

Bishop's senior school mukono
S.3 CHEMISTRY PAPER 1 (545/1)

Time: 1 hour 30 minutes

Name: **Stream:**

Signature:

Instructions:

This paper has 50 objective questions.

Answers must be written in the boxes provided at the right hand of each question.

Attempt all questions.

1. Components of black ink are separated by;
A. Sublimation
B. Decantation
C. Chromatography
D. Magnetism
2. Lead (ii) sulphate can be prepared by the action of dilute sulphuric acid on;
A. Lead metal
B. Lead (ii) oxide
C. Lead (ii) nitrate
D. Lead (ii) carbonate
3. Element X reacts with chlorine to form a compound with formula XCl_4 . the formula of the oxide of X is;
A. X_2O
B. XO
C. XO_2
D. XO_4
4. Which of the following is **NOT** a property of sodium metal?
A. Soft with silvery luster.
B. Melts with a silvery ball with water.
C. Burns with a yellow flame.
D. Burns with a blue flame.
5. Beginning with the most reactive, the order of reacting of the following metals with water is;

- A. Sodium $\longrightarrow$ Magnesium $\longrightarrow$ Lead $\longrightarrow$ Copper
B. Magnesium $\longrightarrow$ Sodium $\longrightarrow$ Copper $\longrightarrow$ Lead
C. Copper $\longrightarrow$ Lead $\longrightarrow$ Magnesium $\longrightarrow$ Sodium
D. Lead $\longrightarrow$ Copper $\longrightarrow$ Sodium $\longrightarrow$ Magnesium

☐

6. The valency of M in M_2HPO_4 is;

- A. 1
B. 2
C. 3
D. 4

☐

7. The gas produced when steam is passed over heated iron fillings is;

- A. O_2
B. N_2O
C. H_2
D. Fe_2O_3

☐

8. The alloy of steel consists of iron and;

- A. Carbon
B. Sulphur
C. Phosphorus
D. Tin

☐

9. Which of the following is **NOT** a characteristic of both rusting and burning?

- A. They are both chemical processes.
B. Both processes occur in air.
C. They both involve use of oxygen.
D. Both processes involve water.

☐

10. Which of the following is a neutral oxide?

- A. Sodium oxide
B. Carbon dioxide
C. Carbon monoxide
D. Sulphur dioxide

☐

11. Which of the following is true about a mixture?

- A. Their compositions by mass of the elements present are fixed.

☐

- B. Their formation is accompanied by heat change.
- C. Their formation leads to change in mass.
- D. Their composition by mass of substances present vary
12. Which of the following represents the correct ionic equation for the reaction between aqueous solution of lead (ii) ions and carbonate ions in solution?
- A. $\text{Pb}^{2+}(\text{s}) + \text{CO}_3^{2-}(\text{s}) \longrightarrow \text{PbCO}_3(\text{s})$
- B. $\text{Pb}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \longrightarrow \text{PbCO}_3(\text{aq})$
- C. $\text{Pb}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \longrightarrow \text{PbCO}_3(\text{s})$
- D. $\text{Pb}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{s}) \longrightarrow \text{PbCO}_3(\text{aq})$
13. A certain salt gave off water vapour when heated. There was no colour change. The salt is likely to be;
- A. Copper (ii) nitrate
- B. Lead (ii) nitrate
- C. Sodium carbonate deca-hydrate
- D. Zinc carbonate
14. When gas X is passed over copper (ii) oxide, a brown solid is formed and a gaseous product which turns anhydrous cobalt (ii) chloride from blue to pink is formed. Gas X is;
- A. Hydrogen chloride
- B. Nitrogen
- C. Carbon monoxide
- D. Hydrogen
15. Which one of the following is an amphoteric oxide?
- A. Copper (ii) oxide
- B. Lead (ii) oxide
- C. Iron (ii) oxide
- D. Copper (i) oxide
16. The following are properties acids **except**;
- A. Exhibit acidic properties when without water.
- B. Exhibit acidic properties when dissolved in water.
- C. Have no effect on moist red litmus paper.
- D. Turn moist blue litmus paper red.
17. Which of the following catalysts is used in the manufacture of ammonia gas by the Haber process?

