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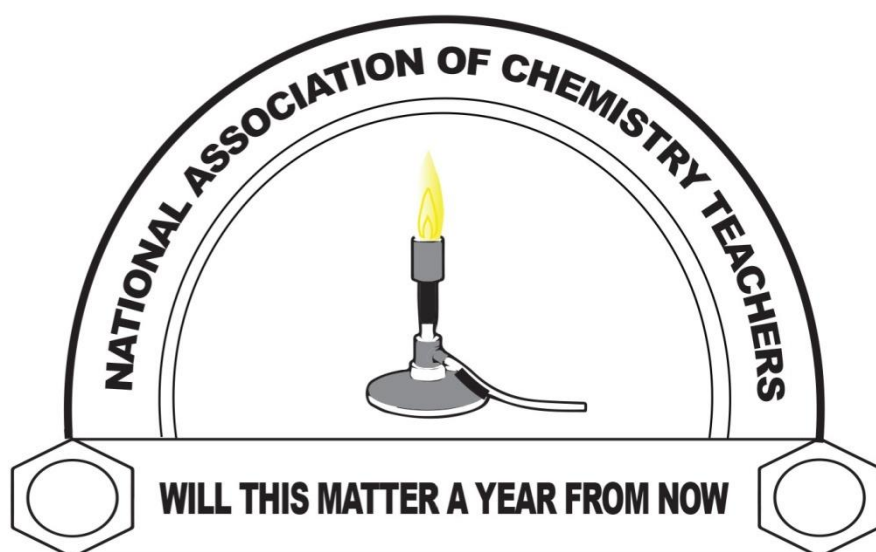
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*Chemistry*

*Paper 1*

*MAY/JUNE 2023*

*1 hour 30 minutes*



*NATIONAL ASSOCIATION OF CHEMISTRY TEACHERS*

**Uganda Certificate Of Education**

**CHEMISTRY MARKING GUIDE**

**Paper 1**

1 hour 30  
minutes.

**Instructions to candidates:**

- *This paper consists of 50 objective typed questions*
- *Answer all questions in this paper*
- *You are required to write the correct answer A, B, C, or D in the box provided on the right hand side of each question.*

•Do not use pencils.

Molar gas volume at s.t.p = 22.4dm<sup>3</sup>

Molar gas volume at room temperature = 24dm<sup>3</sup>

(Cu = 63.5, Mg = 24, C= 12, H=1, O= 16, S= 32, Fe = 56, Cl=35.5, Na=23, N=14 )

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Turn Over

1. Diesel and petrol exist together as a mixture in crude oil refinery. The best method to separate the two substances is.....?

A. Fractional distillation C. Chromatography  
B. Fractional crystallization D. Use of a separating funnel.

A

2. Sulphur dioxide behaves as an oxidising agent when it reacts with?

A. Concentrated nitric acid C. Hydrogen sulphide  
B. Iron(III) sulphate D. Potassium dichromate

C

3. When 0.4g of methanol was burnt, it raised the temperature of 0.1g of water by 20°C.

The heat of combustion of methanol in kJmol<sup>-1</sup> is?(Specific heat capacity of water = 4.2J kg<sup>-1</sup> K<sup>-1</sup>)

A.  $\frac{4.2 \times 20 \times 32}{0.4 \times 0.1 \times 1000}$  C.  $\frac{0.4 \times 4.2 \times 20}{32 \times 0.4 \times 1000}$   
 $\frac{0.1 \times 4.2 \times 20 \times 32}{0.4 \times 1000}$

B

B.

D.  $\frac{0.1 \times 4.2 \times 20}{32 \times 0.4 \times 1000}$

4. Sulphur reacts with concentrated nitric acid to form?

A. Sulphuric acid C. Sulphur trioxide B. Sulphur dioxide D. Hydrogen sulphide

A

5. When sulphur dioxide is bubbled through acidified potassium dichromate solution, the solution changes from orange to green. This is because sulphur dioxide is?

A. An oxidising agent C. A dehydrating agent  
B. A reducing agent D. A poisonous gas

B

6. Which one of the following oxides changes in mass when dried and heated in a dry test tube?

A. Copper (II) oxide C. Mercury (II)

B. Zinc (II) oxide      D.      oxideMagnesium oxide

**C**

7. Which one of the following contains the same number of moles of hydrogen ions as the number of moles of sodium ions in 50cm<sup>3</sup> of 0.2M Na<sub>2</sub>SO<sub>4</sub>.

