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545/1

CHEMISTRY

Paper 1

Jul/Aug 2023

1½ hours



## BUSOGA REGION JOINT EXAMINATION BOARD

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 answers **A, B, C and D** in the box on the right hand side of each question.
- Do not use a pencil.

For Examiners Use Only

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1. Under high temperature and low pressure, substance **A** changes to substance **B** and finally to substance **C**. Which one of the following best describes the states of **A**, **B** and **C**?
  - A. **A** is a liquid, **B** is a solid and **C** is a gas
  - B. **A** is a solid, **B** is a gas and **C** is a liquid
  - C. **A** is a gas, **B** is a liquid and **C** is a solid
  - D. **A** is a solid, **B** is a liquid and **C** is a gas

☐
  
2. Which one of the following pair of mixtures is **NOT** separated by fractional crystallization?
  - A. Salt and Sugar
  - B. Sodium carbonate and ammonium carbonate
  - C. Lead(II) nitrate and Lead(II) sulphate
  - D. Barium chloride and zinc chloride

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3. The number of electrons in one atom of the element represented by  $\frac{7}{3}X$  is
  - A. 3
  - B. 4
  - C. 7
  - D. 10

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4. A solid **T**, dissolved in dilute nitric acid to form a colourless solution which when reacted with dilute hydrochloric acid, formed a white precipitate. **T** is
  - A. Zinc oxide
  - B. Aluminum oxide
  - C. Lead (II) chloride
  - D. Lead (II) oxide

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5. Which one of the following elements is heated with soft rubber to make it hard and strong?
  - A. Phosphorus
  - B. Sulphur
  - C. Calcium
  - D. Iron

☐
  
6. Which one of the following elements is heated with soft rubber to make it hard and strong?
  - A. Phosphorus
  - B. Sulphur
  - C. Calcium
  - D. Iron

☐
  
7. To an aqueous solution **E**, silver nitrate solution was added followed by excess ammonia solution. A white precipitate was observed which was insoluble in ammonia solution. Which one of the following ions is present in **E**?
  - A.  $CO_3^{2-}$
  - B.  $Cl^-$
  - C.  $SO_4^{2-}$
  - D.  $NO_3^-$

☐

8. Hydrogen peroxide decomposes to give oxygen according to the following equation



The volume of oxygen produced at s.t.p when  $50\text{cm}^3$  of 3M hydrogen peroxide solution decomposes completely is. (1 mole of a gas occupies  $22.4\text{dm}^3$  at s.t.p)

A.  $\left(\frac{50 \times 2 \times 22.4}{1000 \times 3}\right) \text{dm}^3$

C.  $\left(\frac{50 \times 3 \times 22.4}{1000 \times 2}\right) \text{dm}^3$

B.  $\left(\frac{1000 \times 3 \times 22.4}{50 \times 2}\right) \text{dm}^3$

D.  $\left(\frac{50 \times 3 \times 2 \times 22.4}{1000}\right) \text{dm}^3$

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9. The full symbols of atoms of elements W and X are  ${}^{31}_{15}\text{W}$  and  ${}^{37}_{17}\text{X}$  respectively. The formula of a compound formed between W and X is

A. WX

C.  $\text{W}_3\text{X}$

B.  $\text{WX}_5$

D.  $\text{W}_5\text{X}$

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10. In which of the following test tubes would a drop of lead (II) nitrate solution form a yellow precipitate? The test tube containing water and

A. sodium iodide

B. sodium sulphate

B. sodium chloride

D. sodium hydroxide

☐

11. When 2.78g of a hydrated salt was heated, 1.52g of anhydrous salt was formed. Which one of the following is the percentage of water of crystallization in the hydrated salt?

A.  $\frac{1.52 \times 100}{2.78}$

C.  $\frac{1.26 \times 100}{2.78}$

B.  $\frac{1.26}{1.52} \times 100$

D.  $\frac{1.52}{4.3} \times 100$

☐

12. Which one of the following substances if present in water can cause hardness that can be removed by boiling the water?

