

CHEMISTRY FORM 3 PAPER I MARKING SCHEME

FORM 3 EXAMS
END OF TERM II EXAM
TIME: 2 HOURS

NAME..... *T/C*ADM NO.....

Answer *all* the questions in the spaces provided.
Write your *name* in the spaces provided above.
Mathematical tables and electronic calculators may be used for calculations.
All workings must be clearly shown where necessary

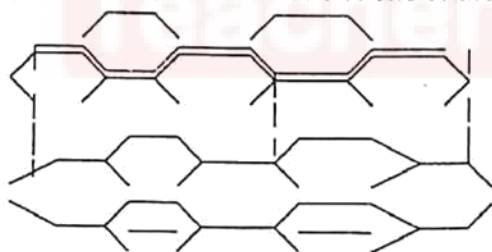
For Examiner's Use only:

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1 - 29	80	

1. a) What is meant by allotropy?

Existence of Elements in more than one form in the same physical state. (1 mark)

b). The diagram below shows the structure of one of the allotropes of carbon



i. Identify the allotrope.

(1 mark)

graphite

ii. State one property of the above allotrope and explain how it is related to its structure.

Soft. Layers can easily slide over each other since they are held by weak van der waal forces. (2marks)

2. (a) State Graham's law of diffusion

(1mk)

The rate of diffusion of a gas is inversely proportional to the square root of its density provided Temp. and pressure are kept constant

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(b). 60cm³ of oxygen gas diffused through a porous hole in 50 seconds. How long will it take 80cm³ of sulphur (IV) oxide to diffuse through the same hole under the same conditions? (3 marks)

(S= 32.0, O=16.0)

$$60\text{cm}^3 \text{ of } O_2 = 50\text{s}$$

$$80\text{cm}^3 \text{ of } SO_2 = x$$

$$x = \frac{80 \times 50}{60} = 66.67\text{s}$$

$$\frac{T_{O_2}}{T_{SO_2}} = \sqrt{\frac{M_{O_2}}{M_{SO_2}}}$$

$$\frac{66.67}{T_{SO_2}} = \sqrt{\frac{32}{64}}$$

$$T_{SO_2} = \frac{66.67 \times \sqrt{64}}{\sqrt{32}} = 94.29\text{s}$$

3. The table below gives the atomic numbers of element w, x, y and z. The letters do not represent the actual symbols of the elements.

	$2:7:1$	$2:8$	$2:8:1$	$8:8:2$
Element	w	x	y	z
Atomic number	9	10	11	12

I. Which one of the elements is least reactive? Explain. (1 mark)

X - Has a stable configuration,

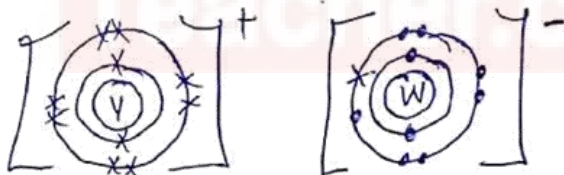
II. Which two elements would react most vigorously with each other? (1 mark)

W and Y

III. Give the formula of the compound formed when elements in (i) above react. (1 mark)

YW

IV. Draw using dots (•) and crosses (x), diagram to show the bonding between y and w (2mks)



4. The following are observations made from two solid substances x and y.

Solid	Electrical conductivity in solution form	Solubility in water	Boiling point
X	Poor	Insoluble	Sublimes
y	good	soluble	high

I. State the most likely type of bonding in

a. Solid x Covalent (1/2 mark)

