Name.....Centre/Index No...../.....

Signature.....

545/1
CHEMISTRY
Paper 1
Jul/Aug, 2023
$1\frac{1}{2}$ Hours

MATIGO MOCK EXAMINATIONS BOARD

Uganda Certificate of Education

CHEMISTRY

Paper 1

1 hour 30 Minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of 50 objectives – type questions,*
- *Answer all questions*
- *You are provided 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	

Turn Over

1. What is always true for a pure substance?
   A. It always boils at $100°C$.
   B. It contains only one type of atom.
   C. It has a sharp melting point.
   D. It is solid at room temperature.

2. Element K has a nucleon number of 19 and proton number of 9 which group in the periodic table does it belong?
   A. I B. III C. VII D. VIII

3. Hydrogen and nitrogen react according to the equation

$$3H_{2(g)} + N_{2(g)} \rightarrow 2NH_{3(g)}$$

   The volume of nitrogen at $s.t.p$ which will react with 6.72 *litres* of hydrogen is ($1\ mole\ of\ gas\ occupies\ 22.4l$)
   A. $2.24l$ B. $6.72l$ C. $22.4l$ D. $67.2l$

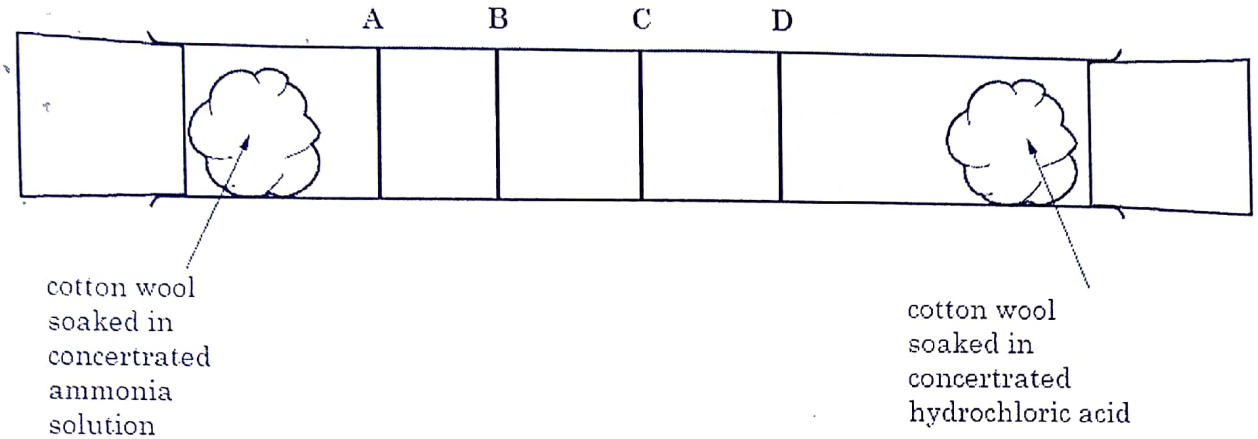
4. Which process is not exothermic?
   A. Burning of fossil fuel.
   B. Melting of solid ice
   C. Radioactive decay of ^{235}U
   D. Reacting hydrogen with oxygen

5. The number of moles of hydroxide ion contained in 10g of calcium hydroxide, $Ca(OH)_2$ is (Ca = 40, O=16,H=1)
   A. 0.135
   B. 0.175
   C. 0.270
   D. 0.350

6. Aluminium is an important metal with many uses. Some of it's properties are listed.
   1. It is a good conductor of heat.
   2. It has a low density.
   3. It has an oxide layer that prevents corrosion.

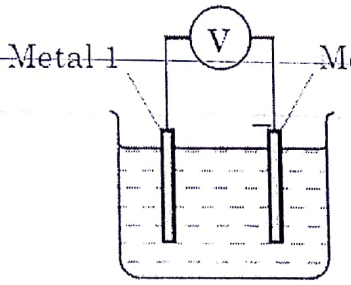
   Which set of properties help to explain the use of aluminium for cooking and storing food?
   A. 1 only B. 1 and 2 only C. 2 and 3 only D. 1,2 and 3

7. The diagram shows the diffusion of hydrogen chloride and ammonia in a glass tube. The gases are given off by the solutions at each end of the tube. When hydrogen chloride and ammonia mix they produce a white solid, ammonium chloride. Which line would most likely show where the white solid is to be formed?



