MARKING SCHEME

SUNSHINE SECONDARY SCHOOL

NAME:.....

A.D.M NO:..... DATE:.....

SIGNATURE:..... STREAM.....

By SIR. CHARLES LANGS

233/1
CHEMISTRY
PAPER 1
TIME : 2HRS

END TERM 2 EXAMINATIONS JULY 2019

FORM 2

INSTRUCTIONS TO CANDIDATES:

a) *Write your **NAME, STREAM** and **ADM NUMBER** in the spaces provided above*
b) *Sign and write the date of examination in the spaces provided above*
c) *Answer **ALL** the questions in the spaces provided*
d) ***ALL** working must be clearly shown where necessary.*
e) *Mathematical tables and silent electronic calculators may be used.*
f) *This paper consists of 11 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing*
h) *Answer all the questions in **ENGLISH***

FOR EXAMINER'S USE ONLY:

Questions	Maximum score	Candidates score
1 – 27	80	

1. a).Distinguish between ionization energy and electron affinity. (2 marks)

I.E is the energy required to remove an electron from an atom in gaseous state while E.A is the energy required by an atom to gain electron in gaseous state (2)

b). The atomic number of A and B are 9 and 17 respectively. Compare the electron affinity of A and B. Explain. (2 marks)

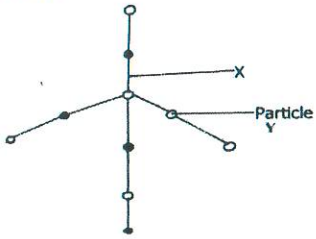
A has higher E.A than B, A has smaller A. Radius thus its nuclear attracts electron strongly (2)

2. The apparats shown bellow is commonly used in chemistry laboratory. Give its name and state its use. (2 marks)

Name Dropping funnel

Use To deliver/add controllable amount of liquids into reaction vessels (2)

3. Silicon (IV) oxide has a structure similar to that of diamond. Part of the structure is shown below.



a). What does x represent? (½mark) (½)

Covalent bond

b). What type of structure is shown by the diagram? (½mark) (½)

Giant atomic/ covalent structure

4. Element K has two isotopes ^{20}K and ^{22}K with relative abundance of 90% and 10% respectively.

a). What are isotopes? (1 mark)

Atoms of the same element with the same atomic number but different mass number due to different in the number of neutrons (1)

b). Determine the relative atomic mass of element K. (3 marks)

$\left(\frac{20 \times 90}{100}\right) + \left(\frac{10 \times 22}{100}\right) = 18 + 2.2$

$= 20.2$ (3)

11

5. The pH values of some solutions labeled E to I are given in the table below. Use the information to answer the questions that follow.

pH	14.0	1.0	8.0	6.5	7.0
Solution	E	F	G	H	I

(a) Identify the solution with the highest concentration of hydroxide ions

E ✓ (1 mark) 1

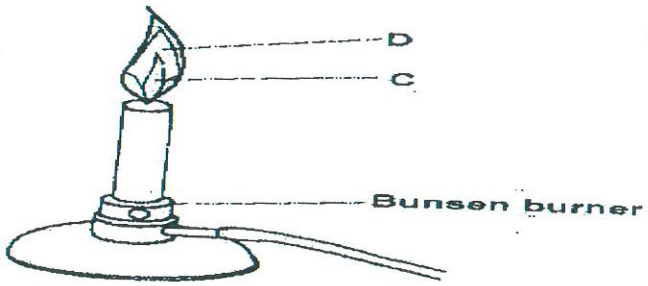
(b). Which solution can be used as a remedy for acid indigestion in the stomach?

G ✓ (1 mark) 1

(c). Which solution would react most vigorously with magnesium metal?