- A. Platinum
- B. Finely divide iron
- C. Manganese (iv) oxide
- D. Vanadium (v) oxide

☐

18. Which of the following metals does not react with cold water or steam to produce hydrogen?

- A. Zinc
- B. Magnesium
- C. Silver
- D. Calcium

☐

19. A separating funnel is used to separate immiscible liquids because of;

- A. Different densities
- B. Formation of separate layers
- C. Different solubility
- D. Boiling point differences

☐

20. Which one the following oxides can react with sodium hydroxide solution?

- A. Al_2O_3
- B. Fe_2O_3
- C. MgO
- D. CaO

☐

21. Which one of the following carbonates will not change in mass when strongly heated?

- A. Zinc carbonate
- B. Potassium carbonate
- C. Sodium hydrogen carbonate
- D. Ammonium carbonate

☐

22. Element Z displaces carbon from carbon dioxide gas. Calcium displaces Z from its oxide.

The order of reactivity of the elements starting from the most reactive is:

- A. Carbon > Calcium > Z
- B. Z > Calcium > Carbon
- C. Z > Carbon > Calcium
- D. Calcium > Z > Carbon

☐

23. Which of the following pairs of compounds are both reducing agents?

- A. Chlorine and Oxygen

☐

- B. Ammonia and Carbon monoxide
- C. Hydrogen and Carbon monoxide
- D. Chlorine and Hydrogen

24. Which of the following reagents can be used to distinguish between ethene and ethane?

- A. Lime water
- B. Bromine water
- C. Hard water
- D. Potassium iodide solution

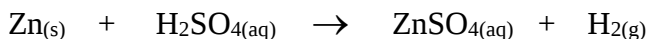
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25. The atomic numbers of elements R and S are 12 and 9 respectively. Which of the following is a property of the compound between R and S?

- A. It conducts electricity in fused state
- B. It is soluble in organic solvents
- C. It is a solid with low melting points
- D. It has a giant molecular structure

☐

26. Sulphuric acid reacts with zinc according to the equation:



The number of moles of zinc that will react with excess sulphuric acid to produce 60 cm³ of hydrogen at room temperature is (1 mole of gas occupies 24 dm³ at room temperature).

- A. 0.0025
- B. 0.005
- C. 0.025
- D. 0.05

☐

27. The percentage composition of nitrogen in ammonium nitrate, NH₄NO₃ is (N=14; H=1; O=16)

- A. $\frac{14}{80} \times 100$
- B. $\frac{28}{80} \times 100$
- C. $\frac{52}{80} \times 100$
- D. $\frac{76}{80} \times 100$

28. 20 cm³ of 0.2 M HCl reacts with 25 cm³ of sodium hydroxide solution. The molarity of the hydroxide is

- A. $\frac{25 \times 0.2}{20}$
- B. $\frac{20 \times 0.2}{25}$

☐

C. $\frac{25}{20 \times 0.2}$

D. $\frac{20}{25 \times 0.2}$

29. The full symbol of an element is ${}_{12}^{24}\text{X}$. Which one of the following represents the number of electrons in the ion?

- A. 10
- B. 8
- C. 16
- D. 24

☐

30. Which one of the following gases is dried using calcium oxide only?

- A. Sulphur dioxide
- B. Ammonia
- C. Hydrogen
- D. Hydrogen chloride

☐

31. Which of the following substances is an element?

- A. Ice
- B. Sand
- C. Graphite
- D. Polythene

☐

32. The salt that can be prepared by direct combination of elements is;

- A. FeCl_3
- B. CaSO_4
- C. CaCO_3
- D. $\text{Pb}(\text{NO}_3)_2$

☐

33. The gas normally collected by upward delivery is;

- A. Ammonia
- B. Chlorine
- C. Sulphur dioxide
- D. Hydrogen chloride

☐

34. The substance that sublimes when heated is;

- A. Phosphorus
- B. Carbon
- C. Iodine

☐

D. Sulphur

35. Potassium Aluminum sulphate is used in the purification of water for;

- A. Removing colouring matter
- B. Killing harmful bacteria
- C. Removing suspended matter
- D. Softening water

