

Name .....Stream.....

UGANDA CERTIFICATE OF EDUCATION

545/1 CHEMISTRY

PAPER 1

TIME: 1½ HOURS

**Instructions:**

*This paper consists of fifty (50) objective questions.*

*All questions are compulsory*

*Answer the questions by writing the correct alternative in the box on the right hand side of the question*

<b>For Examiner's use only</b>	

1. Which one of the following of the following is a characteristic of the element with electronic configuration 2:4?

A: forms ions by electron loss

B: will form an acidic and a neutral oxide

C: does not conduct electricity

D: dissolves in a concentrated acid to give a salt and water

2. Which one of the following compounds will give a gelatinous, reddish brown precipitate when added to aqueous sodium hydroxide solution?

A: Iron (III) oxide

B: Iron (II) sulphate

C: Iron (III) sulphate

D: Iron (II) oxide

3. In which of the following reactions is sulphur dioxide the oxidizing agent?

A:  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{SO}_3(\text{g})$

B:  $\text{SO}_2(\text{g}) + 2\text{HNO}_3(\text{aq}) \longrightarrow \text{H}_2\text{SO}_4(\text{aq}) + 2\text{NO}_2(\text{g})$

C:  $\text{SO}_2(\text{g}) + \text{NaOH}(\text{aq}) \longrightarrow \text{NaHSO}_3(\text{aq})$

D:  $\text{SO}_2(\text{g}) + 2\text{Mg}(\text{s}) \longrightarrow 2\text{MgO}(\text{s}) + \text{S}(\text{s})$

4. Element Y reacts with copper (II) ions but not with zinc ions. Magnesium metal reacts with zinc ions. Which one of the following represents the correct order of the reactivity of these elements, starting with the least reactive?

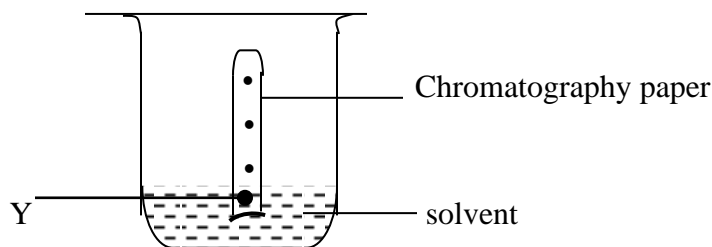
A: Cu – Y – Zn – Mg

B: Y – Mg – Zn – Cu

C: Cu – Zn – Y – Mg

D: Y – Cu – Mg – Zn

5. Paper chromatography was used to investigate a spot of coloured liquid called Y. Three well separated spots appeared on the chromatography paper as shown below



This experiment tells us that

A: Y is a mixture of only three substances

B: Y contained at least 3 substances, and there could be more

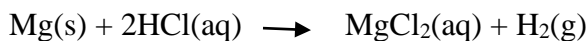
C: the three spots were products of the reaction between Y and the solvent

D: the three spots separated because Y contained three substances of different densities.

6. Which of the following pairs of elements will combine together to form a compound of simplest formula  $ZX_2$ ?

	Atomic number of Z	Atomic number of X
A	18	9
B	11	17
C	9	19
D	20	9

7. 2.40g of magnesium reacted completely with excess hydrochloric acid. Magnesium reacts with hydrochloric acid according to the following equation;



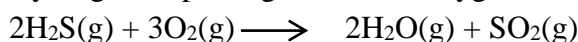
The maximum decrease in mass in this reaction is ..... (H = 1, Mg = 24)

- A: 2.24g                      B: 2.40g                      C: 0.20g                      D: 0.02g

8. If 5.0g of zinc in granulated lumps, are added to  $10\text{cm}^3$  of 2M sulphuric acid in a beaker, the reaction proceeds steadily. The reaction can be made to go more slowly by

- A: replacing the 5.0g of granulated zinc lumps with a 5.0g single cube of zinc  
B: replacing the 5.0g of granulated zinc lumps with 5g of zinc powder  
C: using 5M sulphuric acid instead of 2M acid  
D: raising the temperature of the sulphuric acid by  $10^\circ\text{C}$