A.  $\text{Na}_2\text{CO}_3$

C.  $\text{Ca}(\text{HCO}_3)_2$

B.  $\text{MgCl}_2$

D.  $\text{MgSO}_4$

☐

13. Which one of the following pairs of substances will react to form oxygen?

A. Sodium chloride and concentrated sulphuric acid

B. Calcium carbonate and dilute hydrochloric acid.

C. Potassium manganate (VII) and concentrated hydrochloric acid.

D. Sodium peroxide and water.

☐

14. Which one of the following nitrates when heated, will NOT have effect on a litmus paper?

A.  $\text{NH}_4\text{NO}_3$

C.  $\text{KNO}_3$

B.  $\text{Zn}(\text{NO}_3)_2$

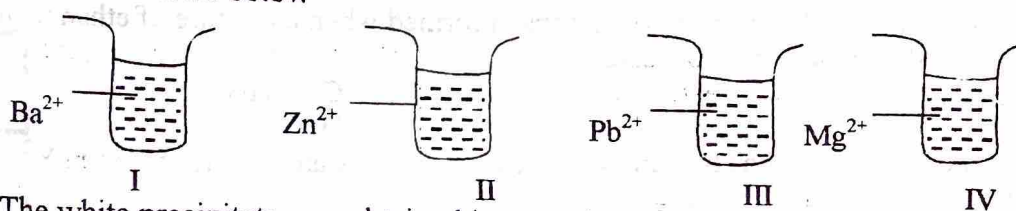
D.  $\text{AgNO}_3$

☐



15. Sulphur dioxide was bubbled through water. The resultant solution
- A. is an oxidizing agent
  - B. is a bleaching agent
  - C. liberates oxygen when exposed to sunlight
  - D. turns red litmus blue
16. When concentrated sulphuric acid is added to sugar in a beaker, a black substance is produced. This is because sulphuric acid is
- A. a strong acid corrosive acid
  - B. a strong reducing agent
  - C. a strong dehydrating agent
  - D. a strong oxidizing agent
17. Which one of the following substances is produced in large amounts at the anode when copper (ii) chloride is electrolyzed using graphite electrodes?
- A. Copper
  - B. Hydrogen
  - C. Copper (II) ions
  - D. Oxygen
18. When 0.6g of an element M was burnt, the heat produced raised the temperature of 500cm<sup>3</sup> of water from 23°C to 32°C. Which one of the following expressions gives the atomic mass of M? (The molar heat of combustion of M is 380KJmol<sup>-1</sup>. Specific heat capacity of water = 4.2J/g°C; density of water = 1.0gcm<sup>-3</sup>)
- A.  $\left( \frac{380 \times 0.6}{500 \times 4.2 \times 9} \right)$
  - B.  $\left( \frac{500 \times 4.2 \times 9 \times 1000}{380 \times 0.6} \right)$
  - C.  $\frac{1380 \times 0.6 \times 1000}{500 \times 4.2 \times 9}$
  - D.  $\left( \frac{500 \times 4.2 \times 9}{380 \times 0.6 \times 1000} \right)$
19. Which one of the following substances will dissolve in water to form a solution whose pH is greater than 7?
- A. Na<sub>2</sub>O<sub>2</sub>
  - B. NO<sub>2</sub>
  - C. CO<sub>2</sub>
  - D. NH<sub>4</sub>Cl
20. The full symbols of atoms of elements R, T, X Y and Z are  $^{29}_{14}R$ ,  $^{31}_{15}T$ ,  $^{30}_{15}Y$ ,  $^{34}_{16}X$ , and  $^{35}_{17}Z$  respectively. Which one of the following is an isotope of Y?
- A. R
  - B. X
  - C. T
  - D. Z
21. Which one of the following sulphates contains the highest percentage of Sulphur? (H = 1, N = 14, O = 16, Na = 23, Ca = 40, Cu = 64)
- A. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>
  - B. CaSO<sub>4</sub>
  - C. Na<sub>2</sub>SO<sub>4</sub>
  - D. CuSO<sub>4</sub>
22. Anhydrous copper (II) sulphate can be used to test for water because it;
- A. is soluble in water.
  - B. is hygroscopic.
  - C. forms a coloured hydrate.
  - D. is a coloured compound.