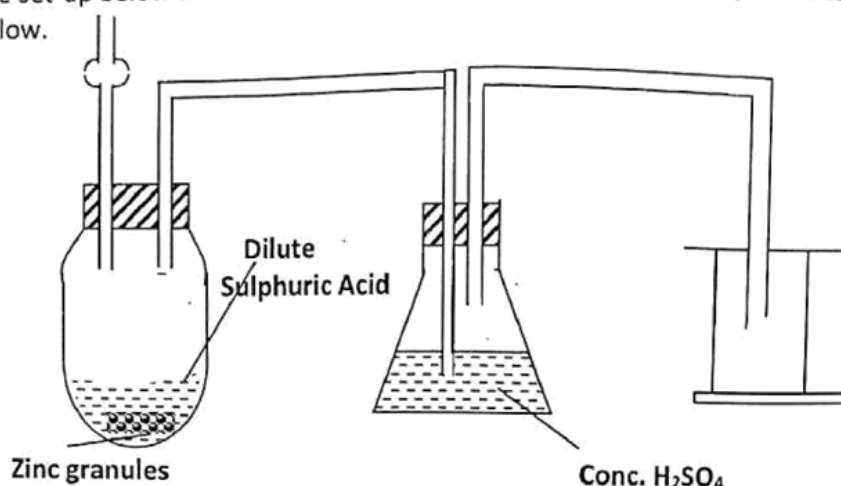
b. Solid y Ionic (1/2 mark)

5. When air is bubbled through pure water (PH=7) the PH drops to 6.0. Explain. (2 marks)

Air contain CO₂. CO₂ ^{slightly} dissolves in water form a weak carbonic acid.

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6. The set-up below shows laboratory preparation of hydrogen gas, use it to answer the questions that follow.

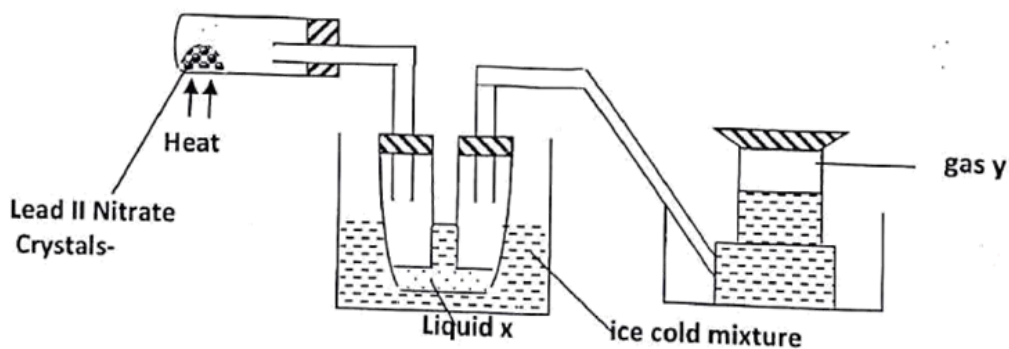


- I. Identify two mistakes in the set-up (2 marks)
 - Thistle funnel is not in solution
 - Wrong method of collection
- II. Why is dilute nitric acid not used in preparation of hydrogen gas? (1 mark)

It will oxidise H_2 gas to water

7. Starting with copper (II) oxide, describe how you can prepare copper (II) sulphate crystals. (3 marks)
- React CuO with dilute sulphuric acid, evaporate excess water to obtain a saturated solution, cool saturated solution to crystallise

8. The set-up below shows the products formed when solid lead (ii) nitrate is heated.

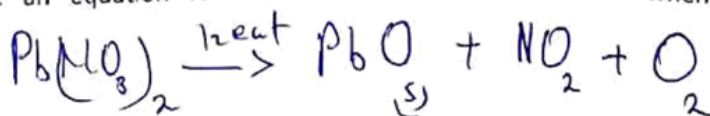


- a) Identify:
 - (i) Liquid x N_2O_4 (Dinitrogen tetroxide) (1 mark)

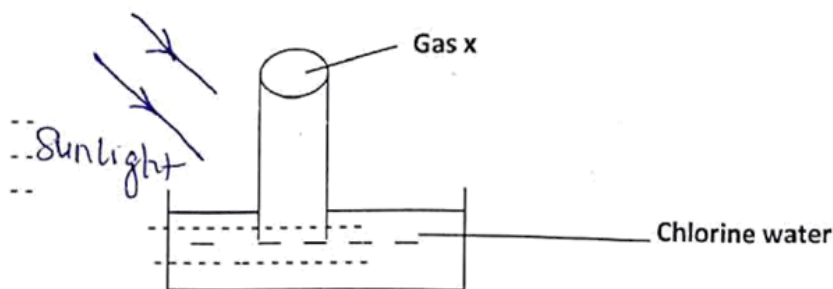
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(ii) Gas y O_2 (1 mark)

b). Write an equation for the reaction that takes place when lead (ii) nitrate is heated. (1 mark)