8. What is the concentration of a solution containing 1.0g of sodium hydroxide in $250cm^3$ of solution?
   - **A.** $0.025mol/dm^3$
   - **B.** $0.10mol/dm^3$
   - **C.** $0.25mol/dm^3$
   - **D.** $1.0mol/dm^3$

9. Different metals were tested using the apparatus shown.



Which pair of metals would produce the largest voltage?
   - **A.** copper and silver
   - **B.** magnesium and silver
   - **C.** magnesium and zinc
   - **D.** zinc and copper

10. Which of these reactions shows only reduction.
   - **A.** $Cu^{2+} + 2e^- \rightarrow Cu$
   - **B.** $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
   - **C.** $HCl + NaOH \rightarrow NaCl + H_2O$
   - **D.** $Mg + ZnSO_4 \rightarrow Zn + MgSO_4$

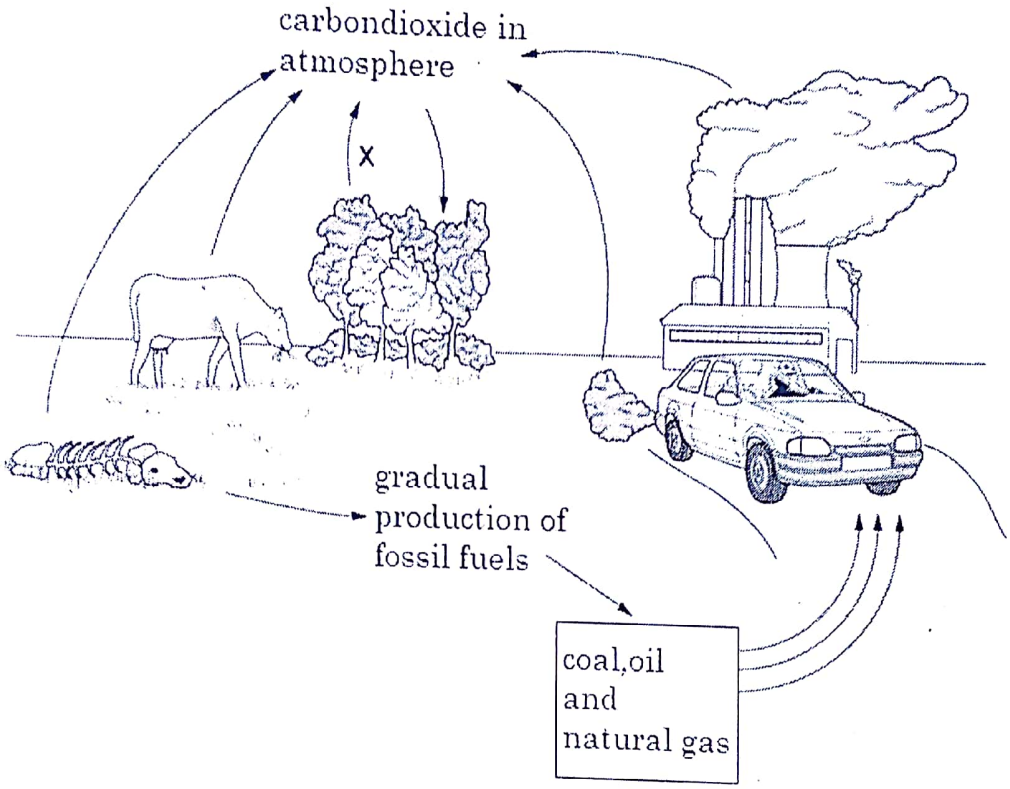
11. Acids are compounds which donate protons

$$NH_3(aq) + H_2O(l) \rightarrow NH_4^+(aq) + OH^-(aq)$$

Which compound in this equation is behaving as an acid?

A. Ammonia
B. Ammonium hydroxide
C. None of them
D. Water

12. The diagram shows the carbon cycle.



Which process is shown by the arrow marked X?

A. Combustion
B. Photosynthesis
C. Respiration
D. Transpiration

13. Hydrogen reacts with chlorine according to the equation.

$$H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$$

The volume of hydrogen chloride formed when $30cm^3$ of hydrogen is reacted with $50cm^3$ of chlorine is.

