

# JAMB

## CHEMISTRY

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## JAMB CHEMISTRY PAST QUESTIONS (PT.1)

**1.** A mixture is different from a compound because \_\_\_\_\_

A. the properties of a compound are those of its individual constituents while those of a mixture differ from its constituents

B. a mixture is always homogeneous while a compound is not

C. the constituent of a compound are chemically bound together while those of a mixture are not

D. a mixture can be represented by a chemical formula while a compound cannot

**2.** What is the percentage of sulphur in sulphur (IV) oxide?

A. 66%

B. 25%

C. 40%

D. 50%

**3.** A gas X diffuses twice as fast as gas Y. If the relative molecular

mass of X is 32, calculate the relative molecular mass of Y.

A. 128

B. 8

C. 16

D. 64

**4.**  $200\text{cm}^3$  of a gas at  $25^\circ\text{C}$  exerts a pressure of 700 mmHg. Calculate its pressure if its volume increases  $350\text{ cm}^3$  at  $75^\circ\text{C}$ .

A. 342.53 mmHg

B. 1430.54 mmHg

C. 467.11 mmHg

D. 400.00 mmHg

**5.** An element X has electron configuration  $1s^2 2s^2 2p^6 3s^2 3p^5$ . Which of the following statements is correct about the element?

A. It has a completely filled p-orbital

B. It has 5 electrons in its outermost shell

- C. It belongs to group II on the periodic table  
D. It is a halogen

**6.** Beryllium and aluminium have similar properties because they \_\_\_\_\_

- A. are both metals  
B. belong to the same group  
C. belong to the same period  
D. are positioned diagonally to each other

**7.** If the difference in electronegativity of elements P and Q is 3.0. The bond that will be formed between them is \_\_\_\_\_

- A. metallic  
B. covalent  
C. co-ordinate  
D. ionic

**8.** How many protons, neutrons and electrons respectively are present in the element  ${}^{60}_{27}\text{Co}$ ?

- A. 27, 33 and 33

- B. 33, 27 and 27  
C. 27, 33, and 27  
D. 60, 33 and 60

**9.** The radioactive radiation used in studying the arrangement of particles in giant organic molecules is \_\_\_\_\_

- A.  $\gamma$ - rays  
B.  $\alpha$ - particles  
C. X- rays  
D.  $\beta$  – particles

**10.** A silicon-containing ore has 92%  ${}^{28}\text{Si}$ , 5%  ${}^{29}\text{Si}$  and 3%  ${}^{30}\text{Si}$ . Calculate the relative atomic mass of the silicon.

- A. 14.00  
B. 29.00  
C. 28.11  
D. 28.00

**11.** The nitrogen obtained from air has a density higher than the one from \_\_\_\_\_ nitrogen-containing compounds because the one from air is contaminated with \_\_\_\_\_

- A. water vapour
- B. oxygen
- C. rare gases
- D. carbon (IV) oxide

**12.** Water is said to be temporarily hard when it contains \_\_\_\_\_

- A.  $\text{Ca}(\text{HCO}_3)_2$  and  $\text{Mg}(\text{HCO}_3)_2$  salts
- B.  $\text{Ca}(\text{HCO}_3)_2$  and  $\text{CaCO}_3$  salts
- C.  $\text{Mg}(\text{HCO}_3)_2$  and  $\text{CaSO}_4$  salts
- D.  $\text{CaSO}_4$  and  $\text{Ca}(\text{HCO}_3)_2$  salts

**13.** On exposure to the atmosphere, a hydrated salt loses its water of crystallization to become anhydrous. This phenomenon is referred to as \_\_\_\_\_

- A. efflorescence
- B. deliquescence
- C. hygroscopy
- D. hydrolysis

**14.** 16.55g of lead (II) trioxonitrate (V) was dissolved in 100g of distilled water at  $20^\circ\text{C}$ , calculate the solubility of the solute in  $\text{mol dm}^{-3}$

[Pb=207, N=14, O=16]

- A. 0.05 g
- B. 2.00 g
- C. 1.00 g
- D. 0.50 g

**15.** The dispersion of a liquid in a liquid medium will give \_\_\_\_\_

- A. an emulsion
- B. a fog
- C. a gel
- D. an aerosol

**16.** The major and most effective way of controlling pollution is to \_\_\_\_\_

- A. improve machinery so that the substances released from combustion are less harmful
- B. pass strict laws against it by individuals and companies
- C. educate people on the causes and effects of pollution
- D. convert chemical wastes to harmless substances before releasing them into the environment