☐

36. Which one the following metals will displace Lead from Lead (ii) nitrate solution?

- A. Silver
- B. Copper
- C. Zinc
- D. Mercury

☐

37. Which one of the following substances when heated undergoes a chemical change?

- A. Candle wax
- B. Ammonium chloride
- C. Zinc oxide
- D. Sodium nitrate

☐

38. Which one of the following does **NOT** react with chlorine?

- A. Aluminum
- B. Oxygen
- C. Sodium
- D. Argon

☐

39. Which one of the following is likely to be the pH of a dilute hydrochloric acid?

- A. 2
- B. 6
- C. 7
- D. 9

☐

40. Which one of the following ions reacts with Cl^- (aq) to form a precipitate which dissolves on heating?

- A. Cu^{2+} (aq).
- B. Fe^{2+} (aq).
- C. Pb^{2+} (aq).
- D. Ca^{2+} (aq).

☐

Each of the questions 41 to 45 consists of an assertion (statement) on the left hand side and a reason on the right-hand side.

Select:

- A. If both the assertion and the reason are true statements and the reason is a correct explanation of the assertion.
- B. If both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion.
- C. If the assertion is true but the reason is not a correct statement.
- D. If the assertion is not correct but the reason is a correct statement

SUMMARY OF INSTRUCTIONS:

Assertion		Reason	
A. True		True (reason is a correct explanation)	
B. True		True (reason is not a correct explanation)	
C. True		Incorrect	
D. Incorrect		Correct	
41. Isotopes of an element show similar chemical reactions	because	isotopes of an element contain the same number of neutrons.	☐
42. Permutit is used to remove temporary and permanent hardness of water	because	permutit is a method of precipitation but not ion-exchange	☐
43. Element Y, atomic number 19 combines with element W, atomic number 17 to form an ionic compound	because	Y and W are elements with the same valence	☐
44. Ammonia is prepared by reacting ammonium salt with calcium hydroxide	because	calcium hydroxide is a base	☐
45. When sodium peroxide	because	sodium peroxide	☐

is dissolved in water, a
gas is evolved

reacts with water to form
hydrogen gas

In each of the questions 46 to 50, one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:

- A.** If 1, 2 and 3 only are correct
- B.** If 1 and 3 only are correct
- C.** If 2 and 4 only are correct
- D.** If 4 only is correct.

46. Which of the following nitrates will produce oxygen as the only gaseous product on strong heating?

- 1. Magnesium nitrate
- 2. Sodium nitrate
- 3. Calcium nitrate
- 4. Potassium nitrate

☐

47. Which of the following elements can react with nitrogen to form a nitride?

- 1. Lead
- 2. Calcium
- 3. Zinc
- 4. Magnesium

☐

48. The following hydroxide(s) is/are not amphoteric

- 1. Zinc hydroxide
- 2. Aluminium hydroxide
- 3. Lead(ii) hydroxide
- 4. Sodium hydroxide

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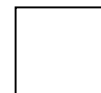
49. Which of the following metals will remove oxygen from zinc oxide?

- 1. Iron
- 2. Magnesium
- 3. Aluminium
- 4. Calcium

☐

50. Which of the following properties of metals is/are as a result of its/their free delocalized electrons?

1. Electrical conduction
2. Ductility
3. Heat conduction
4. Malleability



END

BISHOP'S SENIOR SCHOOL MUKONO
SENIOR THREE CHEMISTRY PAPER TWO
TIME: 2 HOURS 30 MINUTES

Answer all questions from this section.