A. 1.83g of HCl      C. 100cm<sup>3</sup> of a 0.2 M H<sub>2</sub>SO<sub>4</sub>

B. 0.73g of HCl      D. 100cm<sup>3</sup> of a 2M HCl

2 4

**B**

8. When concentrated nitric acid is added to a solution containing iron (II) ions, the solution changes from?

A. Green to colourless      C. Green to yellow

B. Yellow to green      D. Green to blue

**C**

9. Which one of the following mixtures would not form a precipitate?

A. Barium nitrate and sodium chloride

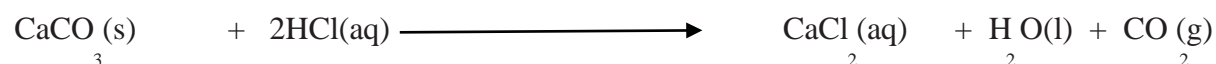
B. Lead(II) nitrate and sodium chloride

C. Silver nitrate and potassium bromide

D. Calcium nitrate and sodium chloride

**A or  
D**

10. Calcium carbonate reacts with dilute hydrochloric acid according to the equation below.



Which one of the following pairs of substances will show the highest rate of production of carbon dioxide at room temperature?

A. 10cm<sup>3</sup> of 2M hydrochloric acid + 2g of lumps of calcium carbonate

B. 10cm<sup>3</sup> of 1M hydrochloric acid + 2g of lumps of calcium carbonate

C. 10cm<sup>3</sup> of 2M hydrochloric acid + 2g of powdered calcium carbonate

D. 10cm<sup>3</sup> of 1M hydrochloric acid + 2g of powdered calcium carbonate

**C**

11. Increasing the temperature of the reactants increases the rate of reaction because the particles...?

A.

Move faster

B.

Gain kinetic energy and collide more frequently

C.

Collide with more force

D.

Collide more often

**B**

12. What mass of carbon monoxide; CO, will occupy the same volume as 0.85g of ammonia has at room temperature. (Molar gas volume at room temperature = 24dm<sup>3</sup>)

A. 1.94g      C. 0.14g

B. 0.52g      D. 1.40g

**D**

13. A solid was burnt strongly in air to form a white solid X. When a few drops of water was added to X, a colourless gas that forms dense white fumes with concentrated hydrochloric acid was evolved. X contains.....?

A.  $\text{NH}_4^+$  C.  $\text{Zn}^{2+}$   
 B.  $\text{NO}_3^-$  D.  $\text{Ca}^{2+}$

**D**

14. Which one of the following statements is not true about the kinetic theory of gases?

A. Gas molecules consist of tiny particles  
 B. Gas particles collide with one another  
 C. Gas particles are in a state of continuous motion  
 D. There is a strong force of attraction between the gas particles

**D**

15. A hydrocarbon Z, when burnt in excess oxygen, produced 220g of carbon dioxide and 45g of water. The empirical formula of Z is?

A.  $\text{CH}_2$  C.  $\text{CH}_4$   
 B.  $\text{CH}_2$  D.  $\text{C}_2\text{H}_5$

**A**

16. When 6.5g of zinc was reacted with 200cm<sup>3</sup> of 2M hydrochloric acid, 13.6KJ of heat was evolved. The molar heat of reaction of zinc with the acid is? (Zn = 65)

$$\frac{6.5 \times 65}{13.6} \text{ KJ}$$

A.

$$\frac{13.6 \times 200}{6.5 \times 65} \text{ KJ}$$

C.

**No Answer**

B.

$$\frac{65 \times 13.6}{65} \text{ KJ} \quad \text{D.} \quad \frac{13.6 \times 65}{6.5 \times 200} \text{ KJ}$$

17. Which one of the following statements is not true about sulphur dioxide gas?

A. It is a reducing agent  
 B. It turns a blue litmus paper red  
 C. It is an oxidizing agent

**D**

- D. It decolourises potassium manganate (VII) solution
18. Potassium aluminium sulphate (potash alum) is used in the purification of water for?
- A. Removing colouring matter
- B. Killing harmful bacteria
- C. Removing suspended matter C
- D. Making water soft
19.  $10\text{cm}^3$  of hydrogen was mixed with  $10\text{cm}^3$  of oxygen and the mixture exploded. The mixture was allowed to cool at room temperature. The volume of the gas that remained was?
- A.  $10\text{cm}^3$  of steam
- B.  $15\text{cm}^3$  of steam and oxygen C
- C.  $5\text{cm}^3$  of oxygen
- D.  $5\text{cm}^3$  of hydrogen
20. The gas which when passed over strongly heated iron can oxidize iron to iron(II) only is?
- A. Oxygen C. Hydrogen chloride C
- B. Carbon monoxide D. Chlorine
21. Which one of the following statements is true about producer gas and water gas?
- A. Both gases produce a lot of heat
- B. Both gases require carbon as one of their constituents
- C. Water gas is a better fuel than producer gas B
- D. Producer gas is a better fuel than water gas
22. In the fractional distillation of crude oil (petroleum), the product that is obtained first is the one which has the...?
- A. Lowest density C. Highest density B
- B. Lowest boiling point
- D. Highest boiling point
23. When hydrogen sulphide is bubbled through iron(III) chloride solution, what is observed?

