Candidate's Name: .....

School:.....

.....

Sign: .....

| Centre No. | | | | | Personal No. | | |
|---|---|---|---|---|---|---|---|
| U | | | | | | | |

**545/1**
**CHEMISTRY**
**Paper 1**
**JULY/AUG. 2022**
1½ hours

# HOIMA DIOCESE EXAMINATIONS BOARD

## UCE Mock Examination, 2022

CHEMISTRY
**Paper 1**

1½ hours

INSTRUCTIONS TO CANDIDATES

*This paper consists of* **50** *objectives questions.*

**All** *questions are compulsory.*

*Answer the questions by writing the correct alternative* **A**, **B**, **C** or **D**, *in the box on the right-hand-side of question.*

(*1 mole of a gas occupies 22.4 dm$^3$ at s.t.p.*)

| For Examiners' Use Only | | |
|---|---|---|
| | | |
| | | |

1. The atomic number $X$ is 13. The electronic configuration of the ion of $X$ is

A. 2: 8
B. 2: 8 :5
C. 2: 8 : 3
D. 2: 8 : 8

2. The elements that can be extracted from their oxide by chemical reduction using carbon are

A. Ca and Cu
B. Mg and Cu
C. Zn and Fe
D. A1 and Zn

3. Which one of the following is produced at the cathode when a solution of copper (II) sulphate is electrolyzed using carbon electrodes?

A. Oxygen
B. Hydrogen
C. Copper
D. Sulphur dioxide

4. Which of the following salts can be separated by filtration?

A. Sodium carbonate and ammonium carbonate
B. Ammonium sulphate and magnesium sulphate
C. Barium chloride and barium nitrate
D. Zinc carbonate and zinc sulphate

5. Which one of the following hydrocarbons decolorize bromine water when bubbled through it?

A. Methane
B. Propene
C. Butane
D. Ethane

6. What mass of sodium hydroxide would be needed to neutralize exactly 200 $cm^3$ of a solution containing 49 g of sulphuric acid per litre?

$2NaOH\,(aq) + H_2SO_4\,(aq) \rightarrow Na_2SO_4\,(aq) + 2H_2O\,(l)$

A. 4 g
B. 8 g
C. 16 g
D. 32 g

7. A solid *M* dissolves in water to form a colorless gas that fumes with hydrogen chloride gas. The solid *M* is likely to be

A. Magnesium nitrate
B. Magnesium nitride
C. Sodium nitrate
D. Sodium peroxide

8. 20 $cm^3$ of 0.1 **M** sodium carbonate reacted completely with 10 $cm^3$ of dilute hydroxide acid according to the equation below.

$Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$

The morality of the acid is

A. $\frac{2 \times 20 \times 0.1}{10} M$

B. $\frac{10 \times 0.1}{20 \times 2} M$

C. $\frac{20 \times 0.1}{10 \times 2} M$

D. $\frac{20 \times 10}{0.1 \times 2} M$

9. Which one of the following conducts electricity in a solution of sodium chloride?

A. Electrons
B. Neutrons
C. Protons
D. Ions

10. In which of the following reactions is chlorine acting as an acidic gas?

A. $2Fe(s) + 3Cl_2(g) \rightarrow 2FeCl_3(s)$
B. $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$
C. $H_2(g) + Cl_2(g) \rightarrow HCl(g)$
D. $NaOH(ag) + Cl_2(g) \rightarrow NaOCl(aq) + NaCl(aq) + H_2O(1)$

11. Silver nitrate solution was added to solution *F* and a white precipitate was formed. The precipitate dissolved in aqueous ammonia. Solution *F* contained

A. Carbonate ions
B. Sulphate ions
C. Chloride ions
D. Nitrate ions



Turn Over

12. Nitrogen reacts with hydrogen according to the equation;

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The volume of gaseous products formed when 50 $cm^3$ of nitrogen were mixed with 120 $cm^3$ of hydrogen is

A. 70 $cm^3$
B. 80 $cm^3$
C. 90 $cm^3$
D. 170 $cm^3$

13. Which of the following mixtures does **not** contain copper?

A. Brass
B. Bronze
C. Solder
D. Duralumin

14. Element *W* forms an ion whose electronic configuration is 2:8:8. The number of protons in the nucleus of the atom is:

A. 17
B. 18
C. 19
D. 39

15. 1.0 g of sodium hydroxide was dissolved in water to make 250 $cm^3$ of solution; The morality of the solution is

A. 0.05 M
B. 0.1 M
C. 0.5 M
D. 2 M

16. An element burns readily in oxygen to form a solid. The solid dissolves in water producing an alkaline solution and a gas that relights a glowing splint. The element is most likely to be;