A. $20cm^3$ B. $40cm^3$ C. $60cm^3$ D. $80cm^3$

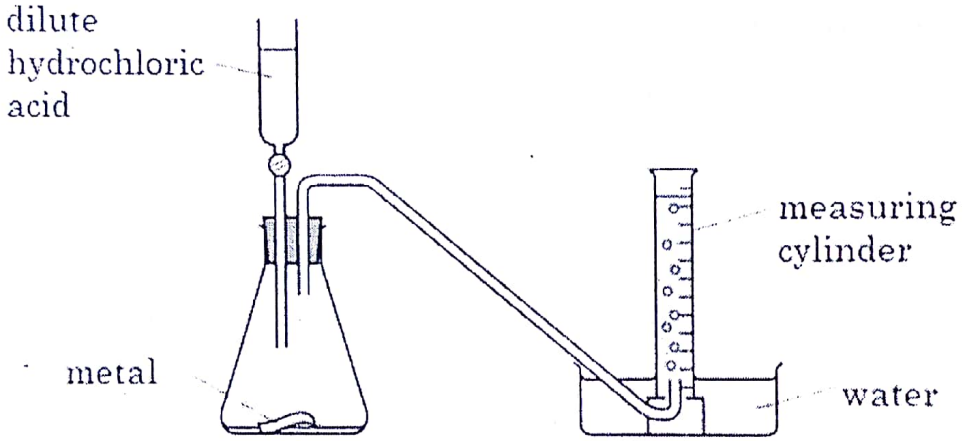
14. Which pair of atoms contain the same number of neutrons?

A. $^{59}_{27}Co$ and $^{59}_{28}Ni$
B. $^{64}_{29}Cu$ and $^{65}_{29}Cu$
C. $^{64}_{29}Cu$ and $^{65}_{30}Zn$
D. $^{65}_{29}Cu$ and $^{65}_{30}Zn$

15. A covalent molecule M contains a total of four shared electrons, what is M
    A. Ammonia
    B. Hydrogen chloride
    C. Methane
    D. Water

16. Which changes are physical changes?
    1. Boiling water to form steam
    2. Adding sodium to water
    3. Burning hydrogen to form water
    4. Melting ice to form water
    A. 3 and 4 B. 1 and 4 C. 2 and 3 D. 1 and 2

17. The diagram shows an experiment to measure the rate of a chemical reaction.



Which change decreases the rate of reaction?
    A. adding water to the flask
    B. heating the flask during the reaction
    C. using more concentrated acid
    D. using powdered metal

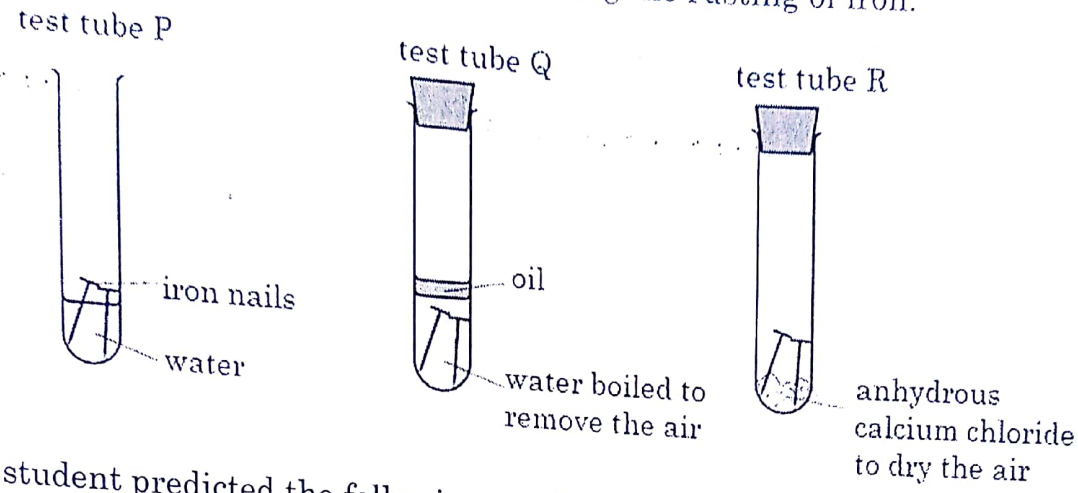
18. Period 3 of the periodic table is shown.