F ✓ (1 mark) 1

6. The diagram below shows a Bunsen burner when in use.



a) Name the regions labelled C and D. (2 marks)

C → Almost colourless zone ✓ 1

D → Green blue zone ✓ 1

(b) Give **two** reasons why non-luminious flame is preferred for heating in the laboratory instead of luminous flame (2 marks)

It is hotter than luminous flame ✓ 1

It does not dirtifies the apparatus unlike luminous flame ✓ 1

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

Dissolve $PbCO_3$ solid in dilute HNO_3 ✓ to obtain $Pb(NO_3)_2$ solution ✓
Dissolve K_2SO_4 solid in distilled H_2O ✓ to obtain K_2SO_4 solution ✓
Add $Pb(NO_3)_2$ solution into a solution of K_2SO_4 solution ✓ to obtain $PbSO_4$ solid ✓
Filter ✓ to obtain solid lead II sulphate ✓
Wash the $PbSO_4$ solid ✓
Dry it between the filter paper ✓ to obtain dry solid $PbSO_4$ ✓

3 (3)

10

8. For each of the following experiments, give the observations and the type of change that Occurs (Physical or chemical)

(3 marks)

Experiment	Observation	Type of change
A few drops of water are added to small amount of anhydrous Cobalt (II) chloride	Blue Cobalt II chloride turns pink ✓	Temporary chemical change ✓
A few crystals of Iodine are heated gently in a test tube	Purple vapour Condenses on the cooler parts of the ✓	Physical ✓
A few crystals of copper (II) Nitrate are heated strongly in a test tube.	Brown gas forms ✓	Chemical ✓

3

9. When magnesium ribbon is burnt in air and the product dissolved in water, a colourless solution is formed and a colourless gas is evolved.

(i) What effect does the solution formed have on litmus paper?

(1 mark) ✓

Turns Red litmus paper blue ✓ 1

(ii) Name the compound responsible for the production of the colourless gas.

(1 mark)

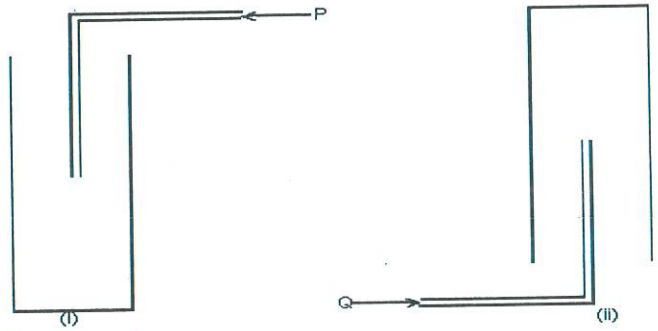
Magnesium Nitride ✓ Repeat Mg_3N_2 ✓ 1

(iii) Write down a balanced chemical equation for the reaction producing the colourless gas

(1mk)

$Mg_3N_{2(s)} + H_2O_{(l)} \rightarrow 3Mg(OH)_2 + 2(NH_3)_{(g)}$ ✓ 1

10. The diagram below shows how two gases, P and Q were collected.



(a) Name the two methods used.

(2 marks)

(I) Downward delivery | Upward displacement of air ✓ 1

(II) Upward ✓ | Downward ✓ 1

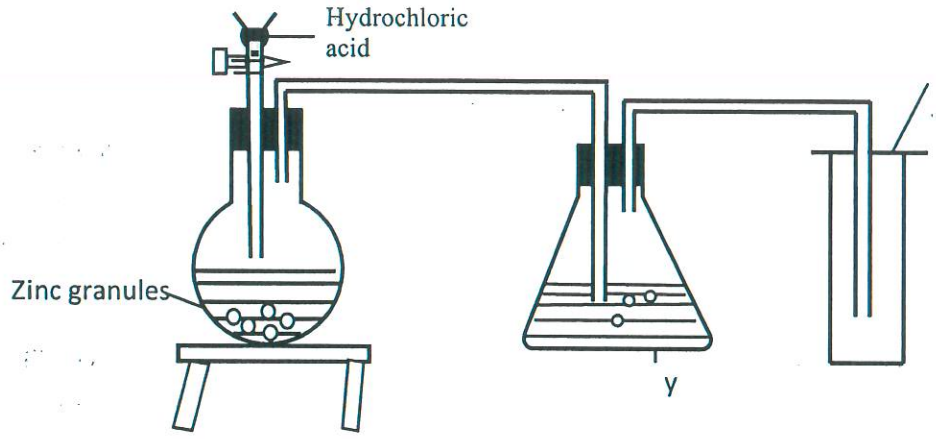
8

(b) State properties of P and Q that enable them to be collected through the methods shown. (2 marks)

P → denser than air ✓

Q → less dense than air | lighter than air

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



(i) With a reason, identify the mistake in the set-up above. (1 mark)

The method of collection is wrong, H_2 gas is less dense than air.