9. Hydrogen sulphide gas burns in oxygen according to the equation;



The volume of oxygen, at the same temperature and pressure, used up when 14.4 litres of hydrogen sulphide are completely burned at s.t.p is. (1 mole of gas occupies 22.4 litres at s.t.p)

- A: 7.2 litres                      B: 21.60 litres                      C: 43.2 litres                      D: 9.6 litres

10. Sewage from a town, P, flows into a river. Further down the river another town Q; requires to take water from the river for drinking. Which one of the following operations would most quickly destroy germs and bacteria and so make water in town Q safe for drinking?

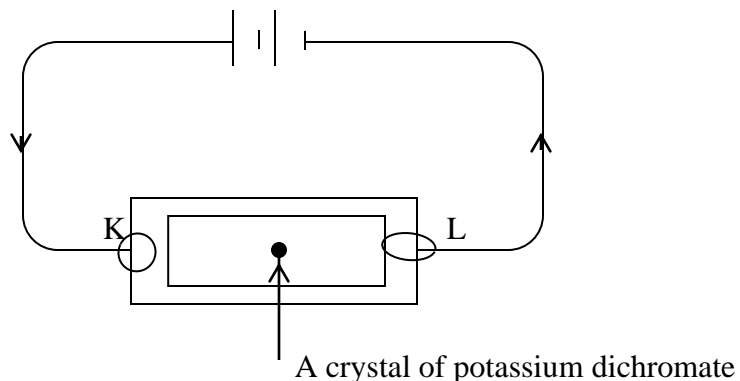
- A: filtration of water through sand to obtain clear water  
B: precipitation of the magnesium and calcium ions  
C: addition of chlorine in small quantities such that it is difficult to notice when drinking the water  
D: storage in an open reservoir

11. To a green solution of iron (II) sulphate was added concentrated nitric acid followed by dilute sodium hydroxide solution. A reddish brown precipitate was formed. The role of the acid in this experiment was to

- A: catalyse the formation of the reddish brown precipitate  
B: liberate nitrogen dioxide  
C: provide acidic conditions suitable for the formation of the reddish brown precipitate  
D: oxidize iron (II) ions to iron (III) ions

12. Which one of the following is an important alloy of copper?  
 A: Duralumin                      B: steel                      C: solder                      D: Brass
13. Chlorine has relative atomic mass of 35.5. This is not a whole number because chlorine is  
 A: composed of isotopes                      B: a very reactive element   
 C: a nonmetal                      D: diatomic
14. The percentage of water of crystallization in  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  crystals is  
 (Na = 23, O = 16, S = 32, H = 1)  
 A:  $\frac{18 \times 100}{158}$                       B:  $\frac{90 \times 100}{248}$                       C:  $\frac{90 \times 100}{158}$                       D:  $\frac{9 \times 100}{232}$
15. When concentrated sulphuric acid is added to a small quantity of sawdust in an evaporating basin, the sawdust darkens and a black mass results. Which one of the following best explains the observation?  
 A: the heat evolved burns the sawdust.  
 B: sulphuric acid is an oxidizing agent   
 C: the water of crystallization is removed from the sawdust  
 D: the acid dehydrates the sawdust.
16. A compound has the following percentage composition by mass  
 Carbon 40.0%  
 Hydrogen 6.7%  
 Given that the relative molecular mass of the compound is 180, what is the number of hydrogen atoms in one molecule of it?  
 (C = 12, H = 1, O = 16)   
 A: 6                      B: 24                      C: 12                      D: 18
17. Temporary hardness in water is due to the presence of  
 A: ions of calcium and magnesium  
 B: hydrogen carbonates of calcium and magnesium   
 C: sulphates and chlorides of magnesium and calcium  
 D: hydrogen carbonate ions.

18. Study the diagram below and then answer the question



A filter paper is soaked in saturated sodium sulphate solution and placed on a microscope slide. A crystal of potassium dichromate is then placed on the paper. If current is allowed to flow to make a complete circuit, which one of the following will not be true?

