CHRIST HIGH SCHOOL

CHRIST HIGH SCHOOL PLOT 5, CHS STREET, KM 32, ABUJA-KEFFI ROAD UKE, NASARAWA STATE

SECOND TERM EXAMINATION 2024/2025 ACADEMIC SESSION

SUBJECT: chemistry
SECTION: paper I & II
CLASS: SS3
TIME: 2hours 30minutes

NAME……

CANDIDATE'S ADMISSION NO.

INSTRUCTION

Write your name and number in the space provided on your answer booklet. Write your name on any extra sheet used.

Answer all questions in Part A and four in Part B.

At the end of the examination, staple all your work securely together.

FOR EXAMINER'S USE	
Total Score:	+

1. The negatively charged particle in an atom is the
   A. Electron
   B. Neutron
   C. Positron
   D. Proton
   E. Nucleus
2. How many orbitals are contained in an atom with atomic number 13?
   A. 7
   B. 6
   C. 5
   D. 3
   E. 1
3. The compound formed between $_{14}X$ and $_{16}Y$ is
   A. XY
   B. XY_2
   C. X_2Y
   D. X_1Y_6
   E. None of the above
4. The van der waals forces are dominant intermolecular forces in
   A. Ammonium chloride
   B. Chlorine
   C. Sodium chloride
   D. Water
   E. Calcium oxide
5. The shape of a molecule of water is
   A. Non linear
   B. Octahedral
   C. Pyramidal
   D. Tetrahydral
   E. Linear
6. A metallic ion Z^{2+} with an inert gas structure contains 18 electrons. How many protons are contained in this ion?
   A. 20
   B. 18
   C. 16

D. 2
E. 17

7. Which of the following pairs of compounds belongs to the same homologous series?
   A. C_3H_8 and C_3H_6
   B. C_4H_{10} and C_5H_{10}
   C. C_2H_4 and C_4H_{10}
   D. C_2H_6 and C_4H_{10}
   E. None of the above
8. Which of the following pairs of elements forms amphoteric oxides?
   A. Be and Mg
   B. Na and K
   C. B and Al
   D. Si and Pb
   E. F and Ar
9. The following transition metal ions would be colored in aqueous solution except
   A. Cr^{3+}
   B. Fe^{3+}
   C. Mn^{3+}
   D. Sc^{3+}
   E. All of the above
10. The gas given off when ethanol reacts with sodium is
   A. Carbon (iv) oxide
   B. Hydrogen
   C. Methane
   D. Oxygen
   E. Sulphur
11. Which of the following halogen is solid at room temperature?
   A. Bromine
   B. Chlorine
   C. Fluorine
   D. Iodine
   E. Astatine
12. the alkaline earth metals have similar chemical properties because

A. they are in the same period
B. their salts are colourless
C. they have the same number of valence electrons
D. they are very reactive
E. they are unreactive

13. the number of unpaired electrons in an atom of an element $_{8}Q$ is
A. 2
B. 4
C. 6
D. 8
E. 10

14. the bond formed when ammonia reacts with hydrogen ion to form ammonium ion is
A. covalent
B. dative
C. hydrogen bond
D. ionic
E. electrovalent

15. to which group and period respectively does an element with 15 electrons belong?
A. 3 and 3
B. 3 and 5
C. 5 and 3
D. 5 and 5
E. None of the above

16. The shape of a graphite crystal is
A. Tetrahedral
B. Pyramidal
C. Octahedral
D. Hexagonal
E. Linear

17. Which of the following oxide is ionic?
A. P_4O_{10}
B. MgO
C. Al_2O_3

D. SO_2
E. All of the above

18. Which of the following substances when boiled with aqueous solution of sodium hydroxide would be hydrolysed?
I. Protein II. Fat III. polythene
A. I
B. II
C. I and II
D. II and III
E. All of the above

19. Which of the following trioxonitrate (v) salts would decompose on heating to form a metal?
A. $Cu(NO_3)_2$
B. $AgNO_3$
C. $Pb(NO_3)_2$
D. KNO_3
E. All of the above

20. Consider the following reaction equation:
$C_2H_{4(g)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 2H_2O_{(g)}$
The volume of CO_2 produced at s.t.p when 0.05 moles of $C_2H_{4(g)}$ was burnt in O_2, is (molar volume of gas =22.4dm^3)
A. 1.12dm^3
B. 2.24dm^3
C. 3.72dm^3
D. 4.48dm^3
E. 5.50dm^3

21. The number of oxygen molecules present in 16.0g of the gas is (Avogadro's number= 6.02 X 10^{23})
A. 6.02 X 10^{22}
B. 6.02 X 10^{23}
C. 3.01 X 10^{23}
D. 1.51 X 10^{23}
E. 6.03 X 10^{22}

22. Consider the following equation:
$SO_4^{2-} + 2H^+ + ye^- \longrightarrow SO_3^{2-} + H_2O$

The value of y in the equation is

A. 2
B. 3
C. 4
D. 6
E. 7

23. The general gas equation was derived from
    A. Boyle's and Gay Lussac's laws
    B. Boyle's and graham's laws
    C. Boyle's and Charle's laws
    D. Dalton's atomic theory
    E. Ideal gas equation
24. The vapour pressure of a liquid depends on: I. temperature II. Rate of condensation III. cohesive forces holding the particles together.
    A. I
    B. I and II
    C. I and III
    D. II and III
    E. None of the above
25. Which of the following gases will diffuse most rapidly? (H = 1, C = 12, O =16, S = 32 Cl =35.5)
    A. Cl_2
    B. SO_2
    C. CH_4
    D. C_2H_6
    E. None of the above
26. When a reaction is endothermic
    A. Enthalpy change is negative
    B. Heat content of product is less than the heat content of reactant
    C. Heat content of reactant is less than the heat content of product
    D. The reaction is non spontaneous
    E. All of the above
27. Which of the following statements about intermolecular distances and cohesive forces between gas is correct? They are
    A. Both large

B. Both negligible
C. Constant and negligible
D. Large and negligible
E. None of the above

28. The two elements $_{11}X$ and $_{19}Y$ are in the same group because they have the same
A. Valence electron
B. Ionization energy
C. Number of shell
D. Atomic size
E. Oxidation number

29. An example of an acid salt is
A. CH_3COONa
B. $Mg(OH)Cl$
C. $NaHSO_4$
D. $(NH_4)_2SO_4$
E. $NaCl$

30. Which of the following oxides can be reduced by hydrogen?
A. Aluminium oxide
B. Magnesium oxide
C. Sodium oxide
D. Silver oxide
E. None of the above

31. Solubility is practically applied in
A. Fractional distillation
B. The determination of PH
C. The determination of saturation in hydrocarbons.
D. Solvent extraction
E. All of the above

32. Which of the following compounds is the least soluble in water?
A. $CaCl_2$
B. $CaSO_4$
C. $NaCl$
D. Na_2SO_4
E. KCl

33. A substance which dissolves readily in organic solvent would
    A. Be a covalent compound
    B. Have strong electrostatic forces of attraction
    C. Have a high melting point
    D. Conduct electricity in molten state
    E. Have a high boiling point
34. Consider the following equilibrium system:
    $3SO_{2(g)} + O_{2(g)} \Longleftrightarrow 2SO_{3(g)}$

    The addition of more $O_{2(g)}$ to the system will shift the equilibrium position to

    A. Right leading to the production of more $SO_{3(g)}$
    B. Right leading to the production of more $SO_{2(g)}$
    C. left leading to the production of more $SO_{2(g)}$
    D. left leading to the production of more $SO_{3(g)}$
    E. none of the above
35. A change in the temperature of a saturated solution disturbs the equilibrium between the
    A. Undissolved solute and the solvent
    B. dissolved solute and the solvent
    C. dissolved solute and the undissolved solute
    D. dissolved solute and the solution
    E. all of the above
36. which of the following statements about an electrochemical cell is correct? Oxidation occurs
    A. at the anode
    B. at the cathode
    C. through the salt bridge
    D. in the aqueous solution
    E. in the electrolyte
37. consider the following reaction equation:
    $CuO_{(s)} + H_{2(g)} \longrightarrow Cu_{(s)} + H_2O_{(l)}$. which substance is oxidized?
    A. Cu
    B. CuO
    C. H_2
    D. H_2O

E. Ar

38. which of the following metals is the strongest reducing agent?
    A. Sodium
    B. Silver
    C. Potassium
    D. Copper
    E. Carbon
39. The complete hydrogenation of benzene gives
    A. Cyclohexene
    B. Cyclohexane
    C. Hexene
    D. Hexane
    E. Heptane
40. A compound has an empirical formula CH_2O and molecular mass of 90. Determine its molecular formula. (H = 1, C = 12, O = 16)
    A. $C_4H_{10}O_2$
    B. $C_3H_{10}O_2$
    C. $C_3H_6O_2$
    D. $C_2H_2O_4$
    E. $C_{10}H_4O_2$
41. Which of the following reactions would take place when concentrated sodium hydroxide solution is added to hot palm oil?
    A. Esterification
    B. Neutralization
    C. Polymerization
    D. Saponification
    E. Condensation
42. Starch could be converted to glucose by the process of
    A. Condensation
    B. Dehydration
    C. Fermentation
    D. Hydrolysis
    E. Electrolysis
43. Which of the following compound is a secondary alkanol?
    A. Ethanol

B. 2-methylbuta2-ol
C. 3-methylpentan-2-ol
D. Propan-1-ol
E. Methane

44. Which of the following substances is a heavy chemical?
A. Ammonia
B. Barium hydroxide
C. Hydrochloric acid
D. Tetraoxosulphate (vi) acid
E. Calcium hydroxide

45. Which of the following processes do not take place in domestic water treatment?
A. Chlorination
B. Flocculation
C. Neutralization
D. Sedimentation
E. Aeration

46. A substance responsible for the sour taste of unripe oranges is
A. alkene
B. alkanol
C. alkanoic acid
D. alkanoate
E. none of the above

47. which of the following products of biotechnology can be used as fuel in place of petrol?
A. Butane
B. Ethanol
C. Ethene
D. Propanol
E. All of the above

48. Which of the following polymer is thermosetting?
A. Bakelite
B. Nylon
C. Polypropene
D. Polystyrene

E. None of the above

49. The correct balanced equation for the reaction between aluminum metal and hot concentrated tetraoxosulphate (vi) acid is

A. $2Al_{(s)} + 6H_2SO_{4(s)} \longrightarrow Al_2(SO_4)_{3(aq)} + 6H_2O_{(l)} + 3SO_{2(g)}$

B. $2Al_{(s)} + 3H_2SO_{4(s)} \longrightarrow Al_2(SO_4)_{3(aq)} + 6H_2O_{(l)} + 3SO_{2(g)}$

C. $2Al_{(s)} + 4H_2SO_{4(s)} \longrightarrow Al_2(SO_4)_{3(aq)} + 8H_2O_{(l)} + 4SO_{2(g)}$

D. $Al_{(s)} + 3H_2SO_{4(s)} \longrightarrow Al_2(SO_4)_{3(aq)} + 6H_2O_{(l)} + 3SO_{2(g)}$

E. All of the above

50. Which of the following gases is monoatomic?

A. Argon

B. Chlorine

C. Nitrogen

D. Oxygen

E. Neon

THEORY QUESTIONS (ANSWER ANY FOUR)

1(a) Define esterification **(2marks)**

(b) state two properties of plastic **(2marks)**

(c) name two components of Duralumin **(2mark)**

(d) what is meant by each of the following term?

(i) raw materials **(2marks)**

(ii) primary product **(2marks)**

(e) state Charle's law **(2marks)**

(f) list four pieces of protective equipment in the laboratory **(4marks)**

(g) give two uses of ammonia **(2marks)**

(h) name the:

(i) process by which lighter hydrocarbons are obtained from heavier ones **(1mark)**

(ii) products formed from the reaction between ethanol and sodium metal **(2mark)**

(i) Determine the oxidation number of sulphur in H_2SO_4 **(2marks)**

(j) write the IUPAC name for each of the following compounds:

(i) $NaClO_3$ **(1mark)**

(ii) $CuSO_4.5H_2O$ **(1mark)**

2(a)consider the following table

element	Atomic number	Mass number
J	9	19
Q	13	27
R	16	32
X	19	39

Y	24	52

(i) Which of the elements: I. is a halogen? II. Is most likely to be attracted by a magnet? III. belongs to group I? IV. would readily form an ion with a double negative charge? **(4marks)**

(ii) What type of bond would exist between **J** and **X** when they combine? **(1mark)**

(iii) How many neutrons are there in **Q**? **(1mark)**

(iv) Write the formula of the compound formed when **R** combines with **X** **(1mark)**

(v) State the element which exists as diatomic molecule **(1mark)**

(vi) Select the element which belong to the d-block of the periodic table **(1mark)**

B(i) explain briefly the term atomic orbital **(2marks)**

(ii) I. state three postulates of Dalton's atomic theory. II. List two limitations of this theory in the study of the atom. **(5marks)**

(iii) Describe briefly the structure of sodium chloride in its solid state. **(3mark)**

(C) A sample of carbon is burnt at a rate of 0.50g per second for 30 minutes to generate heat,

(i) write a balanced equation for the reaction **(2marks)**

(ii) Determine the: I. volume of carbon (iv) oxide produced at s.t.p. II. Moles of oxygen used up in the process at s.t.p. (c=12, O=16, molar volume = 22.4dm^3) **(4marks)**

3a(i) give three characteristics of homologous series **(3mark)**

(ii) name two groups of compounds which form such a series **(2marks)**

(b) A saturated organic compound A containing two carbon atoms reacted with ethanoic acid in the presence of mineral acid to form a compound B with a sweet smell,

(i) name the functional group present in A **(1marks)**

(ii)draw the structure of A **(2marks)**

(iii)Write a chemical equation to show the formation of B **(2marks)**

(iv) Name the compound B **(1marks)**

C(i) write a balanced equation for the reaction between ethyne and excess bromine **(2marks)**

(ii) give the IUPAC name of the product of the reaction in 3c(i). **(2marks)**

(iii) state two conditions under which cracking takes place **(2marks)**

D(i) outline the preparation of ethanol from starch **(2marks)**

(ii) give two properties of starch **(2marks)**

(iii) give a reason why starch does not reduce Fehling's solution **(2marks)**

(iv)Describe briefly a chemical test to confirm the presence of starch. **(2marks)**

4(a) Define electrochemical cell **(2marks)**

(b) Aluminium can be prepared commercially by the application of electrolysis,

(i) Name the: I. electrolyte used in the process. II. Ore from which the electrolyte is obtained. III. electrodes used in the electrolysis **(3marks)**

(ii) give two reasons why cryolite, $NaAlF_6$ is added to the electrolyte? **(2marks)**

C(i) list two gaseous fuels produced from coke **(2marks)**

(ii)which of the two gases listed in 4c(i) is a better fuel? **(1mark)**

(iii) Give a reason for your answer in 4c(ii). **(2marks)**

(iv)write a balanced equation for the production of each gaseous fuel. **(4marks)**

D(i) for each of the following reactions, state what would be observed when: I. chlorine gas is bubbled through aqueous sodium iodide II. Chlorine gas is passed

over heated iron in a hard glass tube. III. aqueous silver trioxonitrate (v) is added to aqueous sodium bromide. **(6marks)**

(ii) write a balanced chemical equation for each of the reactions in 4d(i) **(3marks)**

5a(i) Name two gases that could be used to perform the fountain experiment **(2marks)**

(ii) state the physical property which makes the gases suitable for the experiment in 5a(i). **(2marks)**

B(i) define each of the following term: I. solubility II. Saturated solution **(4marks)**

(ii) state two factors that affect the solubility of a solid in a liquid. **(2marks)**

(iii) A salt Z of mass 10.2g was dissolved in $15.4cm^3$ of distilled water at 40^0c. calculate the solubility of Z in mol/dm^3 at 40^0c. (molar mass of Z = 331). **(5marks)**

C(i) Town water supplies that have passed through iron pipes contain P and Q ions. In the presence of air, P ions are slowly converted to Q ions. I. identify P and Q ions. II. Write a balanced equation for the reaction between P ions, hydrogen ions and oxygen to give Q ions and water. **(4marks)**

(ii) explain briefly a test to confirm the purity of water. **(2marks)**

(iii) state the effect of I. boiling a temporary hard water. II. Adding sodium trioxocarbonate (iv) crystals to permanent hard water **(2marks)**

(iv)write a balanced equation for the process in 5c(iii). **(2marks)**