1. The table below shows the number of protons, neutrons and electrons in the particles P, Q, R, S and T

Particle	Proton	Neutron	Electrons
P	14	14	14
Q	6	8	6
R	8	8	10
S	12	12	10
T	6	6	6

- a) Which particle is the most reactive metal? (01 mark)
.....
 - b) Which two particles are atoms of the same element? (01mark)
.....
 - c) Which two particles belong to the same group? (01mark)
.....
 - d) Which particle is an anion? (01mark)
.....
2. Study the Periodic Table in the figure below and use it to answer the questions that follow. The letters do not represent the actual symbols of the elements.

	I	II		III	IV	V	VI	VII	VIII
Period 1									
2	P			Q		R			S
3					Z			T	
4	Y	B							

a) Write the electronic configuration of ion of: (01½ marks)

i) Y

ii) R

iii) T

b) Which letter represents an element which forms: (01 mark)

i) a trivalent anion.

ii) a divalent cation.

c) i) Write the formula of the compound formed when Z combines with T. (01½ marks)

.....

ii) Name the bond that exists between the atoms of T. (01 mark)

.....

iii) Name the type of bond formed when Z and T combine. (01mark)

.....

v) State two properties of the bond that exists in the compound of Z and T. (01mark)

.....

3. a). Define the following terms used in chemistry;

i. Mixture (01 mark)

.....

ii. Compound (01 mark)

.....

b). In a certain home, an infant mixed the only salt in the house with sand. Explain how the mother was able to retrieve the salt from the sand. (02½ marks)

.....

.....

.....

.....

.....

.....

c). Mr. Okumu was working in a certain industry was asked by his boss to carry out an experiment to identify substances that were in mixtures **A** and **B**. The pure substances in A and B are P, Q, R, S and T. The results of the experiment are shown in the diagram below:

0	0			0		0
0	0	0				
0	0		0			
0						0
A	B	P	Q	R	S	T

a) Identify the substances in the

i) Mixture **A** (01 mark)

.....

ii) Mixture **B** (01 mark)

.....

b) Which substances are present in both mixtures? (01 marks)

.....
.....
.....

c) Which substances are present in mixture **A** only? (0½ mark)

.....

d) Name the method used to separate components in mixtures **A** and **B** (01 mark)

.....

e) (i) Define the term alloy. (01mark)

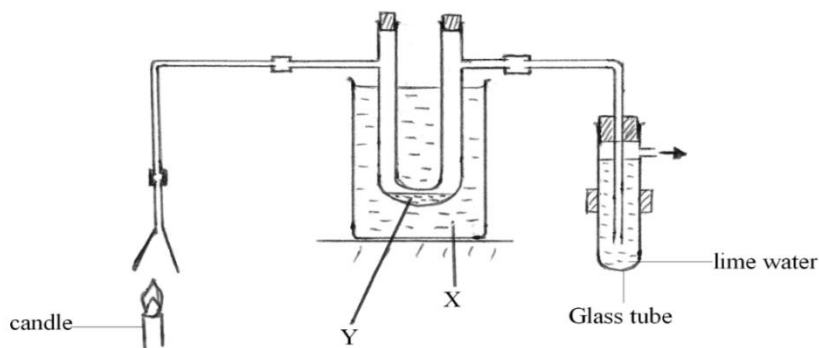
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(ii) Give two advantages of alloys over pure metals. (02 marks)

.....

.....

4. The experiment below was used to investigate candles.



a. Identify; (01 mark)

(i) **X**

.....

(ii) **Y**

.....

b. (i) State the observation made in the glass tube. (01 mark)

.....

.....

(ii). Write the equation for the reaction that takes place in (b) (i) above. (01½ marks)

.....

.....

c. What is the significance of this experiment? (01½ marks)

.....

.....

6. (a) Concentrated sulphuric acid reacts with ethanol to produce ethene.

(i) State the conditions for the reaction. (02 marks)

.....

(ii) Write the equation of the reaction that leads to formation of ethene in (a) (i) above.

(01 mark)

.....

(iii) State the property of sulphuric acid shown in the reaction in (a) (ii). (01 mark)

.....