- A: potassium ions will move towards L
- B: chromate ion will move towards K
- C: sodium ions will move towards L
- D: sulphate ions will move towards L

19. The atoms of graphite are connected together by strong covalent bonds. The reason why graphite feels slippery is because its

- A: atoms form hexagonal rings
- B: layers are weakly bonded together
- C: atoms have delocalized electrons
- D: atoms are not arranged in a definite order

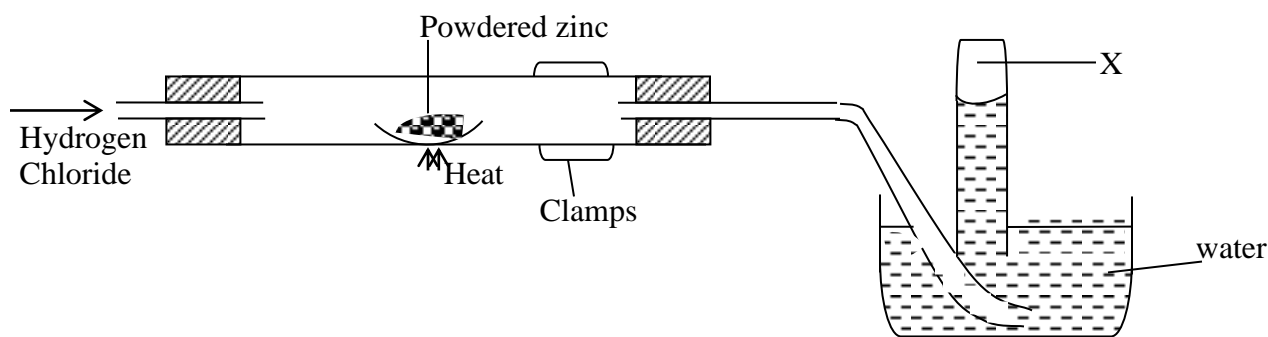
20. Which one of the following hydroxides can react with aqueous ammonia solution to form a colourless solution?

- A:  $\text{Cu}(\text{OH})_2$
- B:  $\text{Al}(\text{OH})_3$
- C:  $\text{Zn}(\text{OH})_2$
- D:  $\text{Fe}(\text{OH})_3$

21. The amount of heat evolved when 6.0g of manganese was displaced from a solution was 28.8KJ. The amount of heat produced when 0.25 moles of manganese was displaced is.. (Mn = 55)

- A:  $\frac{28.8 \times 55 \times 0.25}{6.0}$
- B:  $\frac{55 \times 6.0}{28.8 \times 0.25}$
- C:  $\frac{28.8 \times 55}{6.0 \times 0.25}$
- D:  $28.8 \times 55 \times 6.0 \times 0.25$

22.



The gas X collected during the experiment is

- A: oxygen                      B: chlorine                      C: hydrogen chloride                      D: hydrogen

23. When dilute sulphuric acid is added to zinc oxide, the zinc oxide dissolves forming zinc sulphate solution. In this reaction zinc oxide is acting as

- A: a base                      B: a reducing agent                      C: an oxidizing agent                      D: an acid

24. When 79g of anhydrous salt X (RFM = 158) combines with 45g of water, a hydrated salt of formula  $X \cdot nH_2O$  is formed. The value of n is (H = 1, O = 16)

- A: 2                      B: 3                      C: 5                      D: 10

25. Which one of the following is not a product of decomposition of nitric acid when heated?

- A: water vapour                      B: Nitrogen                      C: oxygen                      D: nitrogen dioxide

26. The salt containing the radical  $HSO_4^-$  is known as an acid salt because

- A: the radical contains hydrogen  
 B: salt containing the radical is derived from sulphuric acid  
 C: the radical liberates hydrogen ions in aqueous solution  
 D: the radical in aqueous solution turns blue litmus red.