9. Study the set-up below and answer the questions that follow.



a). Name gas x (1 mark)

Oxygen

b). State the condition which is not indicated on the diagram for gas x to be formed. (1 mark)

Sunlight / U.V - Light

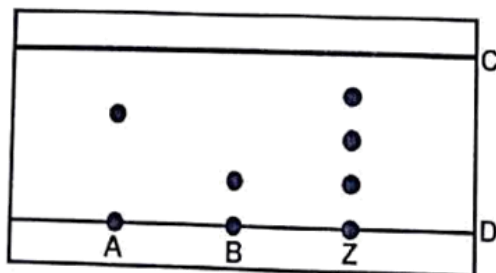
10. (a). Aluminium chloride sublimes. State two other substances that sublime. (2 marks)

- Benzoic Acid
- Iodine
- Iron (III) chloride

b) Aluminium is reactive metal yet utensils made of aluminium do not corrode easily. Explain. (1 mark)

Aluminium reacts with oxygen in air to form a protective layer of Al_2O_3

11. Spots of three pure pigments A, B and mixture Z were placed on a filter paper and allowed to dry. The paper was then dipped in a solvent. The results obtained were as on the paper chromatogram.



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i) Identify;

a) Baseline. Δ

(1/2 mark)

b) Solvent front. C

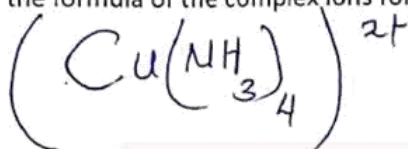
(1/2 mark)

ii) Which pure pigment was component of Z?

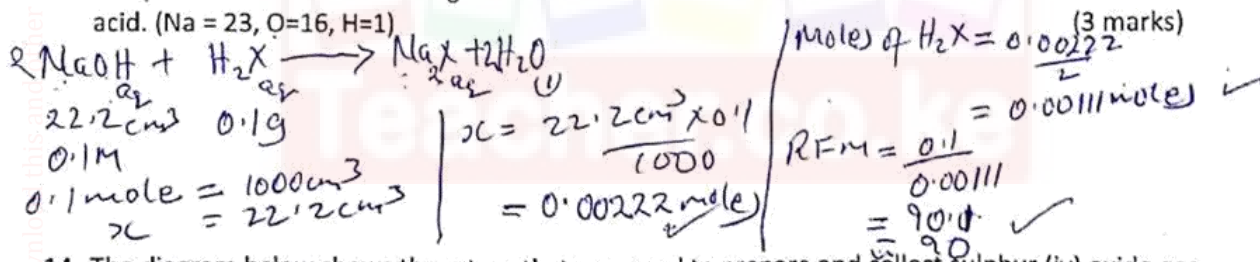
(1 mark)

B

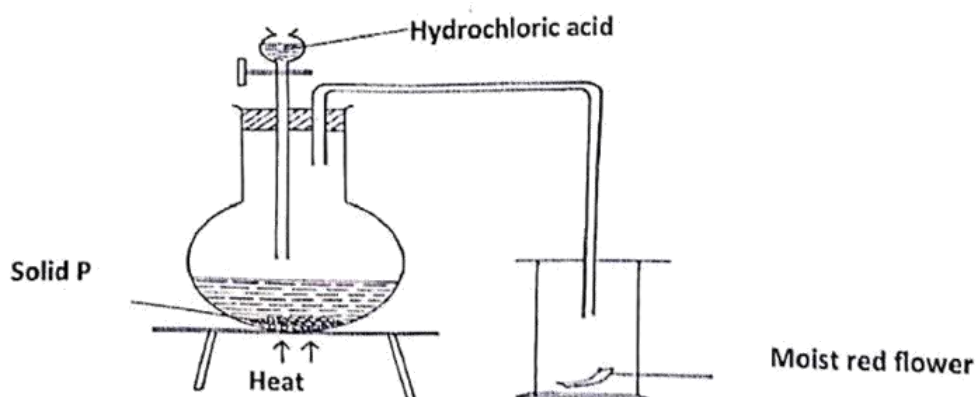
12. When excess ammonia solution is added to a solution of copper (ii) ions, a deep blue solution forms. Write the formula of the complex ions formed. (1 mark)