A. Phosphorus
B. Sulphur
C. Sodium
D. Phosphorous

17. Charcoal buns in oxygen according to the equation

$C(s) + O_2(g) \rightarrow CO_2(g) \quad \Delta H = -390\ kJ\ mol^{-1}$

The heat energy change produced when 48 g of charcoal burns in excess oxygen is;

A. -97.5 kJ
B. -195 kJ
C. -780 kJ
D. -1560 kJ

18. Which of the following is a waste product of the Solvay process for the manufacture of sodium carbonate?

A. $NH_3$
B. $CaO$
C. $CaCl_2$
D. $NaHCO_3$

19. What mass in grams of sodium carbonate dehydrate; $Na_2CO_3 .10\ H_2O$ is contained in 50 $cm^3$ of a 0.1 M solution?

A. $\frac{106 \times 0.1 \times 1000}{50}$

B. $\frac{106 \times 0.1 \times 50}{1000}$

C. $\frac{286 \times 0.1 \times 1000}{50}$

D. $\frac{286 \times 0.1 \times 50}{1000}$

20. Lead (II) nitrate solution reacts with hydrogen chloride gas according to the equation.

$Pb(NO_3)_2(aq) + 2HCl(g) \rightarrow PbCl_2(s) + 2HNO_3(l)$

Calculate the mass of precipitate formed when 1.2 $dm^3$ of hydrogen chloride gas is bubbled through excess aqueous solution of lead (II) nitrate.

(Pb = 207, Cl = 35.5, 1 mole of a gas occupies 24 $dm^3$ at room temperature)

A. 0.207 $dm^3$
B. 6.95 $dm^3$
C. 2.07 $dm^3$
D. 0.695 $dm^3$

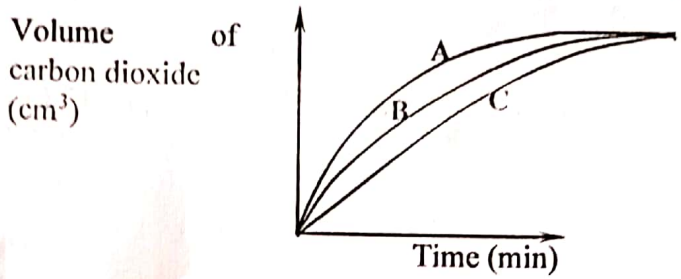
21. During the electrolysis of copper (II)sulphate solution using copper electrodes which one of the following is observed?

A. The cathode reduces in size
B. The anode increases in size
C. The anode becomes polarized
D. The anode decreases in size

22. Which of the following salts can be prepared by neutralization method?

A. Lead (II) sulphate
B. Lead (II)chloride
C. Copper (II) sulphate
D. Copper (II) carbonate

23. Experiments on the rate of reaction between marble chips and hydrochloric acid were carried out using various conditions and the curves for the volume of carbon dioxide against time were plotted on the same axes as below;




Which one of the following set of conditions corresponds to curve A?

A. 2 M hydrochloric acid and marble chips lumps
B. 2 M hydrochloric acid and powdered marble chips
C. 1 M hydrochloric acid and marble chips lumps
D. 1 M hydrochloric acid and marble chips powder

24. Which one of the following is observed when carbon dioxide gas is bubbled through sodium hydroxide solution until excess?

A. White precipitate
B. White precipitate soluble in excess
C. Colorless solution
D. Yellow precipitate

25. When lead (II) nitrate solution was added to a colourless solution containing an anion *X*. A white precipitate soluble on warming was observed. The confirmatory test for the anion is addition of

A. Dilute nitric acid followed by barium nitrate solution
B. Dilute nitric acid followed by lead (II) nitrate solution
C. Dilute nitric acid followed by silver nitrate solution
D. Addition of dilute nitric acid.

26. Which one of the following is observed when sodium nitrate is heated?

A. Yellow solid and brown gas
B. Radish brown solid and colorless gas that relights a glowing splint
C. Reddish brown solid and brown gas
D. Yellow solid and colorless gas that relights a glowing splint.

27. Which one of the following substances can be used to dry ammonia gas?

A. Anhydrous calcium chloride
B. Concentrated Sulphuric acid
C. Calcium oxide
D. Silica gel

28. Burning magnesium ribbon was dipped into a gas jar containing nitrogen gas and the product formed was dissolved in water. Which one of the following is true about the solution formed?

A. It turns blue litmus paper to red
B. It turns red litmus paper to blue
C. It liberates hydrogen gas with magnesium ribbon
D. It liberates carbon dioxide with carbonates

29. Which one of the following is the impurity in spathic iron ore?

A. Gold
B. Silver
C. Silicon dioxide
D. Mercury

30. Which one of the following will displace lead from its sulphate on heating?

A. Copper
B. Mercury
C. Magnesium
D. Gold

31. The following are pairs of unsaturated hydrocarbons, except

A. $C_2H_2$ and $C_2H_6$
B. $C_2H_4$ and $C_3H_6$
C. $C_2H_2$ and $C_2H_4$
D. $C_3H_4$ and $C_4H_8$

32. The catalyst used in the oxidation of Sulphur dioxide to Sulphur trioxide during the manufacture of Sulphuric acid is

A. Iron (III) oxide
B. Silicon (IV) oxide
C. Vanadium (V) oxide
D. Manganese (IV) oxide

**Turn Over**

33. The change from Cu to $Cu^{2+}$ involves

A. Loss of electrons
B. Loss of protons
C. Gain of electrons
D. Gain of protons

34. Which of the following is the explanation for increasing surface of the reactants in the chemical reaction?

A. Decreases the kinetic energy
B. Increases the rate of collision of the particles
C. Increase the amount of reactants
D. Increase the area of contact between reactants.

35. Which one of the following are properties of metals?

A. Low melting point, solid doesn't conduct electricity and insoluble in water
B. High melting point, solid does not conduct electricity but aqueous solution conducts
C. High melting point, solid does conduct electricity, insoluble in water.
D. Low melting point solid does not conduct electricity, aqueous solution does not conduct electricity.

36. The separation of dyes in ink by chromatography depends on the;

A. Different boiling point of dyes in ink
B. Freezing points of substances
C. Solubility of dyes in the solvent
D. Size of the chromatography paper

37. Which one of the following salts cannot be prepared by precipitation?

A. $BaSO_4$
B. Ag Cl
C. Pb $CO_3$
D. Ag $NO_3$

38. Diamond does not conduct electricity because;

A. Its structure is very compact
B. There are carbon atoms present
C. Has no free mobile electrons
D. It is crystalline in nature

39. A compound is composed of 40% carbon, 6.7% hydrogen, the rest being oxygen, 0.52 moles of a sample of the compound weighs 28.8g. Determine the molecular formula of the compound.

A. $CH_2O$
B. $C_2H_2O_2$
C. $C_2H_4O$
D. $C_3H_6O_3$

40. Which one of the following is an example of a non-bio degradable substance?

A. Wood
B. Wool
C. Silk
D. polyethene

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

*A. if both the assertion and reason are true statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and 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. it 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 and is not a correct explanation |
| C. | True | Incorrect |
| D. | Incorrect | Correct |

| | | | | |
|---|---|---|---|---|
| 41. | Diamond and graphite burn in excess oxygen to form carbon dioxide. | because | they are isotopes of carbon. | |
| 42. | Elements with atomic numbers 12 and 17 reach to form a covalent compound | because | the two elements are in the same period of the periodic table | |
| 43. | Chlorine is used in treatment of water. | because | Chlorine is an oxidizing agent | |
| 44. | A mixture of water and petrol can be separated using a separating funnel. | because | water and petrol are immiscible liquids. | |
| 45. | Ethene undergoes polymerization reaction. | because | ethene is a hydro carbon | |

For each of the questions **46 - 50**, one or more answers may be correct. Read question carefully and then write;

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

**46.** During purification of water from a lake for domestic use, potassium aluminum sulphate is added to

1. Bleach water
2. Kill virus and bacteria
3. To remove organic matter from water
4. Coagulate fine suspended particles

**47.** When an iron nail is exposed to air in the presence of moisture it rusts. Which one of the following methods will slow down the rate or rusting of the iron nail?

1. Washing with concentrated hydrochloric acid and keep it dry
2. Coating it with zinc
3. Sprinkling common salt solution
4. Painting

**48.** Which of the following compound(s) is /are saturated hydrocarbon(s)

1. $C_2H_6$
2. $C_3H_8$
3. $C_4H_{10}$
4. $C_5H_{13}$

**49.** Which of the following observations is made when ammonia solution is added to aqueous solution containing copper (II) ion a little at first then in excess?

1. White precipitate insoluble in excess
2. Pale blue precipitate is formed
3. Yellow precipitate
4. Deep blue Solution

**50.** Which of the following is/ are observed when copper (II) nitrate in strongly heated?

1. Green solid forms black residue
2. Colorless condensate at the cooler of the rest tube
3. Brown fumes
4. Grey residue remains

**END**