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CHEMISTRY

PAPER 1

JULY 2023

1 HR 30 MINS



LUWEERO DIOCESE MOCK EXAMINATIONS 2023

UGANDA CERTIFICATE OF EDUCATION

CHEMISTRY

PAPER 1

1 HOUR 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

This paper consists of 50 objective questions.

Answer all questions.

You are required to write the correct answer; A, B, C or D in blue or black ink in the box provided on the right hand side of each question.

Do not use pencil. Any questions answered in pencil will not be marked.

For examiner's use only

1. Which of the following methods can be used to separate a mixture of sodium chloride and ammonium chloride?
- A. Filtration
B. Sublimation
C. Decantation
D. Fractional distillation
2. Which one of the following substances can burn in carbon dioxide?
- A. Phosphorus
B. Iron
C. Carbon
D. Magnesium
3. Which one of the sets below contains oxides which are readily soluble in water?
- A. Hydrogen peroxide, sodium oxide and potassium oxide
B. Sodium oxide, copper (II) oxide and magnesium oxide
C. Lead (II) oxide, iron (II) oxide and potassium oxide
D. Potassium oxide, hydrogen peroxide and copper (II) oxide
4. A hydrocarbon consists of 88.8% carbon by mass. The empirical formula of the hydrocarbon is? ($C=12, H=1$)
- A. CH_2
B. C_2H_3
C. C_4H_8
D. C_2H_5
5. Which one of the following oxides can react with potassium hydroxide solution?
- A. FeO
B. PbO
C. CuO
D. MgO
6. Which one of the following gases can be identified through smell?
- A. H_2S
B. HCl
C. CO_2
D. O_2
7. When heated, 0.25 moles of a hydrated salt lost 27 g of water. Which one of the following is the number of moles of water of crystallisation in one mole of the salt?
- A. 2

- B. 5
C. 10
D. 6

8. Which of the following anions will react with lead (II) nitrate solution to form a yellow precipitate?

- A. Cl^-
B. CO_3^{2-}
C. I^-
D. SO_4^{2-}

9. The electronic configuration of an atom of element X is 2:8:3. The number of electrons in the ion commonly formed by X is,

- A. 13
B. 10
C. 14
D. 18

10. Which of the following anions forms a brown ring when mixed with freshly prepared Iron (II) sulphate in presence of concentrated sulphuric acid?

- A. NO_3^-
B. SO_4^{2-}
C. NO_2^-
D. Cl^-

11. Hydrogen chloride in methyl benzene is

- A. Acidic
B. Electrovalent
C. Covalent
D. Basic

12. The volume of a 0.25M hydrochloric acid required to completely neutralise 20cm³ of a 0.1M sodium carbonate solution is given by

- A. $\frac{20 \times 0.1}{2 \times 0.25}$
B. $\frac{2 \times 20 \times 0.25}{0.1}$
C. $\frac{20 \times 0.25}{0.25}$
D. $\frac{2 \times 20 \times 0.1}{0.25}$

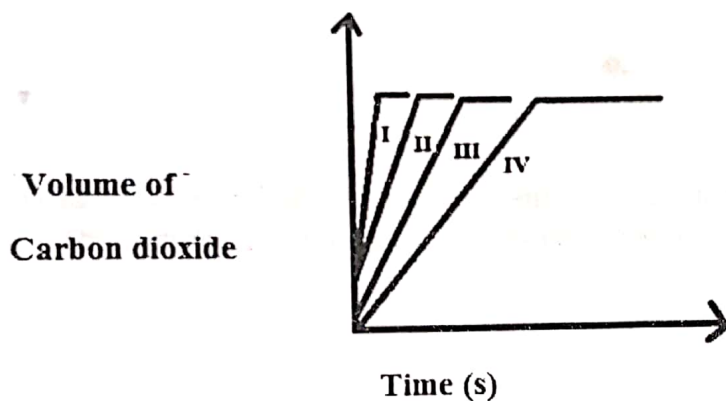
13. Which one of the following electronic configurations is of a noble gas?

- A. 2:8:1
- B. 2:8:8
- C. 2:8:2
- D. 2:8:7

14. Which one of the following metals will react most readily with cold water?

- A. Sodium
- B. Calcium
- C. Potassium
- D. Magnesium

15. The figure below shows the graphs obtained when equal amounts of marble chips of different sizes were reacted with excess 2M hydrochloric acid at room temperature



Which one of the graphs represents the reaction of marble chips with the smallest particle size?

