



**233/ 1**

**Paper 1**

**Chemistry - (Theory)**

**T2 2024 – 2 hours**

**POST MOCK,  
2024**

Name ..... Adm Number.....

Candidate's Signature ..... Date .....

**Instructions To Candidates**

- a) Write your name and index number in the spaces provided
- b) Sign and write the date of examination in the spaces provided
- c) Answer ALL questions in the spaces provided
- d) Mathematical table and electronic calculators may be used.
- e) ALL working MUST be shown clearly where necessary
- f) *Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing*

**For Examiner's Use Only**

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORES
1 – 31	80	



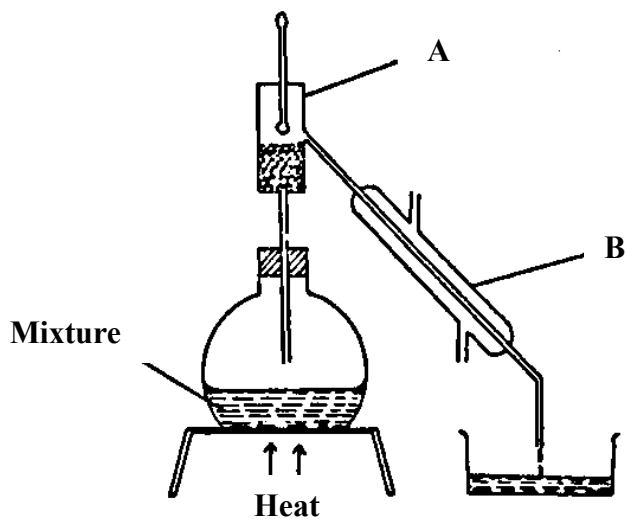
**T3CHEM2024**



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**TURN OVER**

1. The diagram below shows a set-up of apparatus used to separate immiscible liquids.



a) Name the parts labelled A and B. (1 mark)

**A** .....

**B** .....

b) State the function of the part labelled A . (1 mark)

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2. Element K (not actual symbol of the element) has isotopes with relative abundance as shown below.

Isotope	abundance %
$^{10}_5K$	18.69%
$^{11}_5K$	81.28%

Calculate the relative atomic mass of K. (2 marks)

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3. The table below gives the ionization energies of the alkali metals.

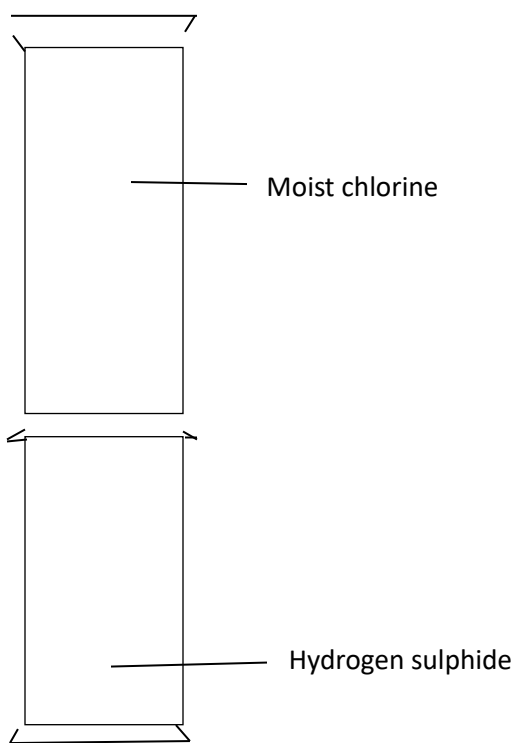
Element	1 <sup>st</sup> ionization energy kJ mol
A	494
B	418
C	519

Which of the three metals is the least reactive. Give a reason. (1mark)

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4. A jar full of moist chlorine was inverted over a jar of hydrogen sulphide as shown below.



(a) State the observation made. (1 mark)

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- (b) Write the equation for the reaction and show using oxidation numbers that the reaction above is redox. (2 marks)

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5. A piece of burning Magnesium was introduced into a gas jar of nitrogen, water was then added to the products. The resultant solution was tested with litmus paper.

- (i) Explain the observation. (1mark)

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- (ii) Write an equation for the formation of the final solution. (1mark)

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6. State one reagent that can be used to distinguish between the pairs of ions.