27. The volume of a 0.5M hydrochloric acid required to exactly react with 20.0cm<sup>3</sup> of a 0.01M sodium carbonate solution is given by

- A:  $\frac{20.0 \times 0.1}{2 \times 0.5}$                       B:  $\frac{20.0 \times 0.5}{2 \times 0.1}$                       C:  $\frac{2 \times 20.0 \times 0.5}{0.1}$                       D:  $\frac{2 \times 20.0 \times 0.1}{0.5}$

28. Which one of the following equations represents the correct equation for the reaction between ammonia and oxygen in the presence of a catalyst?

- A:  $4NH_3(g) + 7O_2(g) \longrightarrow 4NO_2(g) + 6H_2O(l)$   
 B:  $4NH_3(g) + 3O_2(g) \longrightarrow 2N_2(g) + 6H_2O(l)$   
 C:  $4NH_3(g) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(l)$   
 D:  $2NH_3(g) + O_2(g) \longrightarrow 3H_2(g) + 2NO(g)$

29. What mass of barium hydroxide,  $\text{Ba}(\text{OH})_2$ , should be dissolved to make  $1 \text{ dm}^3$  of solution,  $0.01\text{M}$  with respect to hydroxide ions?

A: 0.855g

B: 1.71g

C: 3.42g

D: 85.5g

(Ba = 137, O = 16, H = 1)

30. Which one of the following elements is extracted commercially by the electrolysis of an aqueous solution of one of its compounds?

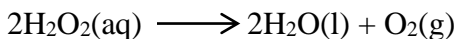
A: sodium

B: chlorine

C: copper

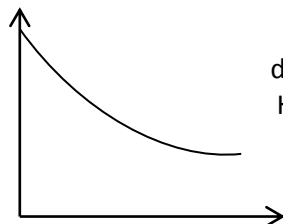
D: aluminium

31. Hydrogen peroxide decomposes in the presence of a finely divided catalyst according to the following equation;

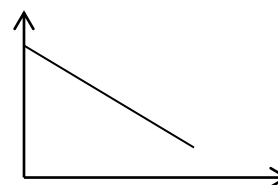


Which one of the following graphs would show correctly that the rate of the reaction is directly proportion to the concentration of hydrogen peroxide?

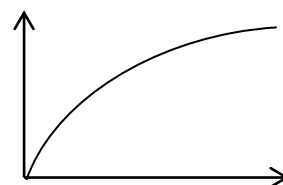
A: rate of decomposition of hydrogen peroxide



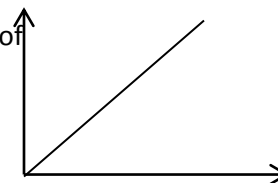
B: rate of decomposition of  $\text{H}_2\text{O}_2$



C: rate of formation of  $\text{O}_2$



D: rate of formation of  $\text{O}_2$



32. Hydrocarbon T was found to decolourise bromine water. 2 moles of T burn in oxygen to give 6 moles of carbon dioxide and 6 moles of water. The molecular formula of T is

A:  $\text{C}_2\text{H}_2$

B:  $\text{C}_2\text{H}_4$

C:  $\text{C}_3\text{H}_6$

D:  $\text{C}_4\text{H}_8$

33. Which one of the following is the correct observation made when a piece of sodium is dropped in water?

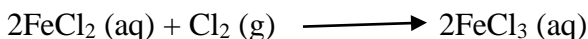
A: it sinks into water

B: it burns with a purple flame

C: A gas which relights a glowing splint is evolved

D: the solution turns red litmus paper blue.

34. The equation below shows the reaction of chlorine and iron (II) chloride solution



Which one of the following statements is correct?