- |    |   |          |
|----|---|----------|
| A. | Yellow solution turns green and a yellow precipitate formed | <b>A</b> |
| B. | Yellow solution remains and a yellow precipitate formed     |          |
| C. | Yellow solution turns green and then bleached               |          |
| D. | Green precipitate formed and finally dissolved              |          |

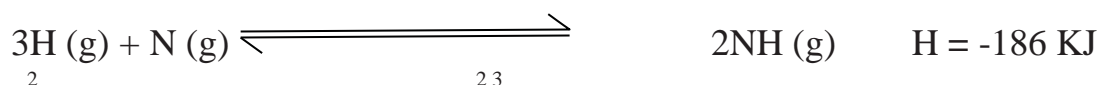
24. Which one of the following alloys is composed of tin?

- |    |        |    |           |          |
|----|--------|----|-----------|----------|
| A. | Brass  | C. | Duralumin | <b>B</b> |
| B. | Bronze | D. | Steel     |          |

25. The two oxides of nitrogen, nitrogen monoxide and nitrogen dioxide are both...?

- |    |                    |    |                              |          |
|----|--------------------|----|------------------------------|----------|
| A. | Colourless gases   | C. | Acidic to litmus             | <b>D</b> |
| B. | Insoluble in water | D. | Reduced by burning magnesium |          |
|    |                    |    |                              |          |

26. Hydrogen reacts with nitrogen according to the following equation.



Which one of the following conditions does not favour high yield of ammonia?

- |    |                  |    |                 |          |
|----|------------------|----|-----------------|----------|
| A. | Catalyst         | B. | High pressure   | <b>C</b> |
| C. | High temperature | D. | Low temperature |          |

27. 20.0cm<sup>3</sup> of a 0.1M, H<sub>n</sub>X required 21.5cm<sup>3</sup> of a 0.2M sodium hydroxide solution for complete neutralization. The acid reacts with sodium hydroxide in a 1:1 ratio. Which one of the following expression gives the value of n?

- |    |   |    |   |
|----|---|----|---|
| A. | $\frac{0.2 \times 21.5}{0.1 \times 20}$ | C. | $\frac{0.1 \times 20}{0.2 \times 21.5}$ |
|----|---|----|---|

**A**

$$\text{B. } \frac{0.1 \times 21.5}{0.2 \times 20} \quad \text{D. } \frac{20 \times 21.5}{0.1 \times 0.2}$$

28. Sodium nitrate was heated strongly in a test tube. Which one of the following statements is correct?

- A. Nitrogen is given off
- B. Oxygen is given off
- C. Nitrogen dioxide and oxygen are given off
- D. Nitrogen dioxide is given off

**B**

29. Which one of the following reactions is not an equation for oxidation reduction reaction?

- A.  $2\text{Mg(s)} + \text{CO}_2\text{(g)} \longrightarrow 2\text{MgO(s)} + \text{C(s)}$
- B.  $\text{MnO(s)} + 4\text{HCl(aq)} \longrightarrow \text{MnCl}_2\text{(aq)} + 2\text{H}_2\text{O(l)} + \text{Cl}_2\text{(g)}$
- C.  $\text{CaO(s)} + 2\text{HNO}_3\text{(aq)} \longrightarrow \text{Ca(NO}_3)_2\text{(aq)} + \text{H}_2\text{O(l)}$
- D.  $3\text{CuO(s)} + 2\text{NH}_3\text{(g)} \longrightarrow 3\text{Cu(s)} + 3\text{H}_2\text{O(l)} + \text{N}_2\text{(g)}$

**C**

30. When 6.5g of solid was heated strongly, gas X was produced at stp. If the vapour density of X is 22, the volume of the gas produced is? (1 mole of a gas at stp occupies 22.4dm<sup>3</sup>)

- A. 3309cm<sup>3</sup>
- B. 18.3cm<sup>3</sup>
- C. 560cm<sup>3</sup>
- D. 1120cm<sup>3</sup>

**A**

31. Chlorine gas was passed over heated iron metal to form solid X. What is observed when excess sodium hydroxide solution was added to an aqueous solution of X?