- |     |                    |                |           |
|-----|--------------------|----------------|-----------|
| (a) | $Pb^{2+}$ (aq)     | $Al^{3+}$ (aq) |           |
|     | <b>Reagent</b>     |                |           |
|     | <b>Observation</b> |                | (2 marks) |

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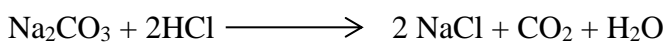
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- |     |                             |          |
|-----|-----------------------------|----------|
| (b) | $SO_4^{2-}$ and $SO_3^{2-}$ |          |
|     | <b>Reagent</b>              |          |
|     | <b>Observation</b>          | (2marks) |

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7. 20cm<sup>3</sup> of sodium carbonate solution was reacted completely with 25cm<sup>3</sup> of a 0.8M hydrochloric acid according to the equations.



- Calculate the concentration of sodium carbonate in grams per litre. (3 marks)

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8. The electronic arrangement of ions of a certain element represented by letters P Q R and S.

P<sup>2-</sup>            2:8:8

Q<sup>2+</sup>            2:8

R<sup>+</sup>             2:8

S                2:8:8

a) Explain why S is not represented as an ion. (1mark)

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b) Which element has the largest atomic radius? Explain (1mark)

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9. A label on a bottle of Hydrochloric acid has the following information;

Density 1.134gm and percentage purity 37%

Determine the molarity of the solution. (4 marks)

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10. The P<sup>H</sup> values of some solutions are given below

<b>P<sup>H</sup></b>	14.0	1.0	8.0	6.5	7.0
<b>Solution</b>	M	L	N	P	Z

(a) Identify the solution with the lowest concentration of hydrogen ion. Give reason for your answer (1mk)

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(b) Which solution would be used as an anti-acid for treating stomach upset. Give for your answer (1mk)

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11. The atomic number of P and S are 6 and 17 respectively.

a) Using dots and cross draw the compound formed when P react with S. (1mark)

b) Name the type of bond and explain whether the compound would conduct electricity. (2 marks)

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12. A given volume of a gas G diffuses through a membrane in 10 seconds. Under same condition an equal volume of oxygen diffuses for 12.5sec. Determine the molecular mass of G. (2 marks)

13. (a) Using an equation explain the observation made when sodium hydroxide is added to aluminum oxide dropwise until in excess. (2 marks)

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(b) Name the product of the reaction

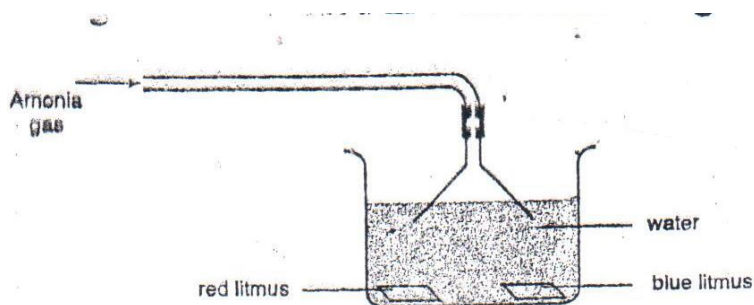
(1mark)

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14. (a) Cynogen is a gaseous compound of carbon and Nitrogen only.  $250\text{cm}^3$  Cynogen. On complete combustion in oxygen.  $750\text{cm}^3$  of nitrogen (iv) Oxide and  $1000\text{cm}^3$  of the rest of product. Determine the formula of cynogen. (3 marks)

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b) Complete the reaction by indicating the polymer. (1mark)

(1mark)

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15. A stream of Ammonia was bubbled in water containing litmus papers.



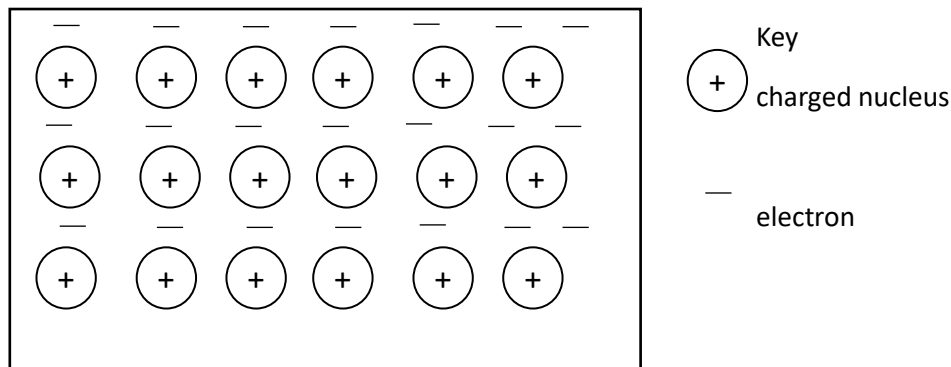
a) State one physical property of the gas (1mark)

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b) Explain the observation made during the experiment. (1mark)

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16. The diagram below is a section of a model of the structure of element K



a) State the type of bonding that exist in K (1mk)

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b) In which group of the periodic table does element K belong. Give a reason (2mks)

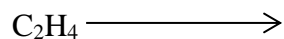
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17. Propene and propane both decolourises bromine liquid at different conditions.

a) Explain with an equation how the hydrocarbons decolourises bromine. (4 marks)

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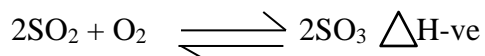
b) Complete the reaction by indicating the polymer (1mark)





- c) State type of reaction and calculate the value of n given the molecular mass of polymer is 33600. (4 marks)

18. Below is a chemical reaction



Using an energy level diagram represent the reaction when vanadium (V) oxide is used.

(2 marks)

a) State the effect of increase temperature to the equilibrium

(1 mark)

b) Give one characteristic of a dynamic equilibrium.

(1 mark)

19. Study the test below and answer the questions.

(i)

Test	Observation
P is heated until no further change	A colourless liquid condensed on the cooler parts of the test tube - A colourless gas which turns Aqueous potassium chromate (VI) green was given out and red-brown residue R was left.

(ii)

Chlorine gas was bubbled through an aqueous of P	Solution turn from green to yellow
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a) Identify P.....  
R.....1mark)

b) Describe how a student would test for anion in solid P. (3 marks)

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c) Name one reagent that can be used to confirm cation in P. (1mark)

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20. Name the main ores of. (2 marks)

a) Iron  
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b) Copper  
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c) Sodium  
.....

d) Aluminium  
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21. Calculate the oxidation number of P given the following  $P_2O_5$  (1mark)

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22. State and explain observation made when chlorine gas bubble through a solution of potassium iodine. (2 marks)

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23. Sketch the bond formed between the complex of tetramine copper(II) ions. (1mark)

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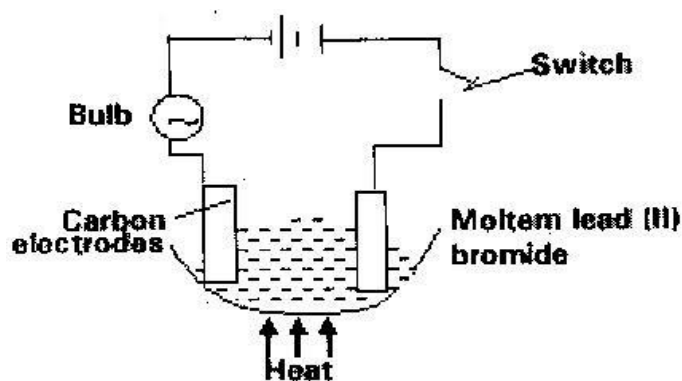
24. Explain why graphite is used as a lubricant in machines. (3 marks)

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25. Study the set up below and answer the questions that flows



State all the observations that would be made when the circuit is completed (3mks)

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26. Most natural water occurs as permanent hard water or temporary hard water.

a. Name **two** compounds that cause;

i. Temporary hardness

(1mk)

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ii. Permanent hardness

(1mk)

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b. How is temporary hardness removed from water?

(1mk)

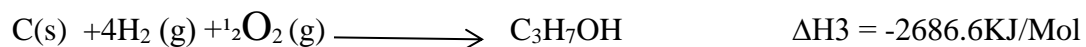
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c. State **one** disadvantage of using hard water in boilers.

(1mk)

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27. Use the information below to answer the questions that follow.



a. Define '**enthalpy** of formation'

(1mk)

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b. Determine the molar enthalpy of formation of propanol.

(2mks)

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