13. 22.2cm³ of sodium hydroxide solution containing 4.0g per litre sodium hydroxide were required for complete neutralisation of 0.1g of a dibasic acid. Calculate the relative formula mass of the dibasic acid. (Na = 23, O=16, H=1)



14. The diagram below shows the set-up that was used to prepare and collect sulphur (iv) oxide gas.



(a). Identify solid P.

(1mk)

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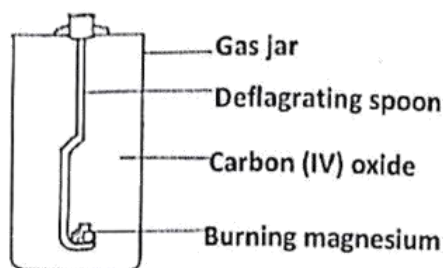
(b) (i) Why is it possible to collect sulphur (IV) Oxide as shown? (1mk)

Its denser than Air

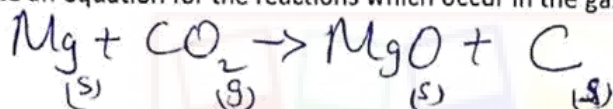
(ii) What happened to the red flower? (1mk)

They turned white (get bleached)

15. The set-up show how small pieces of magnesium are heated in carbon (IV) Oxide.



a) Write an equation for the reactions which occur in the gas jar. (2mks)



b) Give **two** observation made in the gas jar. (2mk)

- White ash
- Black specks

16. A mixture contains iron (III) chloride, zinc (II) oxide and potassium chloride. Describe how each of the substance can be obtained from the mixture. (3mks)

- Heat the mixture Iron (III) chloride sublime
- Dissolve the remaining mixture in water KCl dissolve
- filter to obtain ZnO as a residue & KCl as filtrate
- Heat solution (filtrate) to saturation and cool it to crystallise

17. a) Name **two** types of flame of the Bunsen burner. (1mk)

- Luminous
- Non luminous

b) Which flame is better for heating in the laboratory? Give **two** reasons. (2mks)

- Non Luminous ✓ ⊙*
- Hotter
 - Does not produce soot ✓ ⊙

18. a) Both iodine and bromine belong to the same group and family in the periodic table, Name the family. (1mk)

Halogen

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19. A compound contains carbon 40%, hydrogen 6.71% and the rest is oxygen. The relative molecular mass of the compound is 60. (H=1.0, O=16, C=12)

a) Determine its empirical formula.

(3mks)

Element	C	H	O
(% mass)	40	6.71	53.29
RAM	12	1	16
mole	3.33	6.71	3.33
Ratio	1	2	1

E.P.F = $C_1H_2O_1$

b) Find the molecular formula of the compound.

(1mk)

$$n(EF) = MF$$

$$30n = 60$$

$$n = 2$$

$C_2H_4O_2$

20. Given below are pH values of different solutions P, Q and S. Study it and answer the questions that follow.

Solution	PH
P	1
Q	7
S	14

a) Which two solutions would react together to give a pH of 7.0.

(1mk)

P and S

b) Which solution can be considered to be sodium chloride?