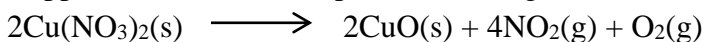
A: chloride ions gained electrons

B: chloride ions lost electrons

C: chlorine atoms lost electrons

D: chlorine atoms gained electrons

35. Copper (II) nitrate decomposes according to the following equation when heated strongly



The mass of copper (II) nitrate required to produce 18.75 dm<sup>3</sup> of gas at s.t.p is

(N = 14, O = 16, Cu = 64; 1 mole of a gas occupies 22.4dm<sup>3</sup> at s.t.p)

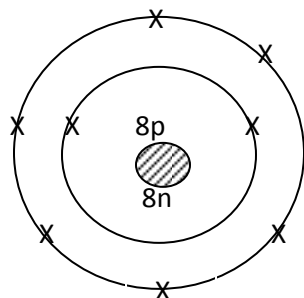
A:  $\frac{2 \times 18.75}{5 \times 22.4 \times 188}$

B:  $\frac{5 \times 18.75}{2 \times 22.4 \times 188}$

C:  $\frac{5 \times 22.4 \times 188}{2 \times 18.75}$

D:  $\frac{2 \times 22.4 \times 188}{5 \times 18.75}$

36. The diagram below illustrates the structure of an atom of a certain element Q. Study this diagram and then answer the question below



How many hydrogen atoms will combine with this atom?

A: 6

B: 4

C: 2

D: 1

37. When testing sodium carbonate solution for the presence of sulphate ions as impurities one should add:

A: excess hydrochloric acid and silver nitrate solution

B: excess sulphuric acid and silver nitrate solution

C: excess nitric acid and silver nitrate solution.

D: excess hydrochloric acid and barium chloride solution

38. The process which does not require a catalyst is the manufacture of

A: sulphuric acid

B: nitric acid

C: sodium hydroxide

D: ammonia

39. Sulphur is obtained from deposits underground by

- A: burning it underground and then reducing the oxide
- B: melting it with superheated water and pumping it out
- C: floating it out on brine
- D: drilling it and sucking it out in a stream of air

40. All the following substances are chemical mixtures except;

- A: rusty iron filings
- B: air
- C: hard water
- D: common salt

In each of the questions 41 to 45, 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

41. Polyvinylchloride (P.V.C) is used to cover electric cables because

- 1. It is opaque
- 2. It is non-conductor of electricity
- 3. It is flexible
- 4. It is waterproof

42. Which of the following reactions occur when sodium metal is exposed to moist air?

- 1.  $4\text{Na(s)} + \text{O}_2\text{(g)} \longrightarrow 2\text{NaO(s)}$
- 2.  $\text{Na}_2\text{O(s)} + \text{H}_2\text{O(l)} \longrightarrow 2\text{NaOH(aq)}$
- 3.  $2\text{NaOH(aq)} + \text{CO}_2\text{(g)} \longrightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O(s)}$
- 4.  $2\text{Na(s)} + 2\text{H}_2\text{O(l)} \longrightarrow 2\text{NaOH(aq)} + \text{H}_2\text{(g)}$

43. Which of the following are characteristic of metals low in the reactivity series?

- 1. The nitrate is decomposed by heat
- 2. The carbonate is not decomposed by heat
- 3. Not attacked by dilute mineral acids
- 4. Are extracted from their ores by electrolysis.

44. Which of the following can be used to distinguish between hydrogen and carbon monoxide?

- 1. Colour of flame when burning in air
- 2. Solubility in water
- 3. Effect on moist litmus paper
- 4. Explosive combination with oxygen

45. In which of the following reactions is carbon dioxide a product?

1. When carbon monoxide is passed over hot lead (II) oxide
2. Action of concentrated sulphuric acid on oxalic acid crystals
3. When steam is passed over white hot coke
4. When sodium carbonate crystals is heated.

Each of the questions 46 to 50 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.

Instructions summarized	
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

46. Graphite is a good conductor of electricity whereas diamond is not BECAUSE Unlike diamond graphite has mobile electrons.

47. Iron is used as the cathode in the electrolysis of fused sodium chloride in industry BECAUSE Sodium is more electropositive than iron

48. Molten sulphur is an allotrope of sulphur BECAUSE Molten sulphur forms a crystalline sulphur when poured into cold water

49. Iodine is a solid at room temperature BECAUSE Iodine may be purified by sublimation

50. Ethanol is obtained by fermentation of glucose BECAUSE Enzymes convert glucose to ethanol and carbon dioxide

**END**