Na	*Mg*	*Al*	*Si*	*P*	*S*	*Cl*	*Ar*

What increases from Na to Ar across period 3
    A. Density
    B. Melting point
    C. Non – metallic character
    D. The number of electron shells

19. What is the property of all metals?
    A. Conducts electricity
    B. Hard
    C. Low melting point
    D. Reacts with water

20. The diagrams show experiments involving the rusting of iron.



A student predicted the following results.

1. In test-tube P, the iron nails rust.
2. In test-tube Q, the iron nails do not rust.
3. In test-tube R, the iron nails do not rust.

Which predictions are correct?

A. 1, 2 and 3 **B.** 1 and 2 only **C.** 1 and 3 only **D.** 2 and 3 only

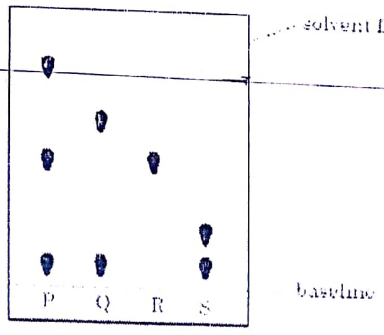
21. Which of the following statements about the extraction of iron in a blast furnace is correct?

A. Calcium oxide reacts with basic impurities
B. Carbon is burnt to provide heat
C. Iron (iii) oxide is reduced to iron by Carbon monoxide
D. The raw materials are bauxite, limestone and coke

22. Which of the following substances is beneficial to aquatic life?

A. Dissolved oxygen
B. Phosphates
C. Plastics
D. Sewage

23. The chromatogram obtained from four mixtures of dyes, P, Q, R and S, is shown.



What is the total number of different dyes identified in the four mixtures?

A. 3 **B.** 4 **C.** 5 **D.** 8

24. Aqueous iron (III) sulphate and aqueous sodium hydroxide react to give a precipitate of iron (III) hydroxide and sodium sulphate. Which of the following is a well-balanced equation?

A. $Fe_2(SO_4)_3(aq) + 2NaOH(aq) \rightarrow Fe(OH)_3(s) + Na_2SO_4(aq)$

B. $Fe_2(SO_4)_3(aq) + 3NaOH(aq) \rightarrow Fe(OH)_3(s) + 3Na_2SO_4(aq)$

C. $Fe_2(SO_4)_3(aq) + 6NaOH(aq) \rightarrow 2Fe(OH)_3(s) + 3Na_2SO_4(aq)$

D. $2Fe_2(SO_4)_3(aq) + 6NaOH(aq) \rightarrow 4Fe(OH)_3(s) + 6Na_2SO_4(aq)$

25. Which of the following is a characteristic of isotopes?

A. have the same atomic number but different atomic mass

B. have the same atomic number but different proton

C. have the same atomic mass but different atomic number

D. should either be chlorine or carbon

26. Which metal compound produces a gas that turns lime water milky when it is heated with a Bunsen burner?

A. Copper (ii) carbonate

B. Magnesium nitrate

C. Sodium sulphate

D. Zinc nitrate

27. An alcohol, C_3H_7OH, burns in air according to the equation.

$$C_3H_7OH_{(l)} + \frac{9}{2}O_{2(g)} \rightarrow 3CO_{2(g)} + 8H_2O_{(l)}; \quad \Delta H = -2017kJ\ mol^{-1}$$

Which one of the following is the mass of the alcohol, in grams, required to produce $200kJ$ of heat? (C=12; O=16; H=1)

A. $\left(\frac{60\times2\times200}{4034}\right)$ B. $\left(\frac{60\times200}{2\times4034}\right)$ C. $\left(\frac{60\times4034}{200}\right)$ D. $\left(\frac{60\times4034}{2\times200}\right)$

28. Which one of the following is the percentage of the sodium carbonate in 2.8g of hydrated sodium carbonate, $Na_2CO_3, 10H_2O$ (Na =23, O=16, C =12, H=1)

A. 9.86% B. 26.20% C.29.02% D. 37.60%

29. Which one of the following oxides would dissolve in excess aqueous ammonia and in excess dilute sodium hydroxide solution?

