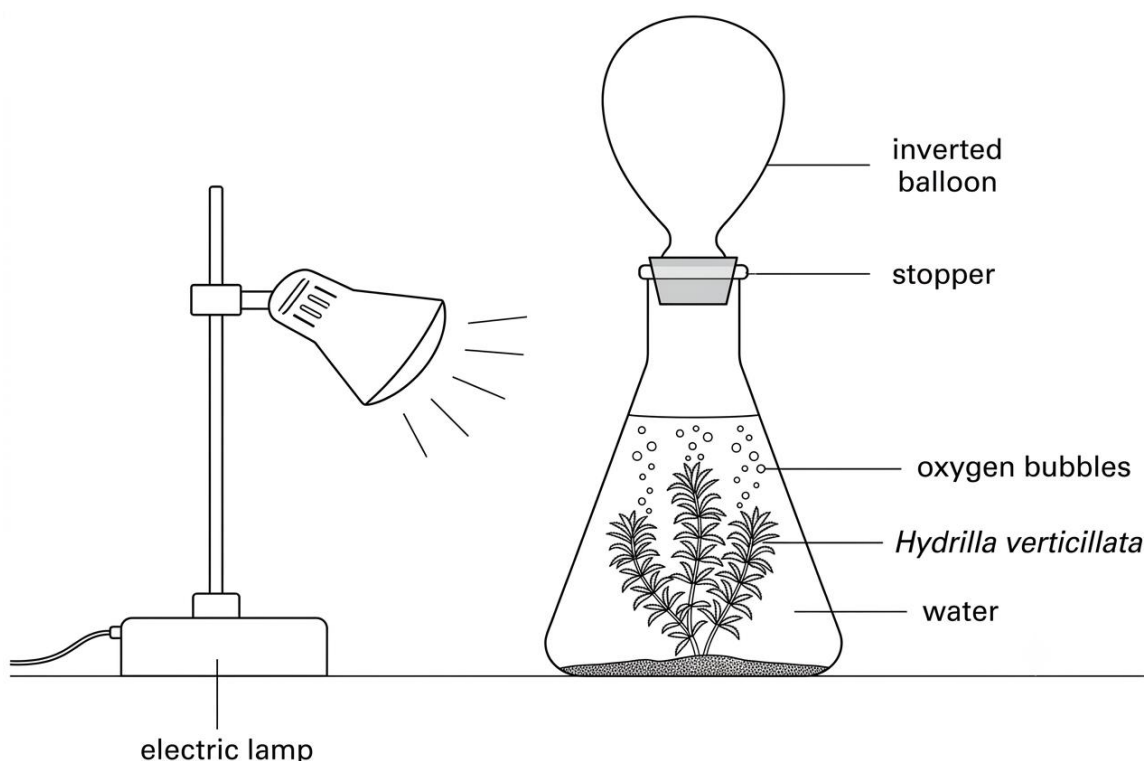


Fig. 5.1

- a. Identify the type of chemical reaction based on the rate at which reaction occur. **[1]**

- b. Write any TWO significance of the reaction in our lives. **[2]**

- c. The total mass of the reactants is equal to the total mass of the products in the reaction. Prove. [2]

--	--

2. The student collects the oxygen gas produced by the plant in a gas syringe. The volume of oxygen collected is measured at different times as shown in Table 5.1.

Table 5.1

Time/min.	Volume of oxygen / cm ³
0	0
5	18
10	35
15	52
20	52

- a. The oxygen collected at 15 minutes has a volume of 52 cm³ and a pressure of 10 atm, and a temperature of 298 K. Calculate the number of moles of oxygen collected. [3]

--	--

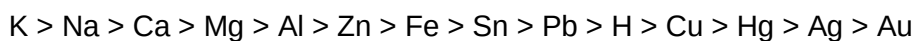
- b. Oxygen gas collected in a sealed gas container occupied a volume of 200 cm³ and a pressure of 4.5 atm. The gas is compressed to 100 cm³ without changing its temperature. Calculate the final pressure of the oxygen gas.

[2]

--	--

Question VI

1. Metals are arranged as per their reactivity as shown below:

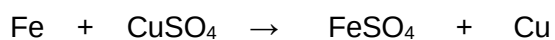


- a. Justify the placement of hydrogen in a metal activity series.

[1]

- b. Comment on the feasibility of the reaction with **one** reason.

[2]



- c. State **one** reason for existence of metals like gold and silver in their native state. [1]

- d. Predict a method that can be used to extract sodium metals from its ore. Give a reason for your prediction [2]

- e. Draw a flow chart to show the extraction of copper from copper sulphide, CuS. The flow chart should include correct methods of dressing, concentration, metal extraction, and refining. [4]

