WAEC

CHEMISTRY objective

Past questions

(PT. 1–7)

For both: **SSCE & GCE**

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WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.1)

1. The electron configuration of carbon atom in its excited state is [$_6C$]

A. $1s^2\ 2s^2\ 2px^1\ 2py^1$.
B. $1s^2\ 2s^2\ 2px^2\ 2py^0$.
C. $1s^1\ 2s^2\ 2px^1\ 2py^1\ 2pz^1$.
D. $1s^2\ 2s^1\ 2px^1\ 2py^1\ 2pz^1$.

2. An important medical use of nuclear radiations is _____

A. activation analysis.
B. carbon dating.
C. radiotherapy.
D. tissue regeneration.

3. Which of the following elements exhibits the same chemical properties as the atom $^{35}_{17}X$? An element with _____

A. atomic number 17
B. atomic number 18
C. mass number 35
D. mass number 52

4. Which of the following noble gases has electronic structure similar to that of N in NH_3? [$_7{}^{14}N$]

A. $_2He$
B. $_{10}Ne$
C. $_{18}Ar$
D. $_{36}Kr$

5. Which of the following equations represents beta decay?

A. $_{92}{}^{238}U \rightarrow {}_{90}{}^{234}Th + {}_2{}^4He$
B. $_7{}^{17}N + {}_4{}^2He \rightarrow {}^{17}{}_8O + {}_1{}^1H$
C. $_{92}{}^{236}U \rightarrow {}^{239}{}_{93}Np + {}_{-1}{}^0e$
D. $_7{}^{13}N + {}^4{}_2He \rightarrow {}^{16}{}_8O + {}^1{}_1H$

6. The energy change which accompanies the addition of an electron to a gaseous atom is _____

A. Atomization.
B. electron affinity.
C. electronegativity.
D. ionization.

7. Which of the following elements is a d-block element?

A. Calcium
B. Iron
C. Lithium
D. Silicon

8. Calcium and magnesium belong to the same group in the periodic table because both _____

A. are metals.
B. form cations.
C. form colourless salts.
D. Have the same number of valence electrons.

9. Which of the following elements is diatomic?

A. Iron
B. Neon
C. Oxygen
D. Sodium

10. Which of the following statements about chlorine and iodine at room temperature is correct?

A. Chlorine is gas and iodine is solid.
B. Chlorine is liquid and iodine is gas.
C. Chlorine and iodine are gases.
D. Chlorine is solid and iodine is liquid.

11. If X is a group III element, its oxide would be represented as _____

A. X_3O_2.
B. X_2O.
C. X_2O_3.
D. XO_3.

12. Which of the following species correctly represents an ion of M with 13 protons and 10 electrons?

A. $_{10}M^{3+}$
B. $_{10}M^{3-}$
C. $_{13}M^{3+}$
D. $_{13}M^{3-}$

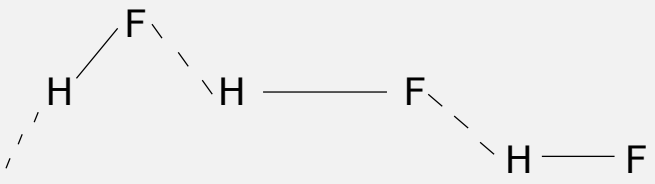
13. A solid substance with high melting and boiling points is likely to be a/an _____

A. covalent compound.
B. dative covalent compound.
C. electrovalent compound.
D. non-metal

14. Which of the following molecules has a linear shape?

A. CH.
B. CO_2
C. H_2S
D. NH_3

15. Which type of bond is represented by the dotted lines in the following structure?



A. Covalent bond
B. Dative bond
C. Electrovalent bond
D. Hydrogen bond

16. Which of the following molecules has a triple bond in its structure?

A. CH_4
B. NH_3
C. N_2
D. O_2

17. The bonds in crystalline ammonium chloride are _____

A. covalent and dative.
B. ionic and covalent.
C. ionic, covalent and dative.
D. ionic, covalent and hydrogen bond.

18. Consider the neutralization reaction represented by the following equation: $Na_2CO_3 + 2HNO_3 \rightarrow 2NaNO_3 + H_2O + CO_2$. The stoichiometric ratio of acid to base is same number of valence electrons.

A. 2:2.
B. 2:1.
C. 1:2.

D. 1:1.

19. A solution of sodium trioxocarbonate (IV) contains 10.6g in 250 cm^3 of solution. Calculate the concentration of the solution. *[Na_2CO_3 = 106.0]*

A. 0.4 mol/dm^3
B. 1.0 mol dm^3
C. 10.6 mol dm^3
D. 25.0 mol dm^3

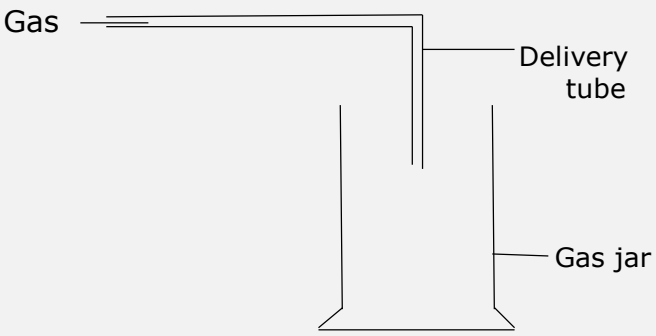
20. What is the volume occupied by 2 moles of ammonia at s.t.p?

A. 44.8 dm^3
B. 22.4 dm^3
C. 11.2 dm^3
D.5.6 dm^{-3}

21. Which of the following apparatus can be used to measure accurately a specific volume of a liquid?

A. Beaker
B. Conical flask
C. Measuring cylinder
D. Pipette

22. Which of the following gases can be collected by the set-up illustrated below?



A. H.
B. HCI
C. NH_3
D. N_2

23. A given volume of oxygen diffused through a porous partition in 8 seconds. How long would it take the same volume of carbon (IV) oxide to diffuse under the same condition? *[C=12.0, O=16.0]*

A. 5.8 seconds
B. 6.8 seconds
C. 9.4 seconds
D. 11.0 seconds

24. Which of the following gases contains the highest number of atoms at s.t.p?

A. 6 moles of neon
B. 3 moles of oxygen
C. 2 moles of chlorine
D. 1 mole of ethane

25. Given that *r* is rate and *p* is density, the expression $r \propto \frac{1}{\sqrt{p}}$ represents _____

A. Boyle's Law.
B. Charles' Law.
C. Dalton's Law.
D. Graham's Law.

26. The determination of heat of combustion is carried out with _____

A. a thermometer.
B. a bomb calorimeter.
C. an evaporating dish.
D. a boiling tube

27. The minimum amount of energy required for effective collisions between reacting particles is known as _____

A. activation energy.
B. bond energy.
C. kinetic energy.
D. potential energy.

28. Which of the following oxides is basic?

A. NO_2
B. Al_2O_3
C. SO_2
D. CaO

29. Which of the following equimolar solutions would have the highest conductivity?

A. $NH_4NO_{3(aq)}$
B. $NaNO_{3(aq)}$
C. $Mg(NO_3)_{2(aq)}$
D. $AI(NO_3)_{3(aq)}$

30. The following substances are normal salts **except** _____

A. $Al(NO_3)_3$.

B. $FeSO_4$.

C. $Mg(OH)\ NO_3$.

D. NaCl.

31. Which of the following chlorides is insoluble in water?

A. AgCl

B. KCl

C. NH_4Cl

D. $ZnCl_2$

32. Which of the following factors would NOT affect the solubility of a gas?

A. Concentration

B. Nature of solvent

C. Pressure

D. Temperature

33. Consider the equilibrium reaction represented by the following equation:

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$$

$\Delta H = 395.7\ kJmol$.

Which of the following statements about the equilibrium system is correct?

A. Addition of catalyst changes the equilibrium position.

B. Decrease in the pressure increases the yield of SO_3

C. Decrease in pressure increases the equilibrium concentration of O_2.

D. Increase in temperature favors the forward reaction.

34. The rate of chemical reaction of solids are not affected by _____

A. catalyst.

B. pressure.

C. particle size.

D. temperature.

35. Which of the following statements about the cell notation Mg/Mg // Cu^2/Cu is correct?

A. Copper is the anode.

B. Magnesium is reduced.

C. Magnesium is the anode.

D. The double line represents the electrodes

36. Which of the following statements about the electrolysis of $CuSO_{4(aq)}$ using copper cathode and platinum anode is not correct?

A. Copper is deposited at the cathode.
B. Oxygen is liberated at the anode.
C. It is used for the purification of copper.
D. The solution becomes acidic.

37. What is the change in oxidation number of manganese in the reaction represented by the following equation? $MnO^{-}_{4(aq)} + 8H^{+}_{(aq)} + 5e^{-} \longrightarrow Mn^{2+}_{(aq)} + 4H_2O_{(l)}$

A. +3 to +2
B. +4 to +2
C. +5 to +2
D. +7 to +2

38. The quantity of electricity required to discharge 1 mole of univalent ion is _____

A. 9,600C
B. 48,250C
C. 96,500C
D. 193,000C

39. Fats and oils are used as raw materials in the following industries **except** _____

A. paint industry.
B. plastic industry.
C. margarine industry.
D. cosmetic industry.

40. Which of the following substances is trihydric?

A. Ethanol
B. Glycol
C. Glycerol
D. Phenol

41. An advantage of detergent over soap is that detergents _____

A. are readily available.
B. are in powdered form.
C. are non-biodegradable.
D. lather readily with water.

42. The products of fermentation of sugar are _____

A. carbon (IV) oxide and water.
B. ethanol and carbon(IV) oxide.
C. ethanol and water.
D. ethanol and enzymes.

43. The IUPAC name of $C_2H_5COOC_2H_5$ is _____

A. ethylethanoate.
B. ethylpropanoate.
C. propylethanoate.
D. propylpropanoate.

44. An organic compound contains 40.0% carbon, 6.7% hydrogen and 53.3% oxygen. What is the empirical formula of the compound? *[O = 16.0, C = 12.0. H = 1.0]*

A. C_2HO
B. CHO
C. CH_2O
D. CHO_2

45. Consider the reaction represented by the following equation:

$$H - C \equiv C - H \xrightarrow{H2} X \xrightarrow{H2} Y$$

X and Y respectively are _____

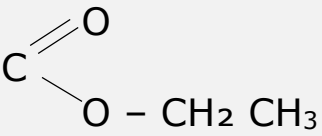
A. ethene and ethane.
B. ethane and ethene.
C. ethyne and ethene.
D. ethene and propene.

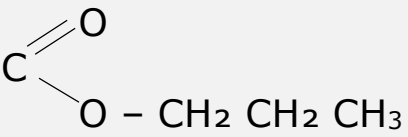
46. Compound *N* reacts with sodium metal to produce a gas that gives a 'pop' sound with a burning splint. *N* also reacts with ethanoic acid to give a sweet smelling liquid. Compound *N* is an _____

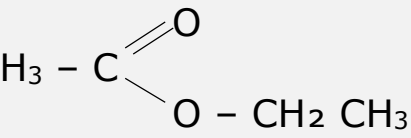
A. alkanol.
B. alkanoate.
C. alkane.
D. alkanoic acid.

47. Which of the following structures represents that of ethylethanoate?

A. $CH_3 - \overset{\overset{O}{\|}}{C} - O - CH_3$

B. 

C. 

D. 

48. The main function of limestone in the blast Furnace is to _____

A. act as a reducing agent.
B. act as a catalyst.
C. remove impurities.
D. supply carbon (IV) oxide.

49. Which of the following substances cannot be classified as a heavy chemical?

A. $AgNO_3$
B. CaO
C. CaOCl
D. H_2SO_4

50. Which of the following metals exists as liquid at ordinary temperature?

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

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.2)

1. How many isotopes has hydrogen?

A. 2
B. 3
C. 4
D. 5

2. Which of the following electrons configurations correctly represents an inert element?

A. $1s^2 2s^2 2p^4$
B. $1s^2 2s^2 2p^6 3s^2$
C. $1s^2 2s^2 2p^6 3s^2 3p^4$
D. $1s^2 2s^2 2p^6$

3. What type of reaction is represented by the following equation? ${}_1^2D + {}_1^3H \rightarrow {}_2^4He + {}_0^1n$ + energy.

A. Nuclear fission
B. Nuclear fusion
C. Radioactive decay
D. Spontaneous decay

4. Which of the following ions has the electron configuration 2, 8, 8?

A. Na^+
B. Mg^{2+}
C. F^-
D. CI^-

5. An element with the electron configuration of $1s^2 2s^2 2p^6$ would have a combining power of _____

A. 0
B. 2
C. 6
D. 8

6. Rare gases are stable because they _____

A. contain equal number of protons and neutrons
B. contain more electrons than protons
C. are chemically active
D. have octet structure

7. Which of the following elements would produce coloured ions in aqueous solution?

A. Calcium
B. Iron
C. Magnesium
D. Sodium

8. The energy change that accompanies the addition of an electron to an isolated gaseous atom is _____

A. bond energy
B. electronegativity
C. electron affinity
D. ionization energy

9. Which of the following hydrohalic acids is the weakest?

A. HBr
B. HCI
C. HF
D. HI

10. Which of the following arrangements is in order of increasing metallic property?

A. Li < Na< k
B. Na < Li < K
C.K < Na < Li
D. K < Li < Na

11. Chlorine, bromine and iodine belong to the same group and _____

A. are gaseous at room temperature.
B. form white precipitate with $AgNO_{3(aq)}$
C. react violently with hydrogen without heating
D. react with alkali

12. Which of the following elements can conveniently be placed in two groups in the periodic table?

A. Carbon
B. Copper
C. Hydrogen

D. Oxygen

13. The bond formed when two electrons that are shared between two atoms are donated by only one of the atoms is _____

A. covalent
B. dative
C. ionic
D. Metallic

14. When element $_{20}A$ combines with element $_{8}Y$, _____

A. a covalent compound, AY is formed
B. an ionic compound AY is formed
C. an ionic compound, A_2Y is formed
D. a covalent compound, AY_2 is formed

15. In metallic solids, the forces of attraction are between the mobile valence electrons and ___

A. atoms
B. neutrons
C. the negative ions
D. positively charged nuclei

16. Which of the following statements about displacement reaction is correct?

A. A more electropositive element displaces a less electropositive one
B. A less electropositive element displaces a more electropositive one
C. The position of elements in the reactivity series has no effect on the reaction
D. it only occurs when the reaction is at equilibrium

17. The volume occupied by 17g of H_2S at s.t.p. is _____ *[H=1.00, S=32.0, Molar volume=22.4 dm^3]*

A. 11.2dm^3
B. 17.0 dm^3
C. 34.0dm^3
D. 44.8dm^3

18. Consider the reaction represented by the following equation: $xKMnO_{4(aq)} + ySO_{2(g)} + zH_2O_{(l)} \rightarrow K_2SO_{4(aq)} + 2MnSO_{4(aq)} + 2H_2SO$ x,y and z are respectively _____

A. 2, 5 and 2
B. 2, 2 and 5
C. 5, 1 and 2
D. 1, 5 and 2

19. What is the amount of magnesium that would contain 1.20×10^{24} particles? *[Mg = 24, Avogadro's constant = 6.02×10^{23}]*

A. 0.5 moles
B. 2.0 moles
C. 12.0 moles
D. 24.0 moles

20. The number of atoms in one mole of a substance is equal to the _____

A. mass number
B. oxidation number
C. atomic number
D. avogadro number

21. Which of the following statements about a molar solution is correct? It _____

A. is a supersaturated solution
B. cannot dissolve more of the solute at that temperature
C. contains any amount of solute in a given volume of solution
D. contains one mole of the solute in 1 dm^3 of solution

22. A gas that is collected by upward delivery is likely to be ____

A. heavier than air
B. insoluble in water
C. lighter than air
D. soluble in water

23. Bubbling excess carbon (IV) oxide into calcium hydroxide solution results in the formation of _____

A. CaO
B. $Ca(HCO_3)_2$

C. H_2CO_3

D. $CaCO_3$

24. The equation P $= \frac{k}{v}V$ illustrates _____

A. Boyle's law

B. Charles' law

C. Dalton's law

D. Gay Lussac's law

25. The initial volume of a gas at 300K was 220cm^3. Determine its temperature if the volume became 250cm^3.

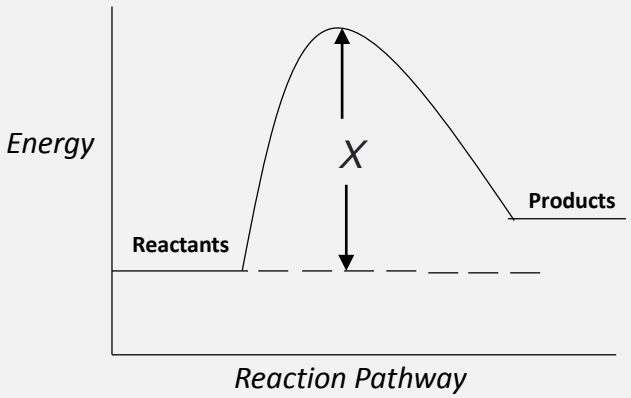
A. 183 K

B. 264 K

C. 300 K

D. 341 K

26. Consider the following energy profile diagram



X represent _____

A. activated complex

B. activation energy.

C. Enthalpy change.

D. Energy of reactant

27. Which of the following equimolar solutions has the highest conductivity?

A. $CH_3COOH_{(aq)}$

B. $H_2CO_{3(aq)}$

C. $H_2SO_{4(aq)}$

D. $NaOH_{(aq)}$

28. The colour of phenolphthalein indicator in alkaline solution at the end-point of an acid-base titration is _____

A. colourless

B. orange

C. pink

D. Yellow

29. Which of the following statements about enthalpy of neutralization is correct? It _____

A. is constant for a strong acid and a strong base
B. cannot be determined using calorimeter
C. has a positive value
D. is higher for strong acid and a weak base

30. When NH_4Cl was dissolved in water, the container was cold to touch. This implies that _____

A. the process is endothermic
B. the process is exothermic
C. NH_4Cl is highly soluble in water
D. NH_4Cl forms a saturated solution

31. Which of the following metallic oxides is amphoteric?

A. Al_2O_3
B. Fe_2O_3
C. MgO
D. Na_2O

32. On evaporation to dryness, $250cm^3$ of saturated solution of salt *X* with relative molar mass 101 gave 50.5g of the. What is the solubility of the salt?

A. 1.0 mol dm^{-3}
B. 2.0 mol dm^{-3}
C. 4.0 $moldm^{-3}$
D. 5.0 $moldm^{-3}$

33. Consider the following reaction equation: $X_{(g)} + Y_{(g)} \rightleftharpoons XY_{(g)}$; $\Delta H = +220KJ\ mol^{-1}$. If the temperature of the system is increased, the _____

A. backward reaction would be favoured
B. forward reaction would favoured
C. reaction would stop
D. reaction would be at equilibrium

34. Which of the following condition would lead to an increase in the rate of a reaction?

A. Increase in the rate and decrease in the surface area of reactants

B. Increase in both temperature and concentration of reactants

C. Decrease in temperature and increase in concentration of reactants

D. Decrease in temperature and increase in the surface area of reactants

35. What is the value of n in the following equation?

$Cr_2O_7^{2-} + 14H^+ + Ne^- \rightarrow 2Cr^{3+} + 7H_2O$

A. 2

B. 3

C. 6

D. 7

36. What mass of copper would be formed when a current of 10.0A is passed through a solution of $CuSO_4$ for 1 hour? *[Cu = 63.5; 1F = 96500C]*

A. 5.9 g

B. 11.8 g

C. 23.8 g

D. 47.3 g

37. Which of the following metals could be used as sacrificial anode for preventing the corrosion of iron?

A. Copper

B. Lead

C. Magnesium

D. Silver

38. Consider the following electrochemical cell notation: $M_{(s)}$ / $M^{2+}_{(aq)}$ // $H^+_{(aq)}$ / $H_{2(g)}$. The value of the electrode potential is positive when _____

A. electrons flow from the metal electrode, $M_{(s)}$ to hydrogen electrode, $H_{2(g)}$

B. electrons fowl from hydrogen electrode, $H_{2(g)}$ to metal electrode, $M_{(s)}$

C. the flow of current is high

D. there is equilibrium between the flow of electrons from the hydrogen electrode, $H_{2(g)}$ to metal electrode, $M_{(s)}$

39. Which of the following compounds determines the octane rating of petrol?

A. 1,2,3 - trimethylpentane
B. 2,3,5 - trimethyloctane
C. 2,3,5 - trimethylpentane
D. 2,2,4 - trimethylpentane

40. Which of the following compounds would react with ethanoic acid to give a sweet smelling liquid?

A. Alkane
B. Alkanol
C. Alkanal
D. Alkyne

41. Which of the following separation techniques would show that black ink is a mixture of chemical compounds?

A. Crystallization
B. Chromatography
C. Filtration
D. Sublimation

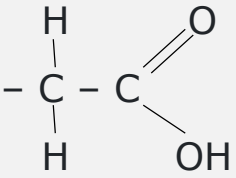
42. The following substances are examples of addition polymer **except** _____

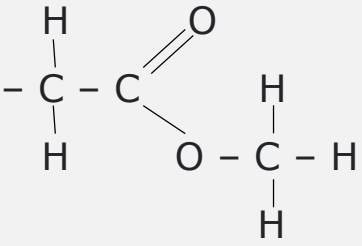
A. nylon
B. perspex
C. polyethene
D. Polychloroethene

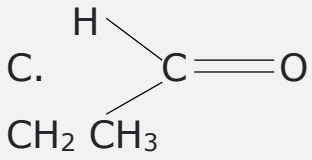
43. When bromine is added to ethene at room temperature, the compound formed is _____

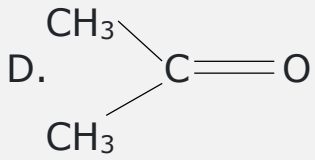
A. 1, 1 - dibromoethane
B. 1, 2 - dibromoethene
C. 1, 1 - dibromoethene
D. 1, 2 - dibromoethane

44. Which of the following organic compound would react with sodium trioxocarbonate (iv) to liberate carbon (iv) oxide?

A.


B.


C. 

D. 

45. The compound that makes palm wine taste sour after exposure to the air for few days is _____

A. ethanol
B. ethanoic acid
C. methanol
D. methanoic acid

46. The reagent that can be used to distinguish ethene from ethyne is _____

A. ammoniacal silver trioxonitrate (V) solution
B. Benedict solution
C. bromine water
D. Fehling's solution

47. The following substances are ores of metals **except** _____

A. bauxite
B. cuprite
C. cassiterite
D. Graphite

48. Which of the following processes does NOT involve the use of limestone?

A. Extraction of iron in the blast furnace
B. Manufacture of tetraoxosulphate (VI) acid by Contact process
C. Production of washing soda by Solvay process
D. Production of cement

49. Which of the following substance is mainly responsible for the depletion of ozone layer?

A. Chlorofluorocarbon
B. Carbon(iv)oxide
C. Nitrogen
D. Oxygen

50. Aluminium is extracted electrolysis from _____

A. bauxite

B. cryolite

C. duralumin

D. Kaolin

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.3)

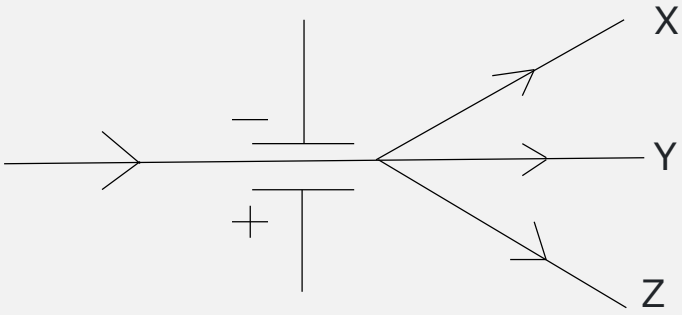
1. The number of orbitals in a p-sub level of an atom is _____

A. 2
B. 3
C. 5
D. 6

2. Which of the following electron configurations represents that of an atom in its ground state?

A. $1s^2\ 2s^1\ 2p^1$
B. $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^1$
C. $1s^2\ 2s^1\ 2p^3$
D. $1s^2\ 2s^2\ 2p^6\ 3s^0$

2. A beam of particles was passed between charged plate as illustrated in the diagram below.



X, Y and Z are respectively _____

A. Electron, neutron and proton
B. Electron, proton and neutron
C. Proton, neutron and electron
D. Proton, electron and neutron

4. Which of the following ions has an electron configuration different from the other?

A. $_{17}CI^-$
B. $_8O^{2-}$
C. $_{12}Mg^{2+}$
D. $_{13}AI^{3+}$

5. The atomic radii of metals are usually _____

A. greater than their ionic radii
B. equal to their ionic radii
C. less than their ionic radii
D. less than those of non-metals in the same period

6. Two elements, X and Y are in the same group on the periodic table because they both have the same _____

A. number of electronic shells

B. number of valence electrons
C. atomic size
D. atomic number

7. The d-block elements are paramagnetic because they _____

A. contain paired electrons which are repelled by magnetic field
B. contain unpaired electrons in the partially filled 3d-orbital
C. contain paired electrons which are repelled by magnetic field force
D. have delocalized valence electrons

8. Which of the following statements about a radioactive substance is/are correct?

I. It emits radiation continuously and spontaneously.
II. The emitted radiations are affected by temperature and pressure.
III. The radiation can penetrate opaque matter.

A. II only
B. I and II only
C. I and III only
D. II and III only

9. Which of the following elements is a metalloid?

A. Carbon
B. Oxygen
C. Silicon
D. Sodium

10. Which of the following halogens is liquid at room temperature?

A. Chlorine
B. Fluorine
C. Iodine
D. Bromine

11. The shape of a graphite crystal is _____

A. tetrahedral
B. pyramidal
C. hexagonal
D. Octahedral

12. The compound formed by the combination of two elements with a large electronegativity difference is likely to be _____

A. Polar covalent
B. Giant molecular
C. Covalent
D. Ionic

13. The complex compound formed when aluminum dissolves in aqueous sodium hydroxide is _____

A. $Na_3Al(OH)_4$.
B. $NaAl(OH)_4$
C. $NaAl(OH)_3$
D. $Na_2Al(OH)_3$

14. The vapour pressure of a liquid depends on _____

I. temperature.
II. rate of condensation.
III. cohesive forces holding the particles together.

A. I only
B. I and II only
C. I and III only
D. II and III only

14

14. MgO does not readily dissolve in water because _____

A. of its high melting point
B. it is a covalent compound
C. it forms a hydroxide when dissolved in water
D. its lattice energy is higher than its hydration energy

16. Consider the following reaction equation: $CaCO_{3(s)} + 2HCI_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$. What mass of $CaCI_2$ would be obtained when 25.0g of $CaCO_{3(s)}$ is reacted with excess $HCI_{(aq)}$? *[$CaCO_3$=100;$CaCI_2$ = 111]*

A. 4.00g
B. 4.44 g
C. 18.9 g
D. 27.8 g

17. The number of sulphur atoms in 3.20g of $SO_{2(g)}$ is _____

[O=16.0; S=32.0; Avogadro constant=6.02 x 10^{23}]

A. 3.01 x 10^{22}
B. 6.02 x 10^{22}
C. 6.02 x10^{23}
D. 1.20 x 10^{24}

18. Consider the reaction represented by the following equation: $xCH_3OH + yO_2 \rightarrow 2CO_2 + zH_2O$. The values of x,y and z respectively, are _____

A. 2, 3 and 4
B. 2, 4 and 3
C. 1, 2 and 3
D. 1, 3 and 5

19. The formula of mercury (I) dioxonitrate (III) is _____

A. $HgNO_3$
B. Hg_2NO_2
C. $Hg_2(NO_2)_2$
D. $Hg(NO_3)_2$

20. A sample of a gas may be identified as chlorine if it turns _____

A. damp blue litmus paper red
B. lime water miky
C. lead ethanoate paper black
D. starch iodide paper blue-black

21. A metal M forms two types of chlorine, MCl_2 and MCl_3 which of the following laws best explains the relationship between the chlorides? Law of _____

A. conservation of mass
B. definite proportion
C. multiple proportion
D. reciprocal proportion

22. Which of the following metals would readily displace hydrogen from steam?

A. Copper
B. Lead
C. Magnesium
D. Silver

23. The volume occupied by 0.4 g of hydrogen gas at s.t.p. is _____ *[H=1.00; Molar volume at s.t.p.=22.4dm^3]*

A. 2.24 dm^3

B. 4.48dm^3

C. 22.4dm^3

D. 44.8dm^3

24. When a substance changes directly from the solid state to the gaseous state without forming a liquid, the substance is said to _____

A. condense

B. evaporate

C. sublime

D. Precipitate

25. At ordinary temperature H_2O is a liquid while H_2S is a gas. This is because H_2O has _____

A. weak inter molecular forces holding its molecules together

B. strong hydrogen bonds holding its molecules together

C. induced dipole-induced dipole forces between its molecules

D. ionic force between its molecules

26. The postulate that molecules are in constant random motion best explains why liquids _____

A. can undergo solidification

B. maintain their volumes

C. are incompressible

D. have no characteristic shape

27. Which of the following gases has the lowest rate of diffusion under the same condition? *[H=1.00; He=4.00; O=16.0; Cl=35.5]*

A. CI_2

B. H_2

C. He

D. O_2

28. The energy evolved when magnesium burns in air is in the form of _____

A. heat

B. heat and sound

C. light and heat

D. Sound

29. A substance L reacts with $NH_4NO_{3(aq)}$ to generate ammonia gas. L is likely to be _____

A. HCl
B. NaOH
C. CH_3COOH
D. $CaSO_4$

30. On heating, the following trioxocarbonate (IV) salts decompose to give solid residue **except** _____

A. ammonium trioxocarbonate (IV)
B. calcium trioxocarbonate (IV)
C. lead (II) trioxocarbonate(IV)
D. zinc trioxocarbonate (IV)

31. Which of the following pH values indicates that a solution is a strong base?

A. 1
B. 5
C. 9
D. 13

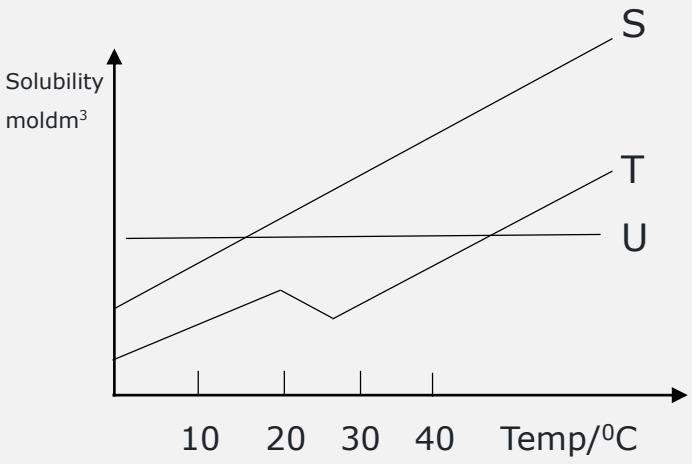
32. The hydrolysis of NH4CI gives _____

A. an acidic solution
B. an alkaline solution
C. a buffer solution
D. a neutral solution

33. A spot of oil paint on a shirt can best be removed using?

A. brine
B. detergent
C. kerosene
D. warm water

Consider the following solubility curves



34. Which of the following deduction could be correctly made from the graph?

A. The solubility of U is not affected by change in temperature

B. The solubility of X decreases with increasing in temperature

C. T is most soluble among the salt

D. S is least soluble among the salt

35. Consider the reaction represented by the following equation:

$$CuO_{(s)} + H_2SO_{4(aq)} \rightarrow CuSO_{4(aq)} + H_2O_{(l)}$$

Which of the following factors will not affect the rate of the reaction?

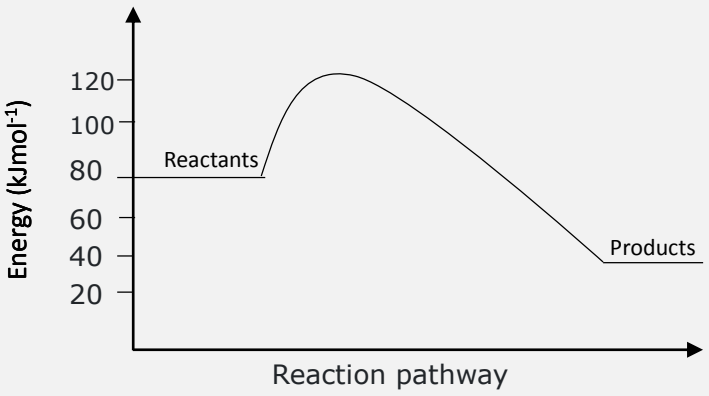
A. Particle size of $CuO_{(s)}$

B. Concentration of $H_2SO_{4(aq)}$

C. Temperature of the reacting mixture

D. Pressure of reaction system

Use the following graph to answer questions 36-37.



36. The activation energy for the reaction is _____

A. 40 KJ

B. 60 KJ

C. 80 KJ

D. 120 KJ

37. The type of reaction represented by the graph is _____

A. Endothermic

B. Exothermic

C. Catalytic

D. Spontaneous

38. Which of the following devices function on redox reaction?

I. Dry cell

II. Car battery

III. Electric generator

A. I and III only

B. II and III only

C. I and II only

D. I, II and III

39. The oxidation number of Fe in $[Fe(CN)^6]^{3-}$ is _____

A. +3
B. +2
C. -2
D. -3

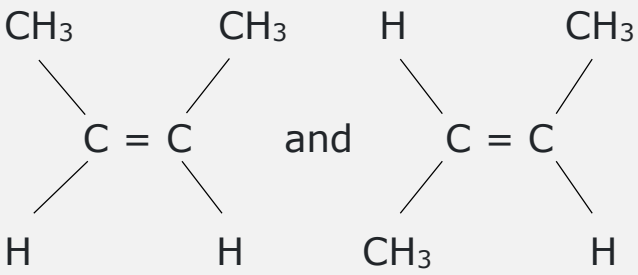
40. Consider the following reaction equation:

$$C_{16}H_{34} \rightarrow C_5H_{12} + C_{11}H_{22}$$

The process represented by the equation is _____

A. cracking
B. fermentation
C. polymerization
D. Reforming

41. Consider the following structure of organic compounds.



Which of the following statement about the structure is NOT correct? They _____

A. are geometric isomers
B. Are saturated hydrocarbons
C. Have similar physical properties
D. Are members of the same homologous series

42. Which of the following substances would not produce ethanol when fermented?

A. Cane sugar
B. Glucose
C. Starch
D. Vinegar

43. An alkanol can be prepared by the reaction of an alkene with ____

A. concentrated tetraoxosulphate (VI) acid
B. bromine tetrachloroethane
C. aqueous potassium tetraoxomanganate (VII)
D. sodium hydroxide solution

44. A compound contains 7.75% hydrogen 37.21% carbon 55.04% chlorine determine the empirical formula?

A. C_3H_3Cl

B. C_2H_5Cl

C. C_3H_8Cl

D. C_5H_2Cl

45. A tertiary alkanol has a molecular formula $C_4H_{10}O$. What is the structural formula of the compound?

A. $(CH_3)_2CHCH_2OH$

B. $CH_3CH_2CH(OH)CH_3$

C. $(CH_3)_3COH$

D. $CH_3CH_2CH_2CH_2OH$

46. Which of the following industrial processes depends on the action of enzymes?

A. Liquefaction of air

B. Manufacture of soap

C. Brewing of beer

D. Catalytic cracking

47. Which of the following pollutants is NOT usually recycled?

A. Aluminium cans

B. Glass bottles

C. Nuclear wastes

D. Paper wastes

48. A metal that is widely used in the manufacture of paints and overhead electric cables is _____

A. aluminum

B. copper

C. iron

D. Lead

49. Brass is a mixture of _____

A. Cu and Sn

B. Cu and Zn

C. Cu and Mg

D. Cu and Pb

50. Which of the following substances is mainly responsible for the depletion of the ozone layer?

A. Oxygen

B. Chlorofluorocarbon

C. Carbon (II) oxide

D. Nitrogen (II) oxide

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.4)

1. Which of the following instruments is used in detecting the presence of radiation?

A. Cathode ray tube
B. Geiger-Muller counter
C. Mass spectrometer
D. X-ray tube

2. The molecule which has a linear shape is _____

A. CH_4
B. NH_3
C. H_2S
D. CO_2

3. The formula of the compound formed between a trivalent metal, M and a divalent non-metal, Y is _____

A. M_2Y_3
B. M_3Y_2
C. MY
D. M_3Y

4. An atom of an element X gains two electrons. The symbol of the ion formed is _____

A. X^+
B. X^{2+}
C. X^{2-}
D. X^-

5. Which of the following statements is correct?

A. Atomic size decreases down the group
B. Atomic size increases across the period
C. Anions are smaller than the parent atom
D. Cations are smaller than the parent atom

6. Which of the following arrangements represents the correct order of electronic energy level?

A. 1s 2p 2s 3p 3s 3d 4s
B. 1s 2s 2p 3s 3p 3d 4s

C. 1s 2s 2p 3s 3p 4s 3d

D. 1s 2s 3s 2p 3p 4s 3d

7. The element with electron configuration $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^1$ belongs to _____

A. s-block period 3, group 1

B. p-block, period 3, group 2

C. s-block, period 3, group 3

D. p-block, period 3, group 3

8. In the periodic table all elements within the same group have the same _____

A. number of neutrons

B. number of valence electrons

C. number of isotopes

D. atomic number

9. Which of the following halogens is liquid at room temperature?

A. Iodine

B. Chlorine

C. Bromine

D. Fluorine

10. Rare gases are stable because they _____

A. are chemically active

B. contain equal number of protons and neutrons

C. contain more electrons than protons

D. have octet structures

11. In the periodic table, alkaline earth metals can be found in group _____

A. I

B. II

C. VI

D. VII

12. In which of the following series are the atoms arranged in order of increasing ionization energy?

A. Li, Na K

B. B, Be, Li

C. O, F, Ne

D. Be, Mg, Ca

13. Which of the following bond types is responsible for the high boiling point of water?

A. Metallic bond
B. Covalent bond
C. Ionic bond
D. Hydrogen bond

14. In metallic solid, the forces of attraction is between the mobile valence electrons and the _____

A. atoms
B. Neutron
C. negative ions
D. positively charged nuclei

15. The bonds in crystalline ammonium chloride are _____

A. covalent and dative
B. ionic and covalent
C. ionic, covalent and dative
D. ionic, covalent and hydrogen bond

16. Which of the following elements is diatomic?

A. Sodium
B. Oxygen
C. Iron
D. Neon

17. Noble gas molecules are held together by _____

A. Van der waals forces
B. hydrogen bonds
C. dative bonds
D. covalent bonds

18. Which of the following statements about nuclear reaction is correct? The reaction _____

A. involves neutrons only
B. takes place inside the nucleus
C. is governed by temperature and pressure
D. involves protons and electrons only

19. Consider the reaction represented by the following equation: $C_2H_2 + yH_2 \rightarrow C_2H_6$. The value of y in the reaction is _____

A. 4

B. 3

C. 2

D. 1

20. The volume of 0.25 moldm^{-3} solution of KOH that would yield 6.5g of solid KOH on evaporation is _____ *(K=39.0 ; O=16.0 ; H=1.00)*

A. 464.30 cm^3

B. 625.00 cm^3

C. 1000.00 cm^3

D. 2153.80 cm^3

21. The percentage by mass of calcium in $Ca(OCl)_2$ is _____ *[Ca=40.0; Cl=35.5; O=16.0]*

A. 28.0%

B. 31.6%

C. 43.8%

D. 44.5%

22. The gas law which describes the relationship between volume and temperature is _____

A. Boyle's law

B. Charles' law

C. Dalton's law

D. Grahams law

23. Which of the following phenomena lead to decrease in volume of a liquid in an open container?

A. Brownian motion

B. Diffusion

C. Evaporation

D. Sublimation

24. The pressure exerted by a gas is a function of the _____

A. total volume of the gas

B. speed of the gaseous molecules

C. mass of each gaseous molecule

D. frequency of collision between gaseous molecules

25. Which of the following gases are arranged in increasing order of diffusion rate? *[H=1.0; C=12; N=14; O=16; S=32]*

A. SO_2 O_2, NH_3, H_2

B. H_2S, NH_2, O_2, SO_2

C. CO_2, N_2O, O_2, SO_2

D. NH_3, NO_2, N_2, CO_2

26. Which of the following variables is a measure of the average kinetic energy of the molecule of a gas?

A. Density

B. Pressure

C. Temperature

D. Volume

27. When heat is absorbed during a chemical reaction, the reaction is said to be _____

A. adiabatic

B. endothermic

C. exothermic

D. Isotherm

28. The aqueous solution which has pH > 7 is _____

A. $FeCI_{3(aq)}$

B. $CuSO_{4(aq)}$

C. $KNO_{3(aq)}$

D. $Na_2CO_{3(aq)}$

29. Which of the following acids would readily react with $CaCO_3$ to liberate CO_2?

A. CH_3COOH

B. H_2SO_4

C. H_2SO_3

D. HNO_3

30. Which of the following compounds crystallizes without water of crystallization?

A. $MgSO_4$

B. Na_2CO_3

C. NaCI

D. $FeSO_4$

31. A substance is said to be impure if _____

A. its melting point range is wide

B. it dissolves in water with difficult

C. it has a low melting point

D. it is coloured

32. The following factors affect the solubility of a solid in a given solvent **except** _____

A. nature of solute
B. nature of solvent
C. pressure
D. Temperature

33. Consider the reaction represented by the equation: $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$; $\Delta H = +x kJmol^{-1}$ What happens when the temperature is reduced at equilibrium?

A. Concentration of $N_2O_{4(g)}$ decreases.
B. Concentration of $N_2O_{4(g)}$ increases.
C. Pressure exerted by the gases increases.
D. Pressure exerted by the gases remains constant.

34. Which of the following cells produce electrical energy from chemical reactions?

I. Lead-acid battery.
II. Dry cell.
III. Daniel cell.
IV. Electrolytic cell

A. I and II only
B. I, II, and III only
C. III and IV only
D. I and III only

35. What happens at the cathode during electrolysis? The _____

A. Anion is oxidized.
B. Anion loses electrons.
C. Cation is oxidized.
D. Cation is discharged.

36. Which of the following substances are electrolytes?

I. $PbBr_{2(aq)}$
II. $NaCl_{2(aq)}$
III. $Na\ Cl_{(s)}$
IV. $C_6H_{12}O_{6(aq)}$

A. I and II only.
B. I, II and IV.
C. III and IV only.
D. I and III only.

37. Consider the redox reaction as represented by the following equation:

$I_{2(aq)} + 2S_2O_3^{2-}{}_{(aq)} \rightarrow 2I^-_{(aq)} + S_4O_6^{2-}{}_{(aq)}$

Which of the species in the equation is reduced?

A. $S_4O_6^{2-}{}_{(aq)}$

B. $S_4O_3^{2-}{}_{(aq)}$

C. $1_{2(aq)}$

D. $1^-_{(aq)}$

38. The separation of petroleum fractions depends on the differences in their _____

A. melting points

B. molar masses

C. solubility

D. boiling points

39. The major product formed by the reaction between ethanoic acid and aqueous sodium hydroxide is _____

A. soap

B. sodium ethanoate

C. sodium methoxide

D. Water

40. Which of the following organic compounds would decolourize bromine water?

A. Benzene

B. Cyclobutane

C. Hexane

D. Pentane

41. How many isomers has $C_3H_6CI_2$?

A. 2

B. 3

C. 4

D. 5

42. The IUPAC name of the compound $(CH_3)_2CHCH_2CHOOH$ is _____

NH_2

A. 2-amino hexanoic acid

B. 2–amino–4–methyl Pentanoic acid

C. 2, 4–dimethyl butanoic acid

D. 4–amino pentanoic acid

43. Which of the following reactions is common to all hydrocarbons?

A. Combustion
B. Addition
C. Polymerization
D. Condensation

44. A hydrocarbon compound contains 92.3% carbon Determine its empirical formula. *[H=1.00; C=12.0]*

A. CH
B. CH_{2-}
C. CH_3
D. C_3H_2

45. The main function of limestone in the blast furnace is to _____

A. act as catalyst
B. act as reducing agent
C. remove impurity
D. supply carbon (IV) oxide.

46. Which of the following raw materials is used in a plastic industry?

A. Ethene
B. Methane
C. Calcium
D. Hydrogen

47. Which of the following statements about thermoplastic material is correct? They _____

A. do not melt on heating
B. harden on heating
C. decompose on heating
D. soften and melt on heating

48. Bronze is a mixture of _____

A. Cu and Mg
B. Cu and Sn
C. Cu and Zn
D. Cu and Pb

49. Which of the following statements about fine chemical is correct? It _____

A. is injurious to health

B. has low degree of purity

C. is produced in relatively small amount

D. can be stored for a long time

50. Which of the following materials is classified as a non-biodegradable pollutant?

A. Animal hide

B. Paper

C. Plastic

D. Wood

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.5)

1. The shape of CH_4 is _____

A. linear
B. planar
C. pyramidal
D. tetrahedral

2. The crystal layers in graphite are held together by _____

A. covalent bond
B. electrostatic forces
C. ionic bond
D. van der waals forces

3. Hydrogen bonds are formed between molecules containing a hydrogen atom bonded to a _____

A. strongly electronegativity atom
B. non-polar species
C. diatomic element
D. complex ion

4. The two elements $_{11}X$ and $_{19}Y$ are in the same group because they have the same _____

A. valence electrons
B. ionization energy
C. number of shell
D. atomic size

5. Which of the following processes is used in food preservation in an industry?

A. Carbon dating
B. Radiation of gamma rays
C. Nuclear fission
D. Nuclear fusion

6. Which of the following arrangements is in decreasing order of atomic radius?

A. Li > Be > C > B
B. Li > B > Be > C
C. Li > Be > B > C
D. C > B > Be > Li

7. The electron configuration of $_{26}Fe^{3+}$ is _____

A. $[Ar]4s^23d^6$
B. $[Ar]4s^23d^3$

C. $[Ar]4s^1 3d^4$

D. $[Ar]4s^0 3d^5$

8. Which of the following transition metals is NOT attracted to external magnetic field?

A. Cu

B. Fe

C. Ti

D. Zn

9. An atom W has 17 electrons and 18 neutrons. Which of the following representations of the atom is correct?

A. $^{17}_{18}W$

B. $^{18}_{17}W$

C. $^{35}_{17}W$

D. $^{35}_{18}W$

10. The relative atomic mass of chlorine is NOT a whole number because _____

A. it is the weighted average mass of all its various isotopes

B. it is the average mass of all the isotopes of the element

C. the element has strong oxidizing ability

D. the atom contains a higher number of neutrons than protons

11. NH_4^- is formed from NH_3 and H^+ by _____

A. covalent bonding

B. dative bonding

C. hydrogen bonding

D. ionic bonding

12. How many lone pair (s) of electrons is present in HF?

A. 0

B. 1

C. 2

D. 3

13. An aqueous solution of Na_2CO_3 is _____

A. acidic

B. alkaline

C. amphoteric

D. Neutral

14. A gaseous mixture contains 0.256g of hydrogen and 2.00g of oxygen. The mole ration of hydrogen to oxygen in the mixture is _____

(H=1.00; O=16.0)

A. 1:1
B. 2:1
C. 1:4
D. 8:1

15. If 0.20 mol dm^{-3} $NaOH_{(aq)}$ was evaporated to yield 5.0g of solid NaOH, calculate the volume of $NaOH_{(aq)}$ used. *(Na=23.0, O=16:0; H=1.00)*

A. 600cm^3
B. 625cm^3
C. 1000^3
D. 1600 cm^3

16. The oxidation number of sulphur in $Fe_2(SO_4)_3$ is _____

A. +2
B. +3
C. +4
D. +6

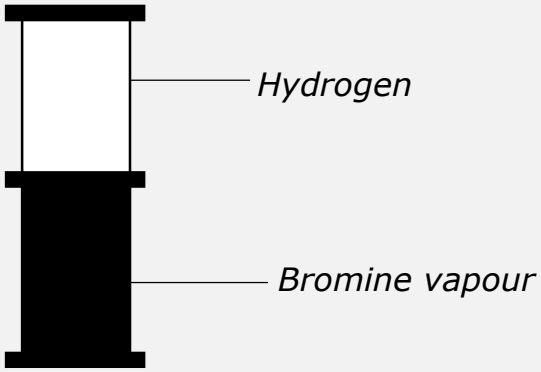
17. The mass of 800cm^3 of gas Q at s.t.p. is 1.0g. What is the molar mass of Q? *[Avogadro constant = 22.4dm^3 mol^{-1}]*

A. 18.0 $gmol^{-1}$
B. 22.4$gmol^{-1}$
C. 28.0$gmol^{-1}$
D. 36.0 $gmol^{-1}$

18. A Compound U melts at 82^0C and boils at 113^0C. If U was found to be insoluble in water, a mixture of U in water could best be separated by _____

A. Chromatography
B. Sublimation
C. Filtration
D. The use of separating funnel

19. The Following set-up can be used to demonstrate _____



A. Diffusion

B. Dissolution

C. Evaporation

D. Sub-Limitation

20. Which of the following statements about a chemical system in equilibrium is correct? The _____

A. reaction is irreversible

B. reaction goes to completion

C. equilibrium is re-established when a stress is applied

D. equilibrium position is affected by catalyst

21. Which of the following relationships correctly expresses the Boyle's law?

A. P α V at constant T

B. V α T at constant P

C. P α $\frac{1}{V}$ at constant T

D. V α $\frac{1}{T}$ at constant P

22. The vapour pressure of a given volume of liquid increase when the _____

A. liquid becomes saturated with a salt

B. Volume of the liquid increases

C. temperature of the liquid falls

D. temperature of the Liquid rises

23. Which of the following statements about volatile liquids is correct? They have _____

A. high vapour pressure and low boiling point

B. high vapour pressure and high boiling point

C. low vapour pressure and low boiling point

D. low vapour pressure and high boiling point

24. The type of energy changes that accompany the mixing of a

strong acid to a strong base is _____

A. electrical
B. heat
C. light
D. Sound

25. Zinc oxide is said to be amphoteric because it _____

A. forms an acid salt
B. is an insoluble base
C. forms a double salt
D. reacts with a base or an acid

26. Which of the following substances with the corresponding pH value is an alkali?

	Substance	***pH***
A.	*Lime*	*2.4*
B.	*Banana*	*4.6*
C.	*Distilled water*	*7.0*
D.	*Milk of magnesia*	*10.5*

27. The gases produced when $Cu(NO_3)_{2(s)}$ was heated are _____

A. NO and NO_2
B. O_2 and NO
C. NO_2 and N_2O_4
D. O_2 and NO_2

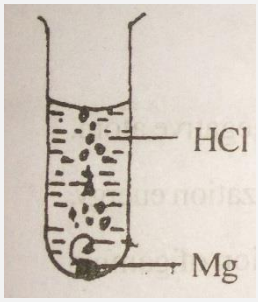
28. Which of the following salts on hydrolysis would give an alkaline solution?

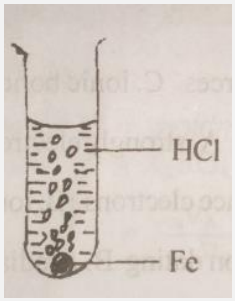
A. $NH_4CI_{(s)}$
B. $AICI_{3(s)}$
C. $CH_3COONa_{(s)}$
D. $NH_4NO_{3(s)}$

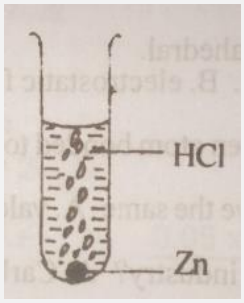
29. Consider the reaction represented by the following equation:
$Na_2CO_{3(aq)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$.
What volume of $0.02moldm^{-3}$ $Na_2CO_{3(aq)}$ would be required to completely neutralize $40cm^3$ of $0.10\ moldm^{-3}$ $HCl_{(aq)}$?

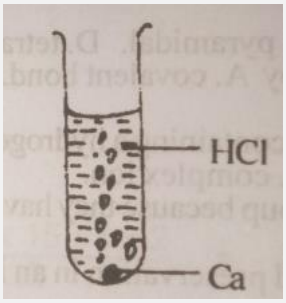
A. 200 cm^3
B. 100 cm^3
C. 40 cm^3
D. 20 cm^3

30. In which of the following experiment set-ups would the rate of evolution of hydrogen gas be fastest?

A. 

B. 

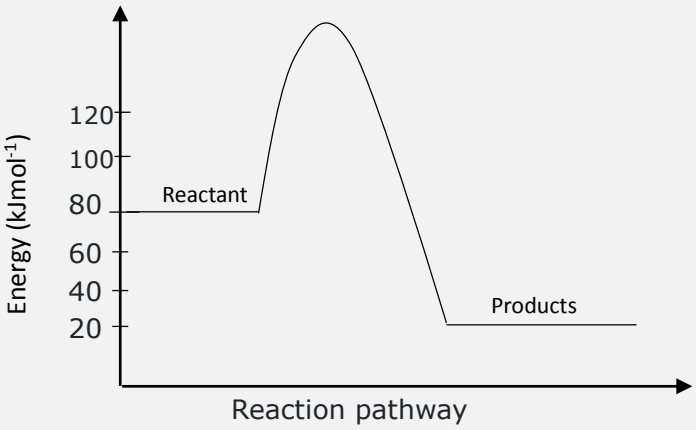
C. 

D. 

31. Which of the following factors would affect the equilibrium constant?

A. Concentration
B. Temperature
C. Pressure
D. Volume

32. Consider the following energy profile diagram of exothermic reaction. The enthalpy change, "H" is _____



A. 120 $KJmol^{-1}$
B. 80 $KJmol^{-1}$
C. 60 $KJmol^{-1}$
D. 40 $KJmol^{-1}$

33. Consider the reaction represented by the following equation: $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$; $_{\Delta H}{}^{\ominus} = -x kJmol^{-1}$. Which of the following conditions would increase the yield of NH_3?

A. Addition of iron catalyst
B. Increase in the temperature of the system
C. Increase in the volume occupied by reactants
D. Increase in the total pressure of the system

34. What is the function of manganese (IV) oxide in the reaction represented by the following equation?

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

A. Catalyst
B. Dehydrating agent
C. Oxidizing agent
D. Reducing agent

35. The reaction that occurs all the anode when $CuSO_{4(aq)}$ is electrolyte using carbon electrode is _____

A. $2H^-_{(aq)} + 2e \rightarrow H_{2(g)}$
B. $Cu^{2+}_{(aq)} + 2e \rightarrow Cu_{(s)}$
C. $4OH_{(aq)} - 4e \rightarrow 2H_2O_{(l)} + O_{2(g)}$
D. $SO_4^{2}{}_{(aq)} - 2e \rightarrow SO_{2(g)} + O_{2(g)}$

36. Reduction is the process of _____

A. loss of electron
B. loss of hydrogen
C. loss of oxygen
D. addition of electro-negative elements

37. Ethene molecules can be added to one another to form a long chain compound called a ___

A. dimer
B. monomer
C. polymer
D. Trimmer

38. Which of the following compounds determines the octane rating of petrol?

A. 1, 2, 3 - trimethyl Pentane
B. 2, 3, 5 - trimethyl Octane
C. 2, 3, 5 - trimethyl Pentane
D. 2, 2, 4 - trimethyl Pentane

39. Which type of reaction is illustrated by the following equation? $C_{12}H_{26} \rightarrow 5C_2H_4 + C_2H_6$

A. Addition
B. Cracking
C. Hydrogenation
D. Polymerization

40. The IUPAC name of the following organic compound is HOOC – COOH

A. Ethan -1, 2- dioc acid
B. ethanoic acid
C. oxalic acid
D. propane -1, 2- dioic acid

41. The enzyme that catalyze the conversion of glucose to ethanol and carbon (IV) oxide is _____

A. diastase
B. maltose
C. ptyalin
D. zymase

42. A colourless hydrocarbon with a sweet smell undergoes substitution reaction. The hydrocarbon is likely to be _____

A. alkanol
B. benzene
C. ester
D. methane

43. Consider the reaction represented by the following equation: $C_2H_{4(g)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(g)}$
How many moles of ethane would be burnt to produce 0.1mol of water?

A. 0.05 mole.
B. 0.10 mole.
C. 0.20 mole
D. 2.00 mole.

44. The liquid hydrocarbon likely to be found in the fraction of crude oil used for domestic cooking is _____

A. C_3H_8
B. C_5H_{12}
C. $C_{13}H_{28}$
D. $C_{20}H_{42}$

45. Which of the following organic compounds could be represented by the empirical formula CH_2O?

A. Ethanal
B. Ethane

C. Ethanol
D. Ethanoic

46. The production of biogas from the fermentation of waste materials is an example of _____

A. combustion
B. incineration
C. refining
D. Recycling

47. The purity of a solid sample can best be determined by its ____

A. boiling point
B. melting point
C. conductivity
D. Solubility

48. Which of the following gases is used to retard the vaporization of the filament in a light bulb?

A. Argon
B. Helium
C. Hydrogen
D. Oxygen

49. The most common process in the extraction of metals from their ore is _____

A. catalysis
B. electrolysis
C. oxidation
D. Reduction

50. The oxide from electric power station is _____

A. carbon (IV) oxide
B. copper (ll) oxide
C. nitrogen (IV) oxide
D. sulphur (IV) oxide

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.6)

1. The negatively charged particle in an atom is the _____

A. Electron
B. Neutron
C. Positron
D. Proton

2. How many orbits are contained in an atom with atomic number 13?

A. 7
B. 6
C. 5
D. 3

3. The compound formed between $_{14}X$ and $_{16}Y$ is _____

A. XY
B. XY_2
C. X_2Y
D. X_4Y_6

4. The Van der Waals' forces are dominant intermolecular forces in _____

A. Ammonium chloride
B. Chlorine
C. Sodium chloride
D. Water

5. The shape of a molecule of water is _____

A. Non-linear
B. Octahedral
C. Pyramidal
D. Tetrahedral

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

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}

8. Which of the following pairs of elements form amphoteric oxides?

A. Be and Mg

B. Na and K

C. B and Al

D. Si and Pb

9. The following transition metal ions would be coloured in aqueous solution **except** _____

A. Cr^{3+}

B. Fe^{3+}

C. Mn^{3+}

D. Sc^{3+}

10. The gas given off when ethanol reacts with sodium is ____

A. Carbon (IV) oxide

B. Hydrogen

C. Methane

D. Oxygen

11. Which of the following halogens is solid at room temperature?

A. Bromine

B. Chlorine

C. Fluorine

D. Iodine

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

13. The number of unpaired electrons in an atom of an element $_8Q$ is _____

A. 2

B. 4

C. 6

D. 8

14. The bond formed when ammonia reacts with hydrogen ion to form ammonium ion is ___

A. Covalent
B. Dative
C. Hydrogen bond
D. Ionic

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

16. The shape of a graphite crystal is _____

A. Tetrahedral
B. Pyramidal
C. Octahedral
D. Hexagonal

17. Which of the following oxides is ionic?

A. P_4O_{10}
B. MgO
C. Al_2O_3
D. SO_2

18. Which of the following substances when boiled with aqueous solution of sodium hydroxide would be hydrolyzed?

i. Protein
ii. Fat
iii. Polythene

A. i
B. ii
C. i and ii
D. ii and iii

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

20. Consider the following reaction equation: $C_2H_{4(g)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(g)}$

The volume of $CO_{2(g)}$ produced at s.t.p when 0.05 moles of $C_2H_{4(g)}$ was burnt in $O_{2(g)}$ is _____ *[Molar Volume of gas = 22.4dm^3]*

A. 1.12dm^3
B. 2.24dm^3
C. 3.72dm^3
D. 4.48dm^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}

22. Consider the following reaction equation: $SO_4^{2-}{}_{(aq)} + 2H^+{}_{(aq)} + ye^- \rightarrow SO_4^{2-}{}_{(aq)} + H_2O_{(l)}$.

The value of y in the equation is _____

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

23. The general gas equation was deprived from_____

A. Boyle's and Gay Lussac's laws
B. Boyle's and Graham's laws
C. Boyle's and Charles' laws
D. Dalton's atomic theory

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

25. Which of the following gases will diffuse most rapidly?

[H=1.00, C=12.0, O=16.0, S=32.0, Cl=35.5]

A. Cl_2

B. SO_2

C. CH_4

D. C_2H_6

26. When a reaction is endothermic, _____

A. Enthalpy change, ΔH is negative

B. Heat content of a product is less than the heat content of a reactant

C. Heat content of reactants is less than the heat content of product

D. The reaction is non-spontaneous

27. Which of the following statements about inter molecular distances and cohesive forces between gas is correct? They are _____

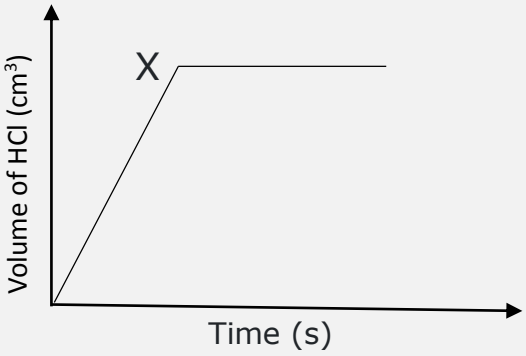
A. Both large

B. Both negligible

C. Constant and negligible

D. Large and negligible

28. The following diagram illustrates the rate curve that was obtained when Mg reacted with excess dilute HCl.



The diagram became horizontal at X because _____

A. The reaction was slowed down

B. All the dilute HCl has reacted

C. All the Mg has reacted

D. Hydrogen gas is produced at a steady rate

29. An example of an acid salt is _____

A. $CH_3COOONa$

B. $Mg(OH)Cl$

C. $NaHSO_4$

D. $(NH_4)_2SO_4$

30. Which of the following oxides can be reduced by hydrogen?

A. Aluminium oxide
B. Magnesium oxide
C. Sodium oxide
D. Silver oxide

31. Solubility is practically applied in _____

A. Fractional distillation
B. The determination of pH
C. The determination of saturation in hydrocarbons
D. Solvent extraction

32. Which of the following compounds is the least soluble in water?

A. $CaCl_2$
B. $CaSO_4$
C. NaCl
D. Na_2SO_4

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

34. Consider the following equilibrium system:

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}.$$

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

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 $SO_{3(g)}$.

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

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

37. Consider the following reaction equation:

$CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{(l)}$

Which substance is oxidized?

A. Cu

B. CuO

C. H_2

D. H_2O

38. Which of the following metals is the strongest reducing agent?

A. Sodium

B. Silver

C. Potassium

D. Copper

39. The complete hydrogenation of benzene gives _____

A. Cyclohexene

B. Cyclohexane

C. Hexene

D. Hexane

40. A compound has an empirical formula CH_2O and molecular mass of 90. Determine its molecular formula. *[H=1.00, C=12.0, O=16.0]*

A. $C_4H_{10}O_2$

B. $C_3H_{10}O_2$

C. $C_3H_6O_3$

D. $C_2H_2O_4$

41. Which of the following reactions would take place when concentrated sodium hydroxide solution is added to palm oil?

A. Esterification

B. Neutralization
C. Polymerization
D. Saponification

42. Starch could be converted to glucose by the process of _____

A. Condensation
B. Dehydration
C. Fermentation
D. Hydrolysis

43. Which of the following compounds is a secondary alkanol?

A. Ethanol
B. 2-methylbutan-2-ol
C. 3-methylpentan-2-ol
D. Propan-1-ol

44. Which of the following substances is a heavy chemical?

A. Ammonia
B. Barium Hydroxide
C. Hydrochloric acid
D. Tetraoxosulphate(VI)acid

45. Which of the following process does not take place in domestic water treatment?

A. Chlorination
B. Flocculation
C. Neutralization
D. Sedimentation

46. A substance responsible for the sour taste of unripe orange is _____

A. Alkene
B. Alkanol
C. Alkanoic acid
D. Alkanoate

47. Which of the following products of biotechnology can be used as a fuel in place of petrol?

A. Butane
B. Ethanol
C. Ethene
D. Propanol

48. Which of the following polymers in thermosetting?

A. Bakelite

B. Nylon

C. Polypropene

D. Polystyrene

49. The correct balanced equation for the reaction between aluminium metal and hot concentrated tetraoxosulphate (VI) acid is _____

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

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

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

D. $2Al_{(s)} + 5H_2SO_{4(l)} \rightarrow Al_2(SO_4)_{3(aq)} + 8H_2O_{(l)} + 3SO_{2(g)}$

50. Which of the following gases is monoatomic?

A. Argon

B. Chlorine

C. Nitrogen

D. Oxygen

WAEC CHEMISTRY OBJECTIVE QUESTIONS (PT.7)

1. The following atoms of carbon $^{12}_{6}C$, $^{13}_{6}C$ and $^{14}_{6}C$ can be described as _____

A. Allotropes
B. Isomers
C. Isotopes
D. Isotopes

2. An atom X consist of 6 protons, 6 electrons and 7 neutrons. Which of the following representations of the atom is correct?

A. $^{13}_{6}X$
B. $^{13}_{7}X$
C. $^{19}_{6}X$
D. $^{19}_{7}X$

3. How many electrons are present in $^{9}_{4}Be^{2+}$?

A. 2
B. 4
C. 5
D. 6

4. When element $_{20}Y$ combines with element $_{8}Z$, it forms _____

A. a covalent compound, YZ is formed
B. a covalent compound, ZY is formed
C. an ionic compound, YZ is formed
D. an ionic compound, ZY is formed

5. The boiling points of HF, H_2O and NH_3 increase in the order of _____

A. NH_3
B. $H_2O < HF$
C. $HF < NH_3 < H_2O$
D. $NH_3 < HF < H_2O$

6. Chemicals that are produced in small quantities and with very degree of purity are _____

A. Bulk chemicals
B. Fine chemicals
C. Heavy chemicals

D. Light chemicals

7. The mass of potassium hydroxide required to make $300.0cm^3$ of $0.4moldm^{-3}$ solution is _____ *{KOH = 56.0}*

A. 26.88g
B. 13.44g
C. 6.72g
D. 3.36g

8. Metals can be stretched into wires because they are _____

A. Ductile
B. Good conductors
C. Lustrous
D. Malleable

9. Aluminium is used in the manufacture or aircraft because it _____

A. Is hard and brittle
B. Is light and resists corrosion
C. Has high density and conducts electricity
D. Is malleable and ductile

10. An unsaturated solution differs from a saturated solution at a given temperature because it _____

A. Cannot dissolve more solute
B. Can hold more solute than it can actually dissolve
C. Can still dissolve more solute at given temperature
D. Form crystal more easily on cooling

11. Which of the following arrangements shows increasing order of reactivity of the halogens?

A. $F_2 > Cl_2 > Br_2 > I_2$
B. $I_2 < Br_2 < Cl_2$
C. $F_2 < Cl_2 < Br_2$
D. $I_2 > Br_2 > Cl_2 > F_2$

12. The shape of the water molecule is _____

A. Linear
B. Pyramidal
C. Tetrahedral

D. V-shaped

13. Which of the following elements would produce coloured ion in aqueous solution?

A. Calcuim
B. Copper
C. Magnesuim
D. Sodium

14. The minimum amount of energy required for effective collisions between reacting particles is known as _____

A. Activation energy
B. Bond energy
C. Kinetic energy
D. Potential energy

15. The bond formed between H_2O and H^+ to form the hydroxonium H_3O^+ is _____

A. Dative
B. Covalent
C. Electrovalent
D. Ionic

16. An element X forms the following oxides X_2O, XO and XO_2. This phenomenon illustrates the law of _____

A. Conservation of mass
B. Definite proportion
C. Mass action
D. Multiple proportion

17. How many moles of oxygen would contain 1.204×10^{24} molecules? *[Avogadro's constant (N_A) = 6.02 x 10^{23}]*

A. 1
B. 2
C. 3
D. 4

18. Which of the following statements about solids is correct?

A. Solid particles are less orderly than those of a liquid
B. Solid have lower densities than liquids

C. Solid particles have greater kinetic energies than those of liquids

D. Solid particles cannot be easily compressed

19. Which of the following apparatus can be used to measure a specific volume of a liquid accurately?

A. Beaker

B. Conical flask

C. Measuring cylinder

D. Pipette

20. The general gas equation $\frac{PV}{T} = K$ is a combination of _____

A. Boyle's and Charles' laws

B. Boyle's and Graham's laws

C. Charles' and Graham's laws

D. Dalton's and Graham's laws

21. The spreading of the scent of a flower in a garden is an example of_____

A. Brownian motion

B. Diffusion

C. Osmosis

D. Tyndal effect

22. Propane carbon(IV)oxide diffuse at the same rate because _____ *[H=1.00, C=12.0, O=16.0]*

A. They are both gases

B. Their molecules contain carbon

C. They have the same relative molecular mass

D. Both are denser than air

23. The energy which accompanies the addition of an electron to an isolated gaseous atom is _____

A. Atomization

B. Electronegativity

C. Electron affinity

D. Ionization

24. An aqueous solution of $(NH_4)_2SO_4$ is _____

A. Acidic

B. Alkaline

C. Amphoteric

D. Neutral

25. When $NH_4Cl_{(s)}$ is dissolved in water, the container feels cold to touch. This implies _____

A. The process is endothermic

B. The process is exothermic

C. NH_4Cl forms a saturated solution

D. NH_4Cl is highly soluble in water

26. The pH of four solutions M, N, Q and R are 2, 6, 8 and 11 respectively. Which of the following deductions about the solutions is correct?

A. The pH of N is increased when the solution is diluted

B. The pH of Q is increased when the solution is evaporated

C. M is the most alkaline solution

D. R is the most acidic solution

27. Consider the following reaction equation:

$H_3O^+_{(aq)} + OH_{(aq)} \rightarrow 2H_2O_{(l)}$

The reaction represents _____

A. Esterification

B. Hydrolysis

C. Neutralization

D. Redox

28. The refreshing characteristic taste of fizzy drinks is due ot the presence of _____

A. Carbon (IV) oxide

B. Glucose

C. Hydrogen

D. Sodium Citrate

29. Chemical equilibrium is attained when _____

A. All the reactants have been completely used up

B. The reaction goes to completion

C. The concentration of reactants and products remain constant

D. The concentration of reactants and products are equal

30. Which of the following factors will affect the rate of the reaction represented by the following equation:

$2HCl_{(aq)} + CaCO_{3(s)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$

I. Pressure
II. Concentration
III. Nature of reactants
IV. Temperature

A. I and II only
B. II, III and IV only
C. I, II and III only
D. I, II. III and IV

31. On evaporation to dryness, $350cm^3$ of saturated solution of salt Z gave 55.5g of salt. What is the solubility of the salt?

[Z = 101]

A. 1.57 $moldm^{-3}$
B. 3.14 $moldm^{-3}$
C. 6.28 $moldm^{-3}$
D. 12.56 $moldm^{-3}$

32. Which of the following salts when dissolved in water will form a solution that will change blue litmus to red?

A. CH_3COONa
B. NH_4Cl
C. NaCl
D. KCl

33. Which of the following bonds are broken when ethanol is boiled?

I. Covalent bonds
II. Ionic bonds
III. Hydrogen bonds

A. I only
B. II only
C. III only
D. I, II, III

34. A compound with molecular formula CH_2O_2 is _____

A. A Carbohydrate
B. A Carboxylic acid
C. An alkanol
D. An ester

35. The quality of electricity required to discharge 1 mole of univalent ion is _____

A. 9600C
B. 48250C
C. 96500C
D. 193000C

36. Chlorine water is used as a bleaching agent because it is ____

A. An acidic solution
B. An alkaline solution
C. An oxidizing agent
D. A reducing agent

37. Which of the following substances is a non-electrolyte?

A. H_2SO_4
B. CH_3COOH
C. $C_6H_{12}O_6$
D. NH_4Cl

38. The oxidation number of sulphur is +4 in _____

A. $Na_2S_2O_3$
B. H_2SO_3
C. H_2SO_4
D. SO_3

39. Consider the following ionic equation: $Cr_2O_7^{2-} + 14H^+ + ne^- \rightarrow 2Cr^{3+} + 7H_2O$. The value of n in the equation is _____

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

40. Consider the following half-cell reactions.

$Al_{(s)} \rightarrow Al^{3+}_{(aq)} + 3e^-$

$Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$

The overall equation for the reaction is _____

A. $Al_{(s)} + Cu^{2+}_{(aq)} \rightarrow Al^{3+}_{(aq)} + Cu_{(s)}$
B. $2Al_{(s)} + Cu^{2+}_{(aq)} \rightarrow 2Al_{(aq)} + Cu_{(s)}$
C. $2Al_{(s)} + 3Cu^{2+}_{(aq)} \rightarrow 3Cu_{(s)} + 2Al^{3+}_{(aq)}$
D. $3Al_{(s)} + 2Cu^{2+}_{(aq)} \rightarrow Cu_{(s)} + 3Al^{3+}_{(aq)}$

41. Amino acids are obtained from proteins by _____

A. Hydrolysis
B. Oxidation
C. Polymerization
D. Reduction

42. When a compound X is heated with conc. tetraoxosulphate (VI) acid, it produces an alkene. X is an _____

A. Alkane
B. Alkanol
C. Alkanoate
D. Alkyne

43. Ripening of fruits is hastened by using _____

A. Ethanol
B. Ethane
C. Ethene
D. Ethyne

44. The compound that makes palm wine taste sour after exposure to the air for few days is

A. Ethanol
B. Ethanoic acid
C. Methanol
D. Methanoic acid

45. Which of the following compounds is/are secondary alkanols?

i) $CH_3CH(CH_3)CH_3OH$
ii) $CH_3CH_2CH(OH)CH_3$
iii) $CH_3C(OH)(CH_3)CH_3$

A. I only
B. II only
C. I and III only
D. II and III only

46. Consider the following reaction equation: $C_2H_{4(g)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(l)}$.
The volume of oxygen at s.t.p that will be required to burn 14g of ethene is _____ *[C_2H_4 = 28; Molar volume of gas at s.t.p = 22.4dm^3]*

A. 64.2dm^3
B. 33.6dm^3

C. 11.2dm^3

D. 3.73dm^3

47. Which of the following sources of energy contributes to green-house effect?

A. Natural gas

B. Nuclear

C. Wind

D. Solar

48. A consequences of global warming is _____

A. Air pollution

B. Flooding

C. Increased humidity

D. Water pollution

49. Which of the following metals is common to both brass and bronze?

A. Aluminium

B. Copper

C. Lead

D. Iron

50. The alkanol obtained from the production of soap is _____

A. Dihydric Alkanol

B. Tertiary Alkanol

C. Trihydric Alkanol

D. Monohydric Alkanol

~~DISCLAIMER~~

These are **not** WAEC expo questions for this year, but past questions of previous years.

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