**17.** The basicity of  $\text{CH}_3\text{COOH}$  is \_\_\_\_\_

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

**18.** The colour of litmus in a neutral medium is \_\_\_\_\_

- A. purple
- B. pink
- C. yellow
- D. orange

**19.** The mathematical expression of pH is \_\_\_\_\_

- A.  $\log_{10} [\text{OH}^-]$
- B.  $\log_{10} \frac{1}{[\text{H}_3\text{O}^+]}$
- C.  $\log_{10} [\text{H}_3\text{O}^+]$
- D.  $\log_{10} \frac{1}{[\text{OH}^-]}$

**20.** Which of the following salts will turn blue litmus red?

- A. Sodium tetrahydroxozincate (II)
- B. Potassium hydrogen tetraoxosulphate (IV)
- C. Sodium trioxocarbonate (IV)

D. Zinc chloride hydroxide

**21.**  $\text{Zn}_{(\text{s})} + \text{CuSO}_{4(\text{aq})} \rightarrow \text{ZnSO}_{4(\text{aq})} + \text{Cu}_{(\text{s})}$

In the reaction above, the oxidation number of the reducing agent changes from \_\_\_\_\_

- A. 0 to +4
- B. 0 to +2
- C. +1 to +2
- D. +1 to +3

**22.**  $\text{H}_2\text{O}_{(\text{g})} + \text{C}_{(\text{s})} \rightarrow \text{H}_{2(\text{g})} + \text{CO}_{(\text{g})}$

The oxidizing agent in the reaction above is \_\_\_\_\_

- A.  $\text{CO}_{(\text{g})}$
- B.  $\text{C}_{(\text{s})}$
- C.  $\text{H}_2\text{O}_{(\text{g})}$
- D.  $\text{H}_{2(\text{g})}$

**23.** Calculate the quantity of electricity in coulombs required to liberate 10g of copper from a copper compound.

*[Cu=64, F=96500 Cmol<sup>-1</sup>]*

- A. 32395.5
- B. 30156.3

C. 60784.5

D. 15196.5

**24.** How many faraday of electricity is required to produce 0.25 mole of copper?

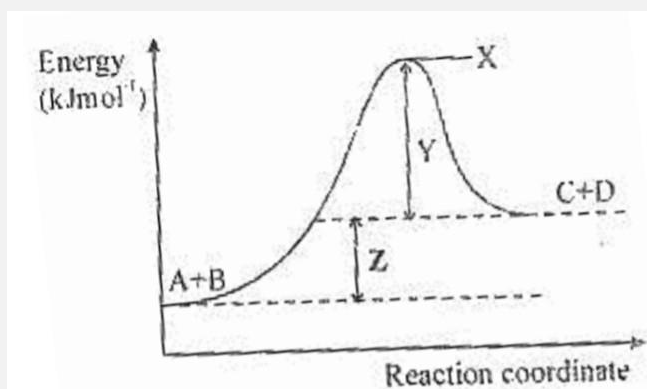
A. 1.00F

B. 0.01F

C. 0.05F

D. 0.50F

**25.** Z in diagram below represents \_\_\_\_\_



A. heat of reaction

B. activation energy

C. free energy

D. entropy of reaction

**26.** If the change in free energy of a system is  $-899\text{Jmol}^{-1}$  and the entropy change is  $10\text{Jmol}^{-1}\text{K}^{-1}$  at

$25^\circ\text{C}$ , calculate the enthalpy change.

A.  $+2081\text{Jmol}^{-1}$

B.  $-2081\text{Jmol}^{-1}$

C.  $-649\text{Jmol}^{-1}$

D.  $+649\text{Jmol}^{-1}$

**27.** In an equilibrium reaction, which of the following conditions indicates that maximum yield of the product will be obtained?

A. Equilibrium constant is very large

B.  $\Delta H - T\Delta S = 0$

C.  $\Delta H > T\Delta S$

D. Equilibrium constant is less than zero

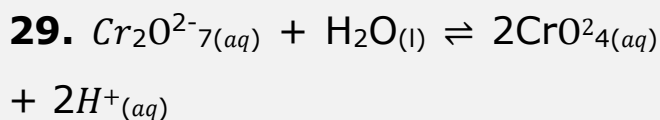
**28.** In a chemical reaction, the change in concentration of a reactant with time is \_\_\_\_\_

A. entropy of reaction

B. enthalpy of reaction

C. rate of reaction

D. order of reaction

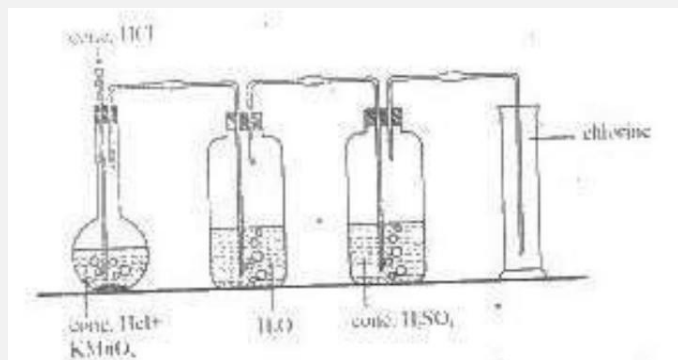


What happens to the reaction above when the hydrogen ion concentration is increased?