- A. I
- B. II
- C. III
- D. IV

16. Which one of the following is not an alkali?

- A. $\text{Cu}(\text{OH})_2$
- B. $\text{Ca}(\text{OH})_2$
- C. KOH
- D. NaOH

17. When 6.5g of Zinc was reacted with 100cm³ of 2M hydrochloric acid, 13.6 KJ of heat was evolved. The molar heat of reaction of zinc with the acid is?

A. $\frac{13.6 \times 100}{65 \times 6.5} \text{ KJ/mol}$

B. $\frac{13.6 \times 6.5}{6.5 \times 100} \text{ KJ/mol}$

C. $\frac{6.5 \times 65}{13.6} \text{ KJ/mol}$

D. $\frac{65 \times 13.6}{6.5} \text{ KJ/mol}$

18. Which one of the following methods is used to separate the alkanes in crude petroleum?

A. Filtration

B. Decantation

C. Fractional distillation

D. Fractional crystallisation

19. Which one of the following gases will produce white fumes when placed near concentrated ammonia?

A. Hydrogen chloride

B. Sulphur dioxide

C. Hydrogen

D. Oxygen

20. Which one of the following hydroxides will dissolve in ammonia solution?

A. Zn(OH)_2

B. Al(OH)_3

C. Pb(OH)_2

D. Fe(OH)_3

21. Which one of the following substances is not formed when zinc nitrate is heated strongly?

A. O_2

B. ZnO

C. NO_2

D. NO

22. Element Y has atomic number 13. The chemical bond in the sulphide of Y is?

A. Ionic bond

B. Covalent bond

C. Dative bond

D. Metallic bond

23. Which one of the following carbon compounds will most likely burn to give a thick soot? (H=1, C=12, O=16)

- A. CH_4
- B. C_2H_2
- C. C_2H_6
- D. CH_3OH

☐

24. The term cation means a particle which

- A. carries a negative charge
- B. is mobile in aqueous or molten state
- C. is discharged at the anode
- D. is discharged at the cathode

☐

25. Hydrogen sulphide is passed through potassium dichromate solution. The ions representing the resulting green colour are

- A. $Cr_2O_7^{2-}$
- B. Cr^{3+}
- C. S^{2-}
- D. SO_4^{2-}

☐

26. A solution of hydrochloric acid is labelled 2M. The concentration of the acid in grams per litre is? (H=1, Cl=35.5)

- A. 2.0
- B. 18.25
- C. 36.5
- D. 73.0

☐

27. Which anion forms a white precipitate with barium nitrate solution soluble in nitric acid?

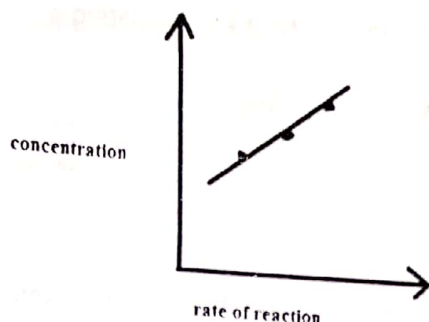
- A. SO_4^{2-}
- B. CO_3^{2-}
- C. Cl
- D. NO_3^-

☐

28. Sodium thiosulphate reacts with dilute hydrochloric acid according to the equation below



The graph shown below was obtained by plotting the concentration of the thiosulphate solution against the rate of the reaction



A straight line graph is obtained showing that

- A. Rate is inversely proportional to concentration
- B. Rate is directly proportional to concentration
- C. The reaction takes place in presence of a catalyst
- D. The rate increases with increase in temperature

☐

29. Which of the following nitrates does not give off oxygen when heated?

- A. Sodium nitrate
- B. Ammonium nitrate
- C. Magnesium nitrate
- D. Zinc nitrate

☐

30. Which one of the following metals is extracted by electrolysis?

- A. Zinc
- B. Lead
- C. Potassium
- D. Copper

☐

31. The solution that could be containing zinc ions is one that forms a

- A. Reddish brown precipitate with magnesium
- B. Green precipitate with aqueous ammonia
- C. White precipitate with dilute sulphuric acid
- D. White precipitate that is soluble in excess sodium hydroxide solution

☐

32. Electrolysis is applied in

- A. Refining of crude oil
- B. Vulcanisation of rubber
- C. Synthesis of polyethene
- D. Manufacture of sodium hydroxide

☐

33. Which one of the following is the correct statement about electroplating a substance with copper

- A. The anode is made of the substance to be copper plated
- B. The cathode is made of copper
- C. The anode is made of copper
- D. The electrolyte is dilute sulphuric acid

☐

34. In an experiment, 12g of propanol, C_3H_8O was burnt and the heat produced raised the temperature of 120g of water by $0.7^{\circ}C$. The enthalpy of combustion of propanol per mole is