(b) Name one reagent, apart from bromine, that can be used to distinguish between ethane and ethene and in each case state what would be observed if the reagent is separately treated with ethane and with ethene. (03 marks)

.....

7. (a) Define the following terms as used in the study of acids;

(i) Basicity of an acid. (01 mark)

.....

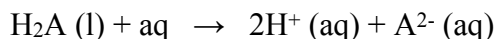
(ii) Strong acid (01 mark)

.....

(iii) Weak acid (01 mark)

.....

(b) The equations below are for the reactions that take place when the respective mineral acids are dissolved in water.





State the basicity of

(i) H_2A (0½ mark)

.....

(ii) H_3A (0½ mark)

.....

Which of the acids shown in (b) above is a

(iii) strong acid? (01½ marks)

.....

Reason

.....

.....

(iv) weak acid? (01½ marks)

.....

Reason

.....

.....

8. (a) What is meant by the terms

(i) Atomic number (01 mark)

.....

.....

.....

(ii) Mass number (01 mark)

.....

.....

.....

(b) An atom of an element **X** has 21 neutrons and a mass number of 41.

(i) Calculate the number of protons in the nucleus of **X**. (01 mark)

.....

.....

(iii) Using the electronic configuration of **X**, state the group and period to which **X** belongs. (01½ marks)

.....

.....

.....

9. a) 6.5 g of metal **M** combines with excess oxygen gas to give 8.1 g of the oxide.
Calculate the formula of the oxide. ($M = 65, O = 16$). (03½ marks)

.....

.....

.....

.....

.....

.....

.....

SECTION B (30 MARKS)

Answer any two questions from this section.

- 10.** (a) Define the following terms;
- (i) Acid (01 mark)
 - (ii) Basic oxide (01 mark)
- (b) Dilute hydrochloric acid was added to solid sodium carbonate in a test tube.
- (i) State what was observed (01½ marks)
 - (ii) Write an equation for the reaction (01½ marks)
- (c) An excess of the gaseous product formed in (b) above was passed through calcium hydroxide solution.
- (i) State what was observed (01½ marks)
 - (ii) Write an equation(s) for the reaction(s) that took place. (03 marks)
- (d) Describe how dry crystals of lead (II) nitrate can be prepared from lead (II) oxide. (05½ marks)
- 11.** (a) (i) Using a well labeled diagram show how dry hydrogen gas can be prepared in the laboratory. (03 marks)
- (ii) Write an equation for the reaction that takes place in (a) (i) above. (01½ marks)
- (b) (i) State what is observed when hydrogen gas is burnt in oxygen. (01 marks)
- (ii) Write an equation for the reaction that takes place in (b) (i) above. (01½ marks)
- (c) (i) Mention any four uses of hydrogen gas. (02 marks)
- (d) The equation below is for the reaction that takes place when hydrogen gas at s.t.p is passed over heated tri-iron tetra oxide.
- $$\text{Fe}_3\text{O}_4 (\text{s}) + 4\text{H}_2 (\text{g}) \rightarrow 3\text{Fe} (\text{s}) + 4\text{H}_2\text{O} (\text{g})$$
- (i) What mass of tri-iron tetra oxide is required to convert 4.48 dm³ of hydrogen gas at s.t.p to steam? (Fe = 56, O = 16, H = 1, 1 mole of H₂ occupies 22.4 dm³ at s.t.p). (04 marks)

- (ii) What property of hydrogen gas is exhibited in the equation in (d) above? (01 mark)
- (iii) Mention any two metal elements that will show a similar property when reacted with heated tri-iron tetra oxide. (02 marks)
12. (a) (i) Define rust. (02 mark)
- (ii) Give the chemical name and chemical formula of rust. (02 marks)
- (iii) Write an equation for the reaction leading to the formation of rust. (02 marks)
- (iv) Describe an experiment to show that water is required for rusting. (05 marks)
- (v) Give two advantages of rusting. (02 marks)
- (vi) Give two practical ways a peasant farmer deep in the village may be able to keep his/her iron garden tools from rusting. (02 marks)