(ii) What would be liquid Y? (1 mark)

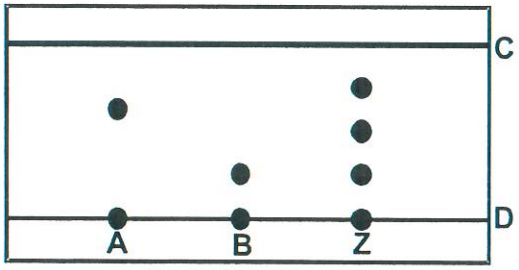
Concentrated H_2SO_4 ✓ acid

(iii) Give two physical properties of hydrogen gas (1 mark)

less dense than air

Colourless Any other

12. .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.



i) Identify;

a) Baseline. (1 mark)

D ✓

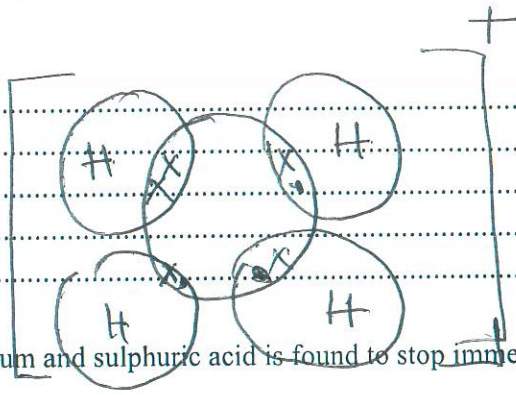
6

b) Solvent front. C ✓ (1 mark)

ii) Which pure pigment was component of Z.? (1 mark)

B ✓

13. Using dot (.) and cross (x) diagram, show bonding in the compound Ammonium ion (NH^+_4). (N= 14, H = 1) (2 marks)



charge ✓
Bracket ✓
Electron arrangement ✓

2

14. The reaction between calcium and sulphuric acid is found to stop immediately the acid is added to the metal. Explain (2 marks)

This is due to the formation of insoluble solid of $CaSO_4$ forming a coating on reactant (metal surface) preventing further reaction. ✓ ✓

2

15. Name the method or process that can be used to separate each of the following mixture

i. Water and motor oil (1 mark)

Separating funnel. ✓ 1

ii. Iron filings and sulphur powder (1 mark)

Use of a magnet ✓ 1

iii. Iodine and sand (1 mark)

Sublimation ✓ 1

9

16. The grid given below represents part of the periodic table. Study it and answer the questionsthat follow. The letters are not the actual symbols of the elements.

							A
B			G		H	E	
	J	I	L				C
D						M	
Y							

(i) What name is given to the family of elements to which A and C belong? (1 mark)

Noble gases ✓

(ii) Write the chemical formula of the sulphate of element D. (1 mark)

D_2SO_4 ✓

(iii) Which letter represents the most reactive (2 marks)

(a) Metal Y ✓

(b) Non-metal E ✓

17. An aluminum metal is a good conductor and is used for overhead cables. **State** any **two** other properties that make Aluminum suitable for this use. (2 marks)