A. FeO B. ZnO C. CuO D. PbO

30. A compound X contains Fe, 80% and O, 20% (Fe = 56, O = 16). The empirical formula of X is given by the ratio

A. $\left(\frac{80}{72}\right):\left(\frac{20}{72}\right)$ B. $\left(\frac{80}{56}\right):\left(\frac{20}{16}\right)$ C. $\left(\frac{80\times56}{100}\right):\left(\frac{20\times16}{100}\right)$ D. $\left(\frac{56}{80}\right):\left(\frac{16}{20}\right)$

A sample of dry soap

31. Which of the following salts is normally prepared by precipitation?
    A. Calcium carbonate
    B. Zinc chloride
    C. Sodium sulphate
    D. Ammonium chloride

32. On boiling spring water, it decomposed to produce white solid particles. The solid particles are;
    A. Calcium hydroxide sulphate
    B. Calcium hydrogen carbonate
    C. Calcium sulphate
    D. Calcium carbonate

33. $560cm^3$ of an oxide of nitrogen N_yO_x weigh 1.10g at s.t.p. which one of the following is the oxide of nitrogen.(N=14, O= 16,1 *mole a gas occupies* $22.4dm^3$ at s.t.p)
    A. NO
    B. NO_2
    C. NO_2
    D. N_2O

34. Which one of the following reacts with both acids and bases?
    A. Potassium oxide
    B. Calcium oxide
    C. Lead (ii) oxide
    D. Copper (ii) oxide

35. The equation below shows $15mm^3$ of nitrogen reacting with excess hydrogen

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

What volume of ammonia is formed at constant temperature and pressure?
    A. $45mm^3$
    B. $15mm^3$
    C. $30mm^3$
    D. $7.5mm^3$

36. What is the basicity of the acid when $25.00cm^3$ of 0.2M acid solution is neutralized by $20.0cm^3$ of 0.5M sodium hydroxide solution?
    A. 1 B. 2 C. 3 D. 4

37. A particle which carries a negative charge is called
    A. Acid
    B. Base
    C. Cation
    D. Anion

(ii) A sample of dry soap can be obtained from the ... (02marks)
...d in (c)(i).

38. A hydrocarbon has C= 85.72% and remaining Hydrogen. its molecular mass is 26
the hydrocarbon is?
A. C_2H_4
B. C_2H_6
C. C_2H_2
D. CH_4

39. Which of the following is an ionic compound?
A. $NaCl$
B. NH_3
C. C_2H_6
D. CH_4

40. Which among the following pairs of bases do not decompose on heating?
A. Calcium hydroxide, potassium hydroxide
B. Sodium hydroxide, potassium hydroxide
C. Copper hydroxide, calcium hydroxide
D. Sodium hydroxide, copper hydroxide.

For each of the following questions 41-45 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 reason are TRUE statements but the reason is NOT the CORRECT explanation of the assertion.
C. If the statement 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 (Reason is a correct explanation)
B. True	True (Reason NOT a correct explanation)
C. True	Incorrect
D. Incorrect	Correct

41. Ethane was bubbled through bromine Water the reddish-brown color turned Colourless. *because* ethane is a saturated hydro carbon.

42. Pure sulphuric acid does not conduct Electricity *because* it has a very high viscosity.

43. Zinc is used to galvanize Iron *because* zinc is passive in air.

44. Crude petroleum is refined by Fractional distillation *because* its fractions are physically combined.

45. Carbon graphite is used to make Glass cutters. *because* it's soft

In each of the questions 46-50 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 are correct.
C. If 2 and 4 are correct.
D. If 4 only is correct.

46. Which of the following change when moving from an element in one period to another element in the same group but in the next period.
    1. Mass number
    2. Proton Number
    3. Electronic configuration.
    4. Valency of the element.

47. Nitric acid shows the following properties.
    1. Turns litmus paper blue
    2. Forms salts with bases
    3. Is a powerful oxidizing agent agent
    4. It produces reducing agent

48. When dry ammonia reacts with heated copper(ii) oxide
    1. Copper (ii) oxide is reduced
    2. Ammonia is reduced
    3. Ammonia is oxidized
    4. Copper is oxidized.

49. Which of the following contains the same volume as 5.0 g of carbon dioxide at s.t.p
    1. 1.23 g hydrogen
    2. 5.9 g Sulphur dioxide
    3. 4.65 g nitrogen dioxide
    4. 3.64 g oxygen

50. Which of the following oxide(s) are both acidic and basic.
    1. Copper (ii) oxide
    2. Zinc oxide
    3. Sodium oxide
    4. Aluminium oxide.