(C=12, O=16, H=1, Heat capacity of water is $4.2Jg^{-1}0C^{-1}$)

A. $4.2 \times 120 \times 0.7 \times 5 J$

B. $\frac{120 \times 0.7 \times 5}{4.2} J$

C. $\frac{120 \times 0.7 \times 0.2}{4.2} J$

D. $4.2 \times 120 \times 0.7 \times 12 J$

☐

35. An indicator is used during neutralisation reaction in order to

- A. Detect the acid and the alkali
- B. Show when exactly reacting quantities of acid and alkali are present
- C. Speed up the rate of reaction between the acid and alkali
- D. Show whether the reaction is reversible

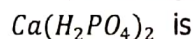
☐

36. If a mixture of fine pollen grains in water is examined closely, it will be seen that the pollen grains are always in motion, this motion is most likely to be due to

- A. The convection currents in the water
- B. The diffusion of pollen grains
- C. The collisions between pollen grains and water molecules
- D. The attraction and repulsion between charged particles

☐

37. The percentage by mass of phosphorus in calcium dihydrogen phosphate,



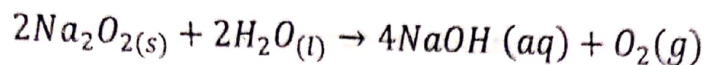
(Ca=40, O=16, P=31)

- A. 13.2
- B. 22.6
- C. 26.5

☐

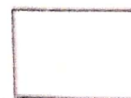
D. 35.2

38. sodium peroxide reacts with water to produce oxygen according to the following equation



What volume of oxygen measured at room temperature would be produced together with 4.0g of sodium hydroxide? (1 mole of a gas occupies 24000cm^3 at room temperature) (Na=23, O=16, H=1)

- A. $\left(\frac{24000}{40}\right)\text{cm}^3$
B. $\left(\frac{4.0 \times 24000}{40}\right)\text{cm}^3$
C. $\left(\frac{8.0 \times 24000}{40}\right)\text{cm}^3$
D. $\left(\frac{2.0 \times 24000}{80}\right)\text{cm}^3$



39. Which of the following salts forms a base when strongly heated?

- A. Na_2CO_3
B. $CuSO_4$
C. K_2SO_4
D. $NaNO_3$



40. Which of the following chemical reactions is an example of a precipitation reaction?

A chemical test of

- A. Ethene gas
B. Hydrogen gas
C. Carbondioxide gas
D. Oxygen gas



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

- 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 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 summarised

Assertion	Reason
A. True	True and is a correct explanation
B. True	True but not a correct explanation
C. True	Incorrect
D. Incorrect	Correct

41. Ionic compounds are solids at room temperature **Because** the electrons are held together by strong electrostatic forces. ☐
42. Elements of group I of the periodic table are very electropositive **Because** their outmost shell electrons are not strongly attracted by the nucleus ☐
43. Water is a mixture of hydrogen and oxygen **Because** water is a liquid at room temperature ☐
44. Manganese (IV) Oxide is used in the preparation of Chlorine gas **Because** Manganese (IV) Oxide oxidises concentrated hydrochloric acid to chlorine ☐
45. Pure concentrated sulphuric acid does not conduct electricity **Because** pure concentrated sulphuric acid is not volatile ☐

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

Instruction summarised

A	B	C	D
1,2,3 only correct	1,3 only correct	2,4 only correct	4 only correct

46. Which of the following pairs of ions can be differentiated by sodium hydroxide solution?

1. Mg^{2+} and Al^{3+}
2. Pb^{2+} and Zn^{2+}
3. Mg^{2+} and Pb^{2+}
4. Ca^{2+} and Mg^{2+}

☐

47. The full symbol of an element is ${}_{13}^{27}Z$. The ion of Z contains

1. 10 neutrons
2. 10 electrons
3. 14 protons
4. 13 protons

☐

48. Which one of the following can be used to soften a sample of temporary hard water?

1. Filter the water
2. Boil the water
3. Add calcium hydrogen carbonate
4. Add sodium carbonate

☐

49. The metals magnesium, zinc and Iron

1. Are used in alloys
2. Reduce steam to hydrogen
3. React with dilute hydrochloric acid
4. Displace calcium from a solution of a calcium salt

☐

50. Which of the following conditions does not affect the rate of the reaction between lumps of calcium carbonate and 1M hydrochloric acid?

1. Grinding calcium carbonate
2. Using 2M hydrochloric acid
3. Warming the reaction mixture
4. Exposing the reaction mixture to light

☐

END