CHEMISTRY 231/1 PP1

1. Study the nuclides below

Nuclide	Mass number	Atomic Number	No. of Neutrons	%Abudance
A1	36	18	-	0.34
A2	38	18	-	0.06
A3	40	18	-	99.6

(i) Calculate the number neutrons on each isotopes (1mk)

(ii) Calculate the relative atomic mass of nuclide A (2mk)

(iii) Give two commercial uses of Oxygen (1mk)

2. In terms of electron define the following terms
   (i) Oxidation (1mk)

   (ii) Reduction (1mk)

3. (a) Differentiate between a strong acid and a concentrated acid (2mk)

   (b) State the types of hardness in water (1mk)

4. The table below gives the solubilities of salts Q and P at O^{o}C and 40^{o}C

Salt	**Solubility g/100g of water**	
Q	55	75
P	10	12

When an aqueous mixture of 60g of Q and 7g of P in 100g of water at 80^{o}C was cooled to O^{o}C some crystals were formed.

i. Identify the crystals formed. (1MK)

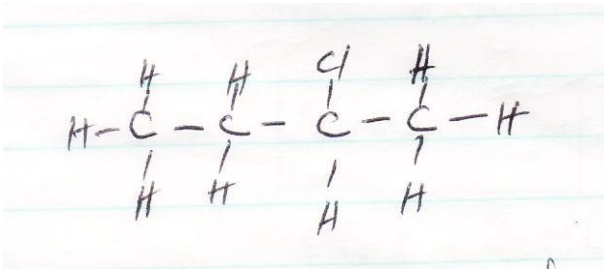
ii. How much crystals in grams were formed. (1MK)

5. When 5.04g of mixture of anhydrous Sodium carbonate and sodium hydrogen carbonate were heated to a constant mass of 4.11g residue.

a. Write an equation for the reaction that takes place when the mixture is heated.
(1MK)

b. Calculate the percentage of anhydrous sodium carbonate in the mixture.
(2MKS)

6. One mole hydrogen chloride gas reacts with an organic compound Z to give a simple product with structural formula shown below



a. Name the product (1MK)

b. Draw the structural formula of the compound Z (1MK)

c. To which homologous series does compound Z belong? (1MK)

7. What is meant by the term enthalpy of neutralization (1MK)

8 a) State Graham's law of diffusion (2MKS)

b) A certain volume of gas P takes 180 seconds to diffuse through a porous plug. Molar mass of P is 18g. Equal volume of gas Q takes 240 seconds. Calculate the molar mass of Q. (2MKS)

9. Calcium nitrate is a nitrogenous fertilizer. Calculate the percentage of nitrogen in the fertilizer.(2MKS) (Ca=40,N=14,O=16.)

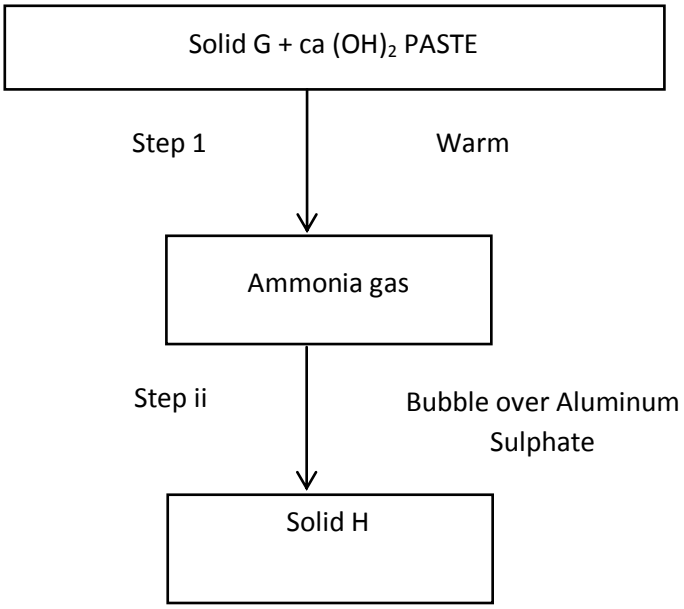
10. a) Distinguish between nuclear fission and nuclear fusion (1MKS)

b) K grammes of a radio-active isotope decay to 6.5g in 100 days. The half-life of the isotope is 25 days

i. What is meant by half-life (1MK)

ii. Calculate the initial mass of isotope K (2 MKS)

11. Study the scheme below and answer the questions that follow



a. Identify solid G (1MK)

b. Write an ionic equation for the reaction in step II that produces solid H (1MK)

12. Study the standard electrode potentials for the half cells given below and answer the questions that follow. The letters do not represent the actual symbols of the element.