--	--

1																			2	
H 1.01																			He 4.00	
3																			10	
Li 6.94			4															9	F 19.00	
11																			18	
Na 22.99			12															17	Cl 35.45	
																			36	
19			20															33	Kr 83.80	
37			38															53	Xe 131.29	
85.47			87.62															51	I 126.90	
55			56															84	Rn 222.00	
132.91			137.33															83	At 210.00	
87			88															116	Og 294.00	
233.00			226.00															117	Ts 294.00	
																			118	
																			119	
																			120	
																			121	
																			122	
																			123	
																			124	
																			125	
																			126	
																			127	
																			128	
																			129	
																			130	
																			131	
																			132	
																			133	
																			134	
																			135	
																			136	
																			137	
																			138	
																			139	
																			140	
																			141	
																			142	
																			143	
																			144	
																			145	
																			146	
																			147	
																			148	
																			149	
																			150	
																			151	
																			152	
																			153	
																			154	
																			155	
																			156	
																			157	
																			158	
																			159	
																			160	
																			161	
																			162	
																			163	
																			164	
																			165	
																			166	
																			167	
																			168	
																			169	
																			170	
																			171	
																			172	
																			173	
																			174	
																			175	
																			176	
																			177	
																			178	
																			179	
																			180	
																			181	
																			182	
																			183	
																			184	
																			185	
																			186	
																			187	
																			188	
																			189	
																			190	
																			191	
																			192	
																			193	
																			194	
																			195	
																			196	
																			197	
																			198	
																			199	
																			200	
																			201	
																			202	
																			203	
																			204	
																			205	
																			206	
																			207	
																			208	
																			209	
																			210	
																			211	
																			212	
																			213	
																			214	
																			215	
																			216	
																			217	
																			218	
																			219	
																			220	
																			221	
																			222	
																			223	
																			224	
																			225	
																			226	
																			227	
																			228	
																			229	
																			230	
																			231	
																			232	
																			233	
																			234	
																			235	
																			236	
																			237	
																			238	
																			239	
																			240	
																			241	
																			242	
																			243	
																			244	
																			245	
																			246	
																			247	
																			248	
																			249	
																			250	
																			251	
																			252	
																			253	
																			254	
																			255	
																			256	
																			257	
																			258	
																			259	
																			260	
																			261	
																			262	
																			263	
																			264	
																			265	
																			266	
																			267	
																			268	
																			269	
																			270	
																			271	
																			272	
																			273	
																			274	
																			275	
																			276	
																			277	
																			278	
																			279	
																			280	
																			281	
																			282	
																			283	
																			284	
																			285	
																			286	
																			287	
																			288	
																			289	
																			290	
																			291	
																			292	
																			293	
																			294	
																			295	
																			296	
																			297	
																			298	
																			299	
																			300	
																			301	
																			302	
																			303	
																			304	
																			305	
																			306	
																			307	
																			308	
																			309	
																			310	
																			311	
																			312	
																			313	
																			314	
																			315	
																			316	
																			317	
																			318	
																			319	
																			320	
																			321	
																			322	
																			323	
																			324	
																			325	
																			326	
																			327	
																			328	
																			329	
																			330	
																			331	
																			332	
																			333	
																			334	
																			335	
																			336	
																			337	
																			338	
																			339	
																			340	
																			341	
																			342	
																			343	
																			344	
																			345	
																			346	
																			347	
																			348	
																			349	
																			350	
																			351	
																			352	
																			353	
																			354	
																			355	
																			356	
																			357	
																			358	
																			359	
																			360	
																			361	
																			362	
																			363	
																			364	
																			365	
																			366	
																			367	
																			368	
																			369	
																			370	
																			371	
																			372	
																			373	
																			374	
																			375	
																			376	
																			377	
																			378	
																			379	
																			380	
																			381	
																			382	
																			383	
																			384	
																			385	
																			386	
																			387	
																			388	
																			389	
																			390	
																			391	
																			392	
																			393	
																			394	
																			395	
																			396	
																			397	
																			398	
																			399	
																			400	
																			401	
																			402	
																			403	
																			404	
																			405	
																			406	
																			407	
																			408	
																			409	
																			410	
																			411	
																			412	
																			413	
																			414	
																			415	
																			416	
																			417	
																			418	
																			419	
																			420	
																			421	
																			422	
																			423	
																			424	
																			425	
																			426	
																			427	
																			428	
																			429	
																			430	
																			431	
																			432	
																			433	
																			434	
																			435	
																			436	
																			437	
																			438	
																			439	
																			440	
																			441	
																			442	
																			443	
																			444	
																			445	
																			446	
																			447	
																			448	
																			449	
																			450	
																			451	
																			452	
																			453	
																			454	
																			455	
																			456	
																			457	
																			458	
																			459	
																			460	
																			461	
																			462	
																			463	
																			464	
																			465	
																			466	
																			467	
																			468	
																			469	
																			470	
																			471	
																			472	
																			473	
																			474	
																			475	
																			476	
																			477	
																			478	
																			479	
																			480	
																			481	
																			482	
																			483	
																			484	
																			485	
																			486	
																			487	
																			488	
																			489	
																			490	
																			491	
																			492	
																			493	
																			494	
																			495	
																			496	
																			497	
																			498	
																			499	
																			500	
																			501	
																			502	
																			503	
																			504	
																			505	
																			506	
																			507	

57	La	138.91	58	Ce	140.12	59	Pr	140.91	60	Nd	144.24	61	Pm	144.91	62	Sm	150.36	63	Eu	151.96	64	Gd	157.25	65	Tb	158.93	66	Dy	162.50	67	Ho	164.93	68	Er	167.26	69	Tm	168.93	70	Yb	173.04	71	Lu	174.97
89	Ac	227.00	90	Th	232.04	91	Pa	231.04	92	U	238.03	93	Np	237.00	94	Pu	244.00	95	Am	243.00	96	Cm	247.00	97	Bk	247.00	98	Cf	251.00	99	Es	252.00	100	Fm	257.00	101	Md	258.00	102	No	259.00	103	Lr	262.00

Blank Page