- A. Blue precipitate formed
- B. Reddish-brown precipitate formed
- C. Green precipitate formed
- D. Reddish-brown solution formed

**B**

32. The electronic configuration of the ion of an element X is 2:8:8. X forms a soluble hydroxide and it also displaced by magnesium from its solution. To which one of the following chemical families does X belong?

- A. Halogens
- B. Alkaline earth metals
- C. Alkali metals
- D. Noble gases

**C**

33. The type of reaction that takes place when concentrated sulphuric acid is added to hydrated copper (II) sulphate is?  
A. Oxidation C. Reduction  
B. Dehydration D. Hydrogenation
- B**
34. During the manufacture of sulphuric acid, sulphur trioxide is dissolved in?  
A. Cold water  
B. Dilute sulphuric acid  
C. Hot water  
D. Concentrated sulphuric acid
- D**
35. Which one of the following is the correct statement about electroplating a substance with silver?  
A. The anode is made of a substance to be silver plated  
B. The cathode is made of silver  
C. The anode is made of silver  
D. The electrolyte is dilute sulphuric acid
- C**
36. Which one of the following statements is correct about fats and oils?  
A. At room temperature, both fats and oils are solids  
B. At room temperature, both fats and oils are liquids  
C. Oils are solids while fats are liquids at room temperature  
D. Oils are liquids while fats are solids at room temperature
- D**



37. Which one of the following is true about the reaction between sulphur and nitric acid?
- The acid must be concentrated
  - Brown fumes are evolved
  - Sulphur oxidises the acid
  - The reaction occurs under hot conditions
- A. (i) and (ii) C. (iii) and (iv)
- B. (ii) and (iii) D. (i) and (iii)
38. Which one of the following elements does not exhibit allotropy?
- A. Sulphur C. Nitrogen
- B. Carbon D. Tin
39. Which one of the following methods may be used to separate red blood cells from a sample of blood?
- A. Centrifugation C. Chromatography
- B. Filtration D. Sublimation
40. Which one of the following nitrates when heated decomposes to give brown fumes?
- A. Potassium nitrate C. Sodium nitrate
- B. Ammonium nitrate D. Silver nitrate

A

C

D

D

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

- A. If both assertion and reason are true statements and the reason a correct explanation of the assertion
- B. If both 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 an incorrect statement D. Is 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

D	Incorrect	True statement
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41. When excess sodium hydroxide solution is added to a solution of copper(II) salt, **because** copper(II) hydroxide is an insoluble base a deep blue solution is formed

42. Pollen grains placed on water are in continuous motion **because** pollen grains collide with water molecules

A

43. Permutit is used for removing ions in temporarily & permanent hardness of water **because** hardness can be separated

A

by ion exchange method

44. A solution of hydrogen chloride benzene conducts electricity **because** methyl benzene is a non ionising solvent

D

45. The pH of an aqueous solution of ammonium sulphate is less than 7 **because** ammonium reacts with water to form

C

an alkaline solution

**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 on your answer sheet according to the following.**

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

Instructions summarized			
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 is/ are true about the zinc-copper cell?

1. Zinc rod is negatively charged  
2. Copper rod dissolves to form copper (II) ions  
3. Copper (II) ions are discharged at the copper rod  
4. Zinc ions are discharged at the zinc rod
47. Which of the following solutions contain the same number of moles of ammonium ions?
1. 50cm<sup>3</sup> of 0.1M ammonium nitrate  
2. 100cm<sup>3</sup> of 0.1M ammonium nitrate  
3. 25cm<sup>3</sup> of 0.1M ammonium phosphate  
4. 25cm<sup>3</sup> of 0.2M ammonium sulphate
48. When the product formed from burning sodium in excess oxygen is dissolved in water.
1. Oxygen is produced  
2. An explosion is heard  
3. An alkaline solution is formed  
4. Sodium carbonate solution is formed
49. Which of the following properties is/ are true about group I elements?
1. The atomic radii decrease down the group  
2. They are highly electro-positive  
3. They do not conduct electricity  
4. They form ionic compounds with chlorine
50. Which of the following factors affect the rate of reaction of gases?
1. Temperature  
2. Surface area  
3. Pressure  
4. Size of the molecules

**B**

**C**

**B**

**C**

**B**

**END**