- A. more of the products will be formed
- B. the reaction will not proceed
- C. the equilibrium position will shift to the right
- D. the equilibrium position will shift to the left

**30.** Which of the following will liberate hydrogen from dilute tetraoxosulphate (VI) acid?

- A. Lead
- B. Magnesium
- C. Copper
- D. Gold



**31.** In the diagram, the function of the concentrated  $\text{H}_2\text{SO}_4$  is to \_\_\_\_\_

- A. purify the gas
- B. dry the gas
- C. liquefy the gas
- D. remove odour

**32.** In the diagram, which gas is removed by the water in the flask?

- A.  $\text{O}_2$
- B.  $\text{SO}_2$
- C.  $\text{HCl}$
- D.  $\text{H}_2$

**33.** Fluorine does not occur in the free state in nature because \_\_\_\_\_

- A. it is a poisonous gas
- B. it belongs to the halogen family
- C. it is inert
- D. of its high reactivity

**34.** In the extraction of sodium from fused sodium chloride, the anode is made of platinum because \_\_\_\_\_

- A. sodium is formed at the anode
- B. chlorine is formed at the anode
- C. sodium does not react with platinum
- D. chlorine does not react with platinum

**35.** A compound that gives a brick-red colour to a non-luminous flame is likely to contain \_\_\_\_\_

- A. copper ions
- B. sodium ions
- C. calcium ions
- D. aluminium ions

**36.** In the electrolytic extraction of calcium from calcium chloride, the cathode is \_\_\_\_\_

- A. zinc
- B. graphite
- C. platinum
- D. iron

**37.** A few drops of NaOH solution was added to an unknown salt forming a white precipitate which

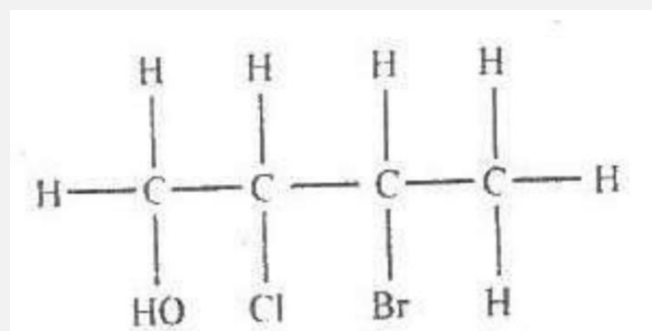
is insoluble in excess solution. The cation likely present is \_\_\_\_\_

- A.  $\text{Zn}^{2+}$
- B.  $\text{Pb}^{2+}$
- C.  $\text{Ca}^{2+}$
- D.  $\text{Al}^{3+}$

**38.** The general formula of haloalkanes where X represents the halide is \_\_\_\_\_

- A.  $\text{C}_n\text{H}_{2n-1}\text{X}$
- B.  $\text{C}_n\text{H}_{2n}\text{X}$
- C.  $\text{C}_n\text{H}_{2n+2}\text{X}$
- D.  $\text{C}_n\text{H}_{2n+1}\text{X}$

**39.**



The IUPAC nomenclature of the compound above is \_\_\_\_\_

- A. 2-bromo-3-chlorobutan-2-ol
- B. 3-bromo-2-chlorobutan-2-ol
- C. 3-chloro-2-bromobutan-2-ol



D. 2-chloro-3-bromobutanol

**40.** The alkanol obtained from the production of soap is \_\_\_\_\_

- A. propanol
- B. ethanol
- C. glycerol
- D. methanol

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## JAMB CHEMISTRY PAST QUESTIONS (PT.2)

1. Ethyne is passed through a hot tube containing organo-nickel catalyst to produce \_\_\_\_\_

- A. isoprene
- B. polythene
- C. ethanol
- D. benzene

2. Which are the correct IUPAC names for  $\text{H}-\text{CO}_2\text{CH}_3$  and  $\text{CH}\equiv\text{CH}$ ?

- A. Methyl methanoate and ethene
- B. Metanoic acid and ethyne
- C. Ethyl methanoate and ethyne
- D. Methyl methanoate and ethyne

3. A solution X on mixing with  $\text{AgNO}_3$  solution, gives a white precipitate soluble in  $\text{NH}_{3(\text{aq})}$ . A solution Y, when added to X, also gives a white precipitate which is soluble on boiling. Solution Y contains \_\_\_\_\_