Low density ✓

Resistance to atmospheric corrosion ✓

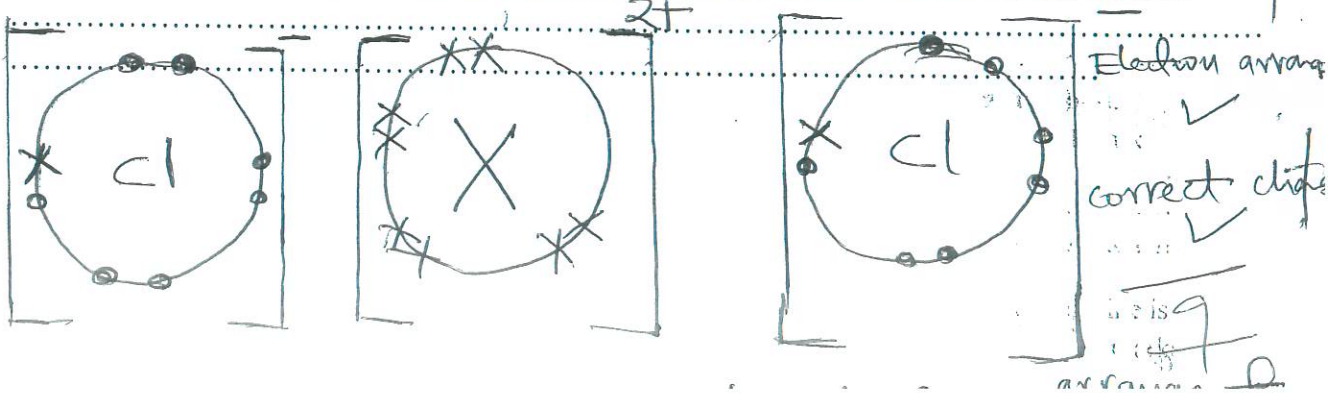
Relatively cheap any 2

18. A metal X (*atomic number 12*) burns in Chlorine (*atomic number 17*) to produce a white solid.

a) Write an equation between X and Chlorine gas. (1mark)

$X_{(s)} + Cl_{2(g)} \rightarrow XCl_{2(s)}$ ✓

b) Draw a dot (•) and cross (X) diagram to show how the compound between X and Chlorine is formed. (2 marks)



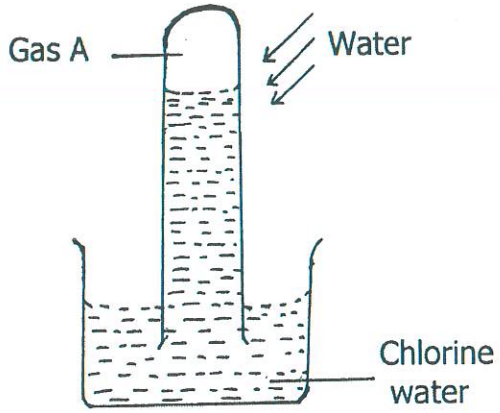
Electron arrang ✓

correct diag ✓

19. In terms of structure and bonding. Explain why water (H_2O) is a liquid at room temperature while Hydrogen sulphide (H_2S) is a gas. (2 marks)

Molecules of water are held together by strong hydrogen bond which are stronger while H_2S are held together by weak intermolecular forces of attraction Van der waals forces of attraction

20. The diagram below shows an experiment involving chlorine water.



a)State and explain the observations made after 24 hours. (2 marks)

Chlorine water changes from yellow to colourless (decolourises) Cl_2 water (yellow) decomposes to forms HCl (colourless).

$2HOCl_{(aq)} \rightarrow 2HCl_{(aq)} + O_{2(g)}$

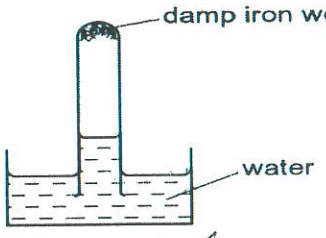
b)Write an equation to show the formation of gas A. (1 mark)

Bleaching agent, Any other Treatment of water $2HOCl_{(aq)} \rightarrow 2HCl_{(aq)} + O_{2(g)}$

c)State one use of chlorine gas. (1 mark)

Bleaching agent, Treatment of water Any other

21. A test-tube containing damp iron wool is inverted in water.



(a). State and explain what is observed after three days. (2 marks)

Iron wool turns red → Due to formation of rust ($Fe_2O_3.nH_2O$) level of water rises up in the test tube → to occupy the space initially occupied by $O_{2(g)}$

Write chemical equation leading to the formation of rust (1 mark)

$4Fe_{(s)} + 3O_{2(g)} + 2nH_2O_{(l)} \rightarrow 2Fe_2O_3.nH_2O_{(s)}$

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22. A certain element Y has atomic number 15 and mass number of 31.

(a) Calculate the number of neutrons in the element (1 mark)

31 − 15 = 16 ✓ 1

(b) Write the electron arrangement of the ion formed by element Y. (1 mark)

2,8,5 ✓ Reject 2.8.5 1

(c) How would the atomic size of the above element compare with another atom X whose atomic number is 11 and mass number 23? Explain. (1mark)

The atomic size of Y is smaller than that of X because Y has more protons than X hence the outermost electons are more tightly held ✓ 1

23. In the fractional distillation of liquified air state:

(a) how dust particles are removed from air (1mark) 1

By electrostatic precipitation ✓

(b) How carbon (IV) oxide is removed before the mixture is cooled to -25°C (1 mark)

Passing air through concentrated kOH/NaOH solution ✓ 1

(c) Why is the mixture cooled to -25°C? (1 mark)

To remove water vapour in form of ice ✓ 1

24. When a compound **Y** is heated,a dark brown gas is evolved and a residue which is yellow when hot and white on cooling is left. Identify

(a) the brown gas (1 mark)

Nitrogen (IV) oxide ✓ 1

(b) the ions present in the residue (1 mark)

Zn^{2+} and O^{2-} ✓ 1

(c) the compound **Y** (1 mark)

Zinc nitrate ✓ 1

9

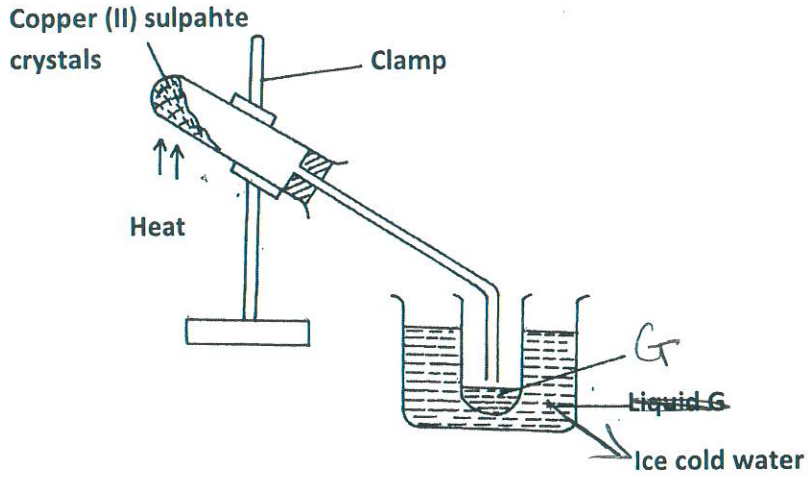
25. (a) Distinguish between a deliquescent and a efflorescent substance. (2 marks)

Deliquescent is a substance that absorbs moisture from the atmosphere to form a solution while efflorescent is a salt substance that loses the water of crystalisation to the atmosphere to become powdery.

(b) Give **one** use of hygroscopic substances in the laboratory. (1 mark)

used in drying of different gases. 1

26. The diagram below is a set up used to investigate the effect of heat on hydrated copper(II) sulphate. Study the diagram and answer the questions that follow.



(a) .Why is boiling tube slanted as shown? (1mark)

To prevent flow back of cold H_2O into hot boiling tube which would cause cracking. ✓

(b) . What is observed in the boiling tube. (1mark)

White solid turns blue. ✓ 1

(c). Identify liquid **G.** (1mark)

Water ✓ 1

6

27. The table below shows atomic numbers of four elements W, X, Y and Z.

Element	W	X	Y	Z
Atomic number	20	17	19	9

(a). Write the electron arrangement of the atom of Z. (1 mark)

2,7 ✓ Reject 2.7. 1

(b). What is the formula of the compound formed between W and X. (1 mark)

WX_2 ✓ 1

(c. Name the bond and structure of the compound in b(i) above. (1 mark)

Bond → ionic ✓ electrovalent ✓ 1

structure → Giant ionic structure. ✓ 1

3