23. Copper can be separated from a mixture of zinc powder and copper powder by adding to the mixture.
- A. Concentrated sulphuric acid  
B. Zinc sulphate solution  
C. Dilute sulphuric acid  
D. Concentrated nitric acid
24. Which one of the following hydrocarbons is formed when a mixture of ethanol and concentrated sulphuric acid is heated?
- A.  $C_2H_6$   
B.  $C_3H_8$   
C.  $C_4H_{10}$   
D.  $C_2H_4$
25. Metal P displaces metal R from its oxide and metal R displaces metal W from its oxide. Which one of the following is the order of affinity of the metals for oxygen?
- A.  $W > R > P$   
B.  $R > P > W$   
C.  $P > W > R$   
D.  $P > R > W$
26.  $20.0\text{cm}^3$  of a  $0.1\text{M}$  acid  $H_nX$  required  $21.5\text{cm}^3$  of a  $0.2\text{M}$  sodium hydroxide solution for complete neutralization. The acid reacts with sodium hydroxide according to the following equation
- $$H_nX_{(aq)} + nNaOH_{(aq)} \longrightarrow Na_nX_{(aq)} + nH_2O_{(l)}$$
- Which one of the following expressions gives the value of  $n$ ?
- A.  $\left(\frac{0.2 \times 21.5}{0.1 \times 20}\right)$   
B.  $\left(\frac{0.1 \times 20}{0.2 \times 21.5}\right)$   
C.  $\left(\frac{0.1 \times 21.5}{0.2 \times 20}\right)$   
D.  $\left(\frac{20 \times 21.5}{0.1 \times 0.2}\right)$
27. Which one of the following chlorides is soluble in hot water only?
- A.  $FeCl_2$   
B.  $ZnCl_2$   
C.  $CuCl_2$   
D.  $PbCl_2$
28. Which one of the following metals will produce hydrogen when heated with steam?
- A. Calcium  
B. Zinc  
C. Potassium  
D. Sodium
29.  $1\text{cm}^3$  of dilute sulphuric acid was added to four test tubes containing solutions of different cations as shown below



The white precipitate was obtained in test tube numbers,

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



30. Pure sulphuric acid does not conduct electricity because ☐
- A. it has a great affinity for water  
B. it is an oxidizing agent  
C. it is an electrovalent compound  
D. it is a covalent compound
31. When carbon dioxide is bubbled through lime water, the latter turned milky and finally colourless because ☐
- A. The reaction between carbon dioxide and water is reversible  
B. Lime water is a good solvent for the milky substance formed  
C. The milk substance reacts to form a soluble colourless compound  
D. Carbon dioxide eventually dissolves in lime water to form carbonic acid
32. Which one of the following reactions does not take place in the blast furnace during the extraction of iron? ☐
- A. Limestone reduces iron (III) oxide to iron  
B. Coke burns in air forming carbon dioxide  
C. Limestone decomposes to form calcium oxide  
D. Coke reduces carbon dioxide to carbon monoxide
33. In which one of the following test tubes would a burning splint produce a pop sound? The test tube containing ☐
- A. manganese (IV) oxide and hydrogen peroxide  
B. dilute sulphuric acid and zinc  
C. dilute hydrochloric acid and calcium carbonate  
D. calcium oxide and water
34. Which one of the following allotropes of sulphur is crystalline and stable below  $96^{\circ}\text{C}$ ? ☐
- A. Rhombic  
B. Plastic  
C. Amorphous  
D. Monoclinic
35. Copper can be separated from a mixture of zinc powder and copper powder by adding to the mixture. ☐
- A. Concentrated sulphuric acid  
B. Zinc sulphate solution  
C. Dilute sulphuric acid  
D. Concentrated nitric acid
36. Which one of the following hydrocarbons is formed when a mixture of ethanol and concentrated sulphuric acid is heated? ☐
- A.  $\text{C}_2\text{H}_6$   
B.  $\text{C}_3\text{H}_8$   
C.  $\text{C}_4\text{H}_{10}$   
D.  $\text{C}_2\text{H}_4$
37. An atom of element Y has two energy levels, if Y forms an ion with formula  $\text{Y}^{2-}$ , what is the atomic number of Y. ☐
- A. 2  
B. 6  
C. 4  
D. 8