(1mk)

Q

21. The table below gives properties of four substances.

Substances	Melting points	Boiling points	Electrical conductivity	
			Solid	Liquid
A	1083	2567	Good	Good
B	-182	-164	Poor	Poor
C	1723	2230	Poor	Good
D	993	1695	Poor	Poor

a. State with a reason which of the above is:-

i). An ionic compound.

(1mk)

C

ii). A metallic structure.

(1mk)

A

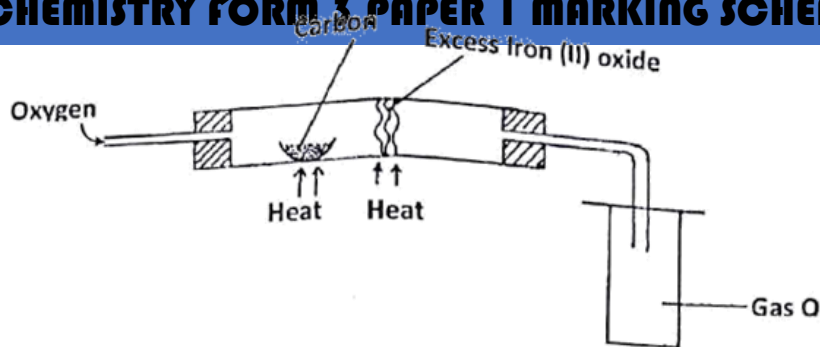
iii). A giant atomic structure.

(1mk)

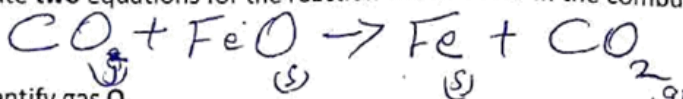
D

22. The set up below was used to obtain a sample of iron.

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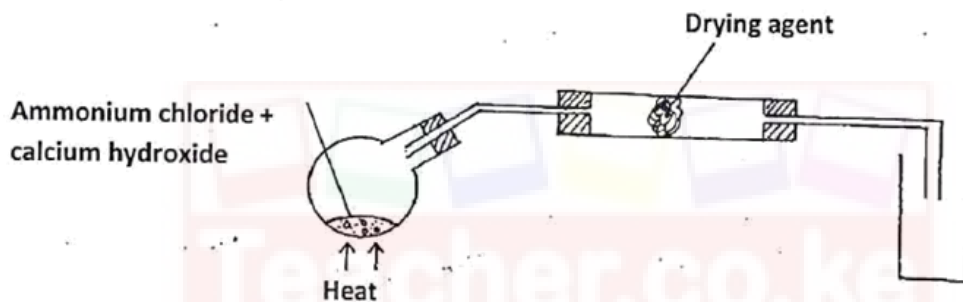
i) Write two equations for the reaction which occur in the combustion tube. (2mks)



ii) Identify gas Q. (1mk)



23. A student set up the apparatus as shown below to prepare and collect dry ammonia.



i) Identify two mistakes in the set up and give a reason for each mistake. (2mks)

- The flask should be slanting down ward
- Wrong method of collection.

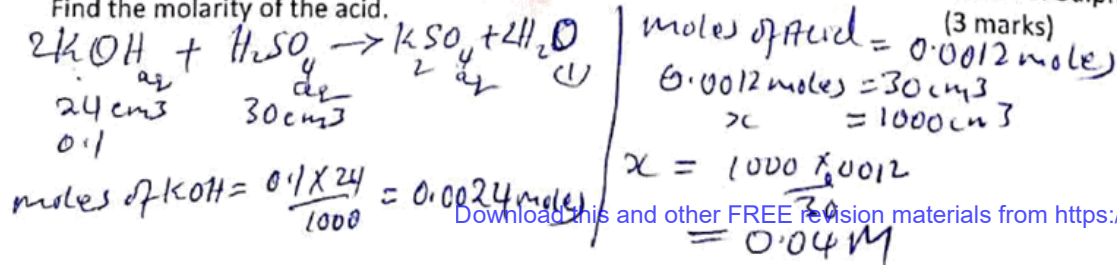
ii) Name a suitable drying agent for ammonia (1mk)



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

The atomic radius decreases from left to right.
The nuclear charge also increases thus increase in Ionisation energy

25. 24.0cm³ of a solution of 0.1M KOH were exactly neutralized by 30cm³ of a solution of Sulphuric acid. Find the molarity of the acid. (3 marks)



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26. In temperate countries, salt is sprayed on roads to defrost and clear roads but the long term effect on this practice is costly to motorists.