- A.  $\text{Ag}^+$  ion
- B.  $\text{Pb}^{2+}$  ion
- C.  $\text{Pb}^{4+}$  ion

D.  $\text{Zn}^{2+}$  ion

4. Methane is a member of the homologous series called \_\_\_\_\_

- A. alkenes
- B. alcohols
- C. esters
- D. alkanes

5. Which of the following bonds exists in crystalline ammonium chloride ( $\text{NH}_4\text{Cl}$ )?

- A. ionic covalent
- B. ionic and co-ordinate
- C. ionic, covalent and co-ordinate
- D. covalent, co-ordinate and metallic

6. Some copper (II) sulphate pentahydrate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), was heated at  $120^\circ\text{C}$  with the following results: Wt of crucible = 10.00 g; Wt of crucible +  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  = 14.98g; Wt of crucible + residue = 13.54g. How many molecules of water of crystallization were lost?

[H = 1, Cu = 63.5, O = 16, S = 32]

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

**7.** Due to the unstable nature of ethyne, it is stored by dissolving in \_\_\_\_\_

- A. ethane-1,2-diol
- B. propanol
- C. ethanoic acid
- D. propanone

**8.** 12.0g of a mixture of potassium carbonate and potassium chloride were dissolved in a 250cm<sup>3</sup> standard flask. 25cm<sup>3</sup> of this solution required 40.00cm<sup>3</sup> of 0.1M HCl neutralization. What is the percentage by weight of K<sub>2</sub>CO<sub>3</sub> in the mixture?

[K = 39, O = 16, C = 12]

- A. 60
- B. 72
- C. 82
- D. 92

**9.** Which of the following, groups of physical properties increases from left to right of the Periodic Table?

- 1. Ionization energy
- 2. Atomic radius
- 3. Electronegativity
- 4. Electron affinity

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

**10.** An element Z, contained 90% of <sup>16</sup>Z and 10% of <sup>18</sup>Z. Its relative atomic mass is \_\_\_\_\_

- A. 16.0
- B. 16.2
- C. 17.0
- D. 17.8

**11.** What are the possible oxidation numbers for an element if its atomic number is 17?

- A. -1 and 7
- B. -1 and 6

C. -3 and 5

D. -2 and 6

**12.** How many valence electrons are contained in the element represented by  $^{31}_{15}\text{P}$ ?

A. 3

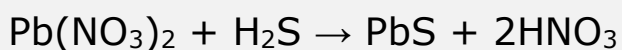
B. 5

C. 15

D. 31

**13.** 10.0 dm<sup>3</sup> of air containing H<sub>2</sub>S as an impurity was passed through a solution of Pb(NO<sub>3</sub>)<sub>2</sub> until all the H<sub>2</sub>S had reacted. The precipitate of PbS was found to weigh 5.02g.

*According to the equation:*



The percentage by volume of hydrogen sulphide in the air is \_\_\_\_\_

A. 50.2

B. 47.0

C. 4.70

D. 0.47

**14.** A quantity of air was passed through a weighed amount of alkaline pyrogallol. An increase in the weight of the pyrogallol would result from the absorption of \_\_\_\_\_

A. nitrogen

B. neon

C. argon

D. oxygen

**15.** Water for town supply is chlorinated to make it free from \_\_\_\_\_

A. bad odour

B. bacteria

C. temporary hardness

D. permanent hardness

**16.** 4.0 g of sodium hydroxide in 250cm<sup>3</sup> of solution contains \_\_\_\_\_

A. 0.40 moles per dm<sup>3</sup>

B. 0.10 moles per dm<sup>3</sup>

C. 0.04 moles per dm<sup>3</sup>

D. 0.02 moles per dm<sup>3</sup>

**17.** A major effect of oil pollution in coastal waters is the \_\_\_\_\_

- A. destruction of marine life
- B. desalination of the water
- C. increase in the acidity of the water
- D. detoxification of the water

**18.** In general, an increase in temperature increases the solubility of a solute in water because \_\_\_\_\_

- A. more solute molecules collide with each other
- B. most solutes dissolve with the evolution of heat
- C. more solute molecules dissociate at higher temperatures
- D. most solutes dissolve with absorption of heat

**19.** The relatively high boiling points of alkanols are due to \_\_\_\_\_

- A. ionic bonding
- B. aromatic character
- C. covalent bonding

D. hydrogen bonding

**20.** Given that  $15.00\text{cm}^3$  of  $\text{H}_2\text{SO}_4$  was required to completely neutralize  $25.00\text{cm}^3$  of  $0.125\text{ mol dm}^3$   $\text{NaOH}$ , calculate the molar concentration of the acid solution.

- A.  $0.925\text{ mