

**ALLIANCE HIGH SCHOOL**  
**FORM 3 CHEMISTRY**  
**END OF TERM 1 EXAM**  
**TIME 2 HOURS**

NAME \_\_\_\_\_ CLASS \_\_\_\_\_ ADM.NO \_\_\_\_\_

1. The table below shows the relative atomic masses and the percentage abundances of isotopes  $K_1$ , and  $K_2$  of element K.

Relative atomic mass	% abundance
$K_1$ 62.5	69
$K_2$ 64.9	31

Calculate the relative atomic mass of element K.

(3mks)

2. Distinguish between ionization energy and electron affinity of an element. (2mks)

3. Distinguish between a covalent bond and a coordinate bond.

(2mks)

4. Draw a diagram to show bonding in

(a) An ammonium ion.

(2mks)

(b) A compound formed when nitrogen reacts with fluorine (F=9, N=7) 2mks)

(c) Sodium oxide (Na=11 O=8) (2mks)

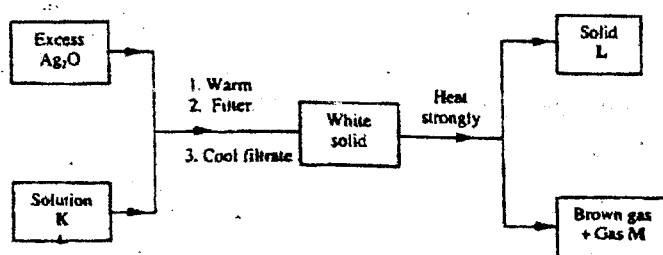
5. An isotope of element E has 34 neutrons and its mass number is 64. E forms a cation with 28 electrons. Write the formula of the cation indicating the mass and atomic numbers. (2mks)

6. Explain why there is a general increase in the first ionization energies of the elements in period 3 of the periodic table from left to right. (2mks)

7. Describe how the following reagents can be used to prepare lead (II) sulphate, solid potassium sulphate, solid lead (II) carbonate, dilute nitric (V) acid and distilled water. (3mks)

8. Explain how you would obtain sodium carbonate from a mixture of lead (II) carbonate and sodium carbonate powders. (3mks)

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



Identify

- (a) Solution K.  
(b) Solid L  
(c) Write a chemical equation for the reaction between solution K and  $\text{Ag}_2\text{O}$ .
10. (a) Distinguish between efflorescent and a hygroscopic substance. (2mks)  
(b) Give one use of hygroscopic substance in the laboratory. (1mk)
11. Write equations to show the effects of heat on each of the following.  
(a) Anhydrous Copper (II) sulphate.  
(b) Lead (II) nitrate.

(c) Sodium hydrogen carbonate.

(3mks)

12. By using aqueous sodium chloride, describe how a student can distinguish calcium ions from lead ions. (2mks)

13. Explain how the following substances conduct an electric current.

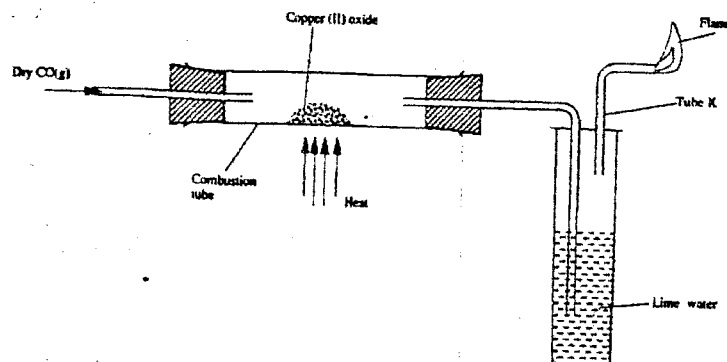
(a) Aluminium metal.

(b) Molten sodium chloride.

(2mks)

14. Explain why burning magnesium continues to burn in a gas jar containing carbon (IV) oxide while a burning splint is extinguished. (3mks)

15. The apparatus shown below was used to investigate the effects of carbon (II) oxide on copper (II) oxide.



(a) State the observation that was made in the combustion tube at the end of the experiment. (1mk)

(b) Write an equation for the reaction that took place in the container with lime water. (1mk)

(c) Why is it necessary to burn the gas coming out of tube K. (1mk)

16. Diamond and graphite are allotropes of carbon.

(a) What is meant by allotropes. (1mk)

(b) Explain why graphite can be used as a lubricant while diamond cannot. (2mks)

17. A fixed mass of a gas has a volume of  $200\text{cm}^3$  at  $20^\circ\text{C}$  and  $750\text{mm Hg}$  pressure. Calculate the volume the gas would occupy at  $40^\circ\text{C}$  and  $700\text{mm Hg}$  pressure. (3mks)

18.  $300\text{cm}^3$  of oxygen diffused from a certain apparatus in 100 seconds. Calculate the time taken for  $200\text{cm}^3$  of carbon (IV) oxide to diffuse under the same conditions. (3mks)

(C=12, O=16)

19. Calculate the amount of calcium carbonate that would remain if 10g of calcium carbonate reacts with  $100\text{cm}^3$  of 1M hydrochloric acid. (3mks)

Ca=40.

20. Calculate the mass of nitrogen (IV) oxide gas that would occupy the same volume as 6g of hydrogen gas at the room temperature and pressure (3mks)

H=1, N=14, O=16.

21. A weighted sample of crystalline sodium carbonate ( $\text{Na}_2\text{CO}_3 \cdot n\text{H}_2\text{O}$ ) was heated in a crucible until there was no further change in mass. The mass of the sample reduced by 14.5%. Calculate the number of moles (n) of water of crystallization. (3mks)

(Na=23, O=16, C=12, H=1)

22. When a hydrocarbon was completely burnt in oxygen 4.2g of carbon (IV) oxide and 1.71g of water were formed. Determine the empirical formula of the hydrocarbon. (3mks)  
(H=1 C=12. O=16)

23. Analysis of a compound showed that it had the following composition 69.42% carbon, 4.13% hydrogen and the rest oxygen.  
(a) Determine the empirical formula of the compound. (2mks)  
(b) If the mass of one mole of the compound is 242, determine its molecular formula. (1mk)

24. 20cm<sup>3</sup> of concentrated sulphuric (VI) acid was diluted to 100cm<sup>3</sup>. 25cm<sup>3</sup> of this solution was neutralized by 30cm<sup>3</sup> of 0.2M sodium hydroxide solution. Determine the mass of sulphuric (VI) acid that was in the concentrated acid. (3mks)  
(S=32, H=1, O=16)

25. Study the information in the table below and answer the questions that follow.

Element	electronic arrangement of stable ion	atomic radius	ionic radius
N	2,8,8	0.197	0.099
P	2,8,8	0.099	0.181
R	2,8	0.160	0.065
S	2,8	0.186	0.095
T	2	0.152	0.068
U	2,8	0.072	0.136

(a) (i) Write the formula of the compound formed when N reacts with P. (1mk)  $N = 20$   
 $P = 1$

(i) Identify the elements which belong to the third period of the periodic table. (2mks)

(ii) Which of the elements identified in (i) above comes first in the third period. Explain. (2mks)

(iii) Select two elements which are non-metals. (2mks)

(iv) The table below gives some properties of substances I, II, III and IV. Study and answer the questions that follow.

Substance	Electrical conductivity		M, P <sup>o</sup> C	B.P <sup>o</sup> C
	Solid	Molten		
I	Does not conduct	Conducts	801	1420
II	conducts	Conducts	650	1107
III	Does not conduct	Does not conduct	1700	2200
IV	Does not conduct	Does not conduct	113	440

(i) What type of bonding exists in substances I and II. (2mks)

(ii) Which substance is likely to be sulphur. Explain. (2mks)