38. Which of the following is/are observed when hydrogen is passed over heated copper (II) oxide?

- A. a colour liquid  
B. black solid turns brown  
C. black solid turns yellow  
D. yellow solid turns grey

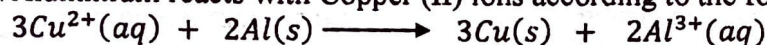
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39. A clean piece of magnesium ribbon was added to Copper (II) sulphate solution. Which one of the following was observed?

- A. The blue colour of the solution faded gradually.  
B. The solution turned colourless and a grey solid formed.  
C. There was no observable change.  
D. The solution remained blue and a brown solid formed.

☐

40. Aluminium reacts with Copper (II) ions according to the following equation.



Which one of the following will be the mass of Copper formed when Copper (II) ions is reacted with 2.5 g of aluminium? ( $\text{Al} = 27$ ;  $\text{Cu} = 63.5$ )

- A.  $\left(\frac{2.5 \times 2 \times 63.5}{27 \times 3}\right) \text{g}$   
B.  $\left(\frac{2.5 \times 2 \times 27}{63.5 \times 3}\right) \text{g}$   
C.  $\left(\frac{2.5 \times 3 \times 27}{63.5 \times 2}\right) \text{g}$   
D.  $\left(\frac{2.5 \times 3 \times 63.5}{27 \times 2}\right) \text{g}$

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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 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 SUMMARISED

A: True	True and is a correct explanation
B: True	True but is not a correct explanation
C: True	Incorrect
D: Incorrect	Correct

41. Polyethene is a thermo softening plastic **Because** Polyethene can be remolded on heating

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42. Dry ammonia gas turns dry red litmus paper blue **Because** Ammonia is an alkaline gas

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43. When sodium hydroxide solution was added to a solution of rust in dilute nitric acid, a brown precipitate formed **Because** Iron(II) hydroxide was formed ☐

44. Aqueous sulphur dioxide conducts electricity **Because** It contains free mobile ions ☐

45. Hydrogen sulphide can be dried using concentrated sulphuric acid **Because** it turns damp blue litmus paper red ☐

For each of questions 46 – 50 one or more of the statements is/are correct . Choose

- A. if statements 1,2,3 only are correct
- B. if statements 1,3, only are correct
- C. if statements 2,4 only are correct
- D. if statement 4 only is correct

**Summarized instructions**

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

46. Which one of the following substance(s) is/are responsible for the formation of kettle fur

- 1. Calcium carbonate
- 2. Magnesium sulphate
- 3. Calcium phosphate
- 4. Calcium sulphate

47. Which of the following substances is/are formed when concentrated nitric acid reacts with sulphur? ☐

- 1. Sulphuric acid
- 2. Nitrogen monoxide
- 3. Nitrogen dioxide
- 4. Sulphur dioxide

48. Which of the following substances would react with copper (II) oxide to produce a colourless liquid which would turn anhydrous copper (II) sulphate blue? ☐

- 1. Carbon
- 2. Hydrogen
- 3. Carbon monoxide
- 4. Ammonia

49. Which of the following is/are true about the extraction of sodium by electrolysis? ☐

- 1. The anode is made of iron
- 2. The electrolyte is concentrated sodium chloride solution
- 3. The cathode is made of carbon
- 4. The sodium is deposited at the cathode

50. Which of the following substance(s) is/are used to prepare carbon dioxide gas ☐

- 1. Calcium carbonate and sulphuric acid
- 2. Lead(II) carbonate and hydrochloric acid
- 3. Silver carbonate and hydrochloric acid
- 4. Magnesium carbonate and sulphuric acid