$N^+_{(aq)} + e^- \longrightarrow N_{(S)}$ - 2.92

$J^+_{(aq)} + e^- \longrightarrow J_{(s)}$ + 0.52

$K^+_{(aq)} + e^- \longrightarrow \frac{1}{2} K_2$ 0.00

$\frac{1}{2} G_{2(g)} + e^- \longrightarrow G^-_{(aq)}$ + 1.36

$M^{2+}_{(aq)} + 2e^- \longrightarrow M_{(s)} \quad + 0.44$

a. Which is the strongest reducing agent? Give a reason for your answer (1MK)

b. Which of the two half-cells would produce the highest potential difference when connected? (1MK)

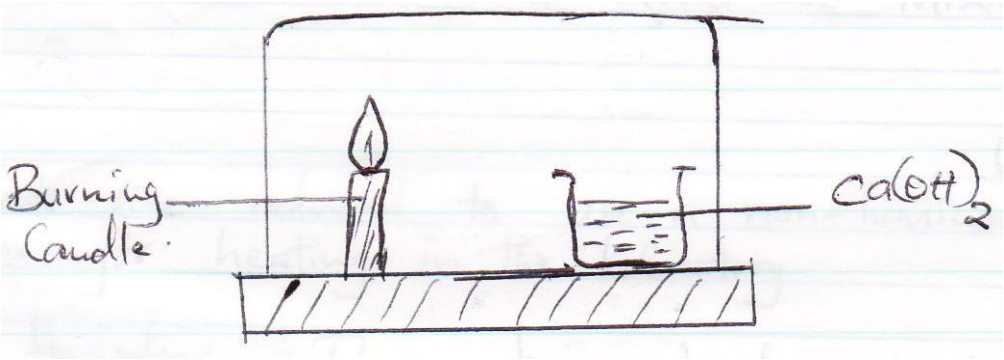
c. Calculate the E.M.F of the cell in (b) above (1MK)

13. A hydrated salt has the following composition by mass Iron 20.2%, Oxygen 23.0% sulphur 11.5 % and the rest is water. If its relative formula mass is 278,. Determine the formula of the hydrated salt (3MKS)

14. a) Name the two crystalline allotropes of sulphur (1MK)

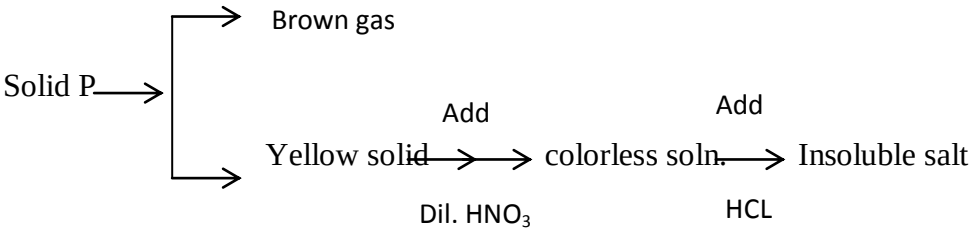
b) Why is sulphur (VI) oxide not absorbed directly into water in the contact process (1MK)

15. Study the arrangement below and answer the questions that follow.



Explain what will be observed after sometime. (2MKS)

16. Study the flow chart below and answer the questions that follow



a. Identify two ions present in solid P

i. Anion-

ii. Cation-

b. Write the ionic equation for the reaction that takes place during the formation of insoluble salt. (1MK)

17. Sodium chloride is accidentally mixed with lead (II) sulphate. Explain how sodium chloride crystals can be obtained from the mixture. (2MKS)

18. Students are advised to use a non-luminous flame for heating in the laboratory

a. How does a Bunsen burner produce a non-luminous flame (1MK)

b. Give one reason why the advice is given to students.
(1MK)

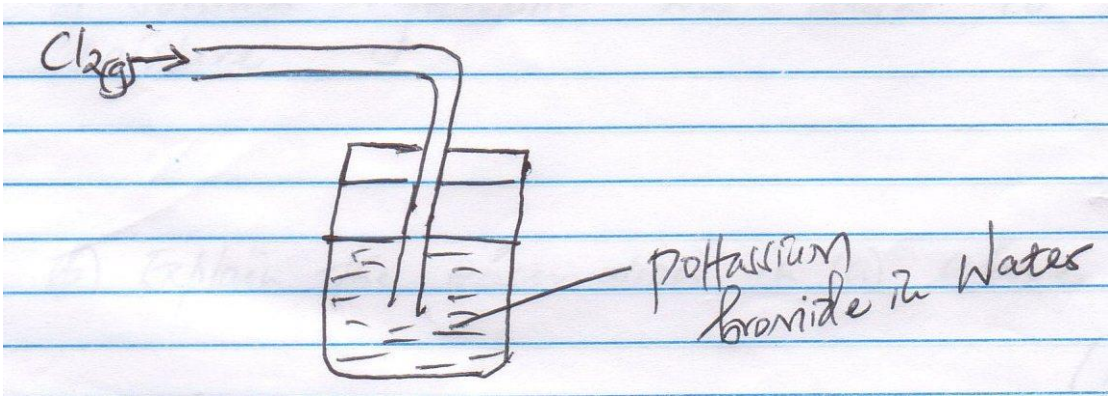
19. In the last stage of Solvay process a mixture of sodium hydrogen carbonate and ammonium chloride is formed.

(i)State the method of separation used (1MK)

(ii)Write an equation showing how lime is slaked (1Mk)

20. a) State and explain why Magnesium ribbon continues to burn in a gas jar full of sulphur (IV) oxide although the gas does not support combustion (2MK)

b) Chorine gas is passed through a solution of potassium bromide in water as shown below.



State and explain the observation made (2MKS)

21. Aluminium is extracted from its ore by the process of electrolysis.

(i)Name the ore from which aluminium is normally extracted (1MK)

(ii)Graphite electrodes are used in the above process. Give the advantage of using graphite? (1MK)

22. Study the reversible reaction below

$$2\ CrO_{4(aq)}^{-} + 2H^{+}_{(aq)} \rightleftharpoons Cr_2O_{7(aq)}^{2-} + H_2O_{(l)}$$

(Yellow) (Orange)

(i) State the colour change if few drops of sodium hydroxide was added to the mixture. (1MK)

(ii) Explain the observation in (a) above (1MK)

23. Study the table and answer the questions that follow

Formulae of ion	**Electronic configuration of ion**
A^{2+}	2
B^{-}	2.8
C^{2-}	2.8.8
D^{3+}	2.8
E^{2+}	2.8

Select the elements in

i. Same group (1/2 MKS)

ii. Period II (1/2 MKS)

Write the electronic configuration of elements

i. C (1/2 MKS)

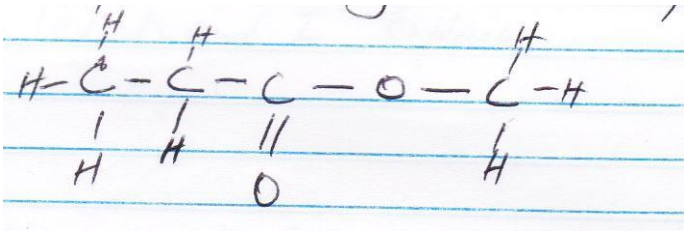
ii. D (1/2 MKS)

24. Use the bond energies given below to calculate the enthalpy change for the reaction

Bond	Energy kj/mole
C – H	413
C – Br	280
Br – Br	193
H – Br	365

$C_2H_{6(g)} + Br_{2(g)} \longrightarrow C_2H_5Br_{(g)} + HBr_{(g)}$ (2MKS)

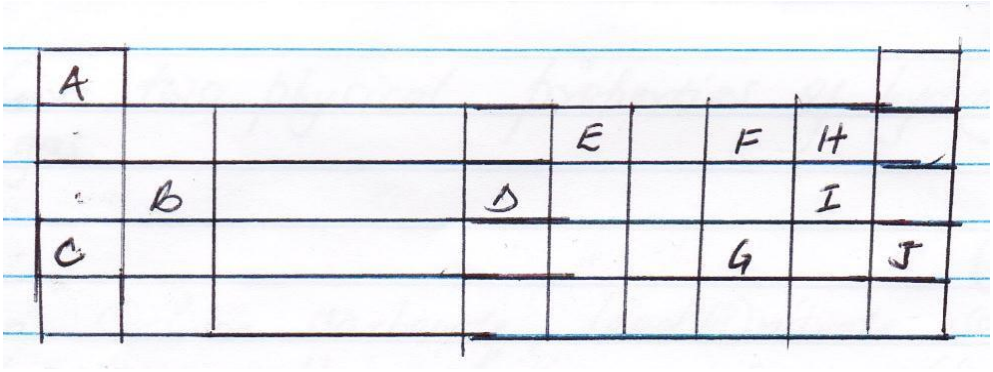
25. Study the organic compound below



a. In which homologous series does the compound belong to? (1MKS)

b. Name and draw the structure of two compounds that can be used to prepare the above compound (2MKS)

26. The grid below shows a section of the periodic table. The letters do not represent the actual symbols for elements. Study it and answer the question that follows.



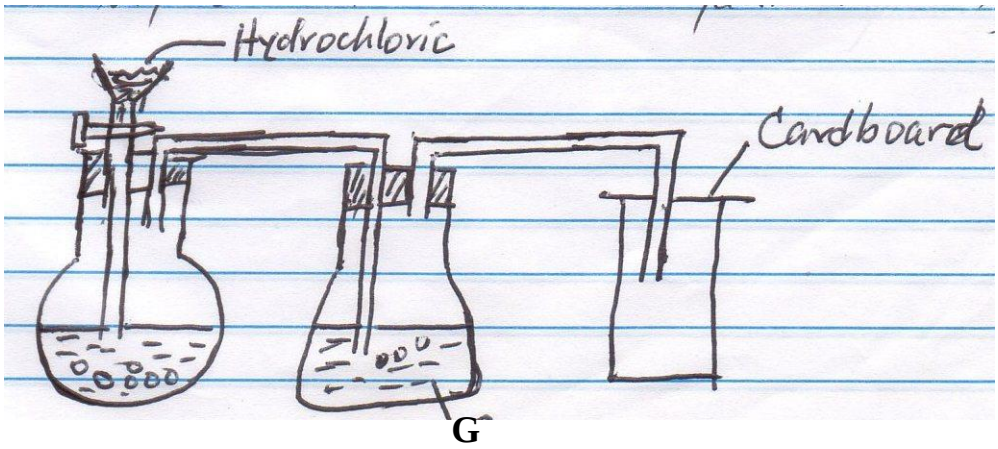
a) Give the name of the family in which element H and I belong. (1MK)

b) Compare the atomic radii of elements.

i. F and G explain (1MK)

ii. D and I Explain (1MK)

27. The set-up below was used to prepare hydrogen gas. Study it and answer the questions that follow



i. What would be liquid G (1MK)

ii. Is the method of collecting the gas correct? Give a reason (1MK)

iii. Give two physical properties of hydrogen gas (1MK)

28 .Given sodium carbonate, Lead (ii) nitrate solid and water, explain how you can obtain a solid sample of lead (ii) carbonate. (3MK)

29. Solution can be classified as acid ,base and neutral. The table below shows solutions and their pH value.

Solution	PH value
R	2.5
S	6.9
T	13.5

Identify two solutions that would react with Aluminum Oxide. Explain (2MKS)