I. Explain the role of salt in defrosting the ice.

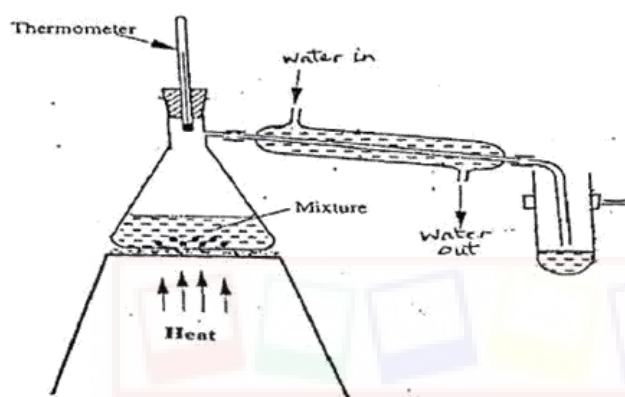
Acts as an impurity thus lower the melting point of ice (1mk)

II. Explain why the long term effect is costing to motorists.

Salts accelerates rusting

(1mk)

27. The set-up represented below can be used to separate ethanol from its mixture with water.



(a) Identify an error in the set-up.

Direction of water in Liebig condenser has been reversed (1 mark)

(b) Name this method of separation.

Fractional Distillation

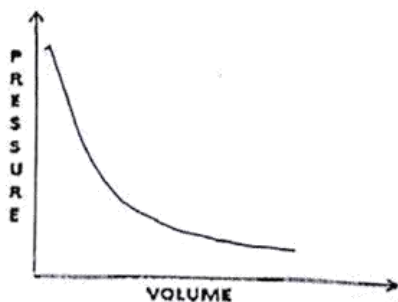
(1 mark)

(c) What properties make it possible to separate ethanol from water by this method? (1 mark)

They have different B.P and they are also miscible.

28. (a) On the grid provided sketch a graph of pressure against volume for fixed mass of gas at constant temperature.

(1mk)



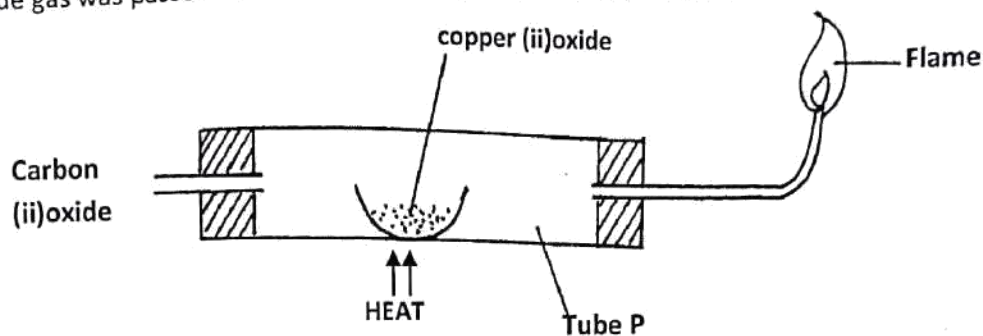
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(b) 50dm^3 of a gas at 1 atmosphere was compressed to 4 atmospheres at Constant temperature. Calculate the volume occupied by the gas (3mks)

$$1 \times 50 = 4 \times V_2$$

$$V_2 = \frac{50}{4} = 12.5 \text{ dm}^3$$

29. Carbon (ii) oxide gas was passed over heated iron (iii) oxide as shown below



(a) Give one observation made in tube P (1mk)

Black solid turns Red Brown

(b) Write an equation for the reaction which takes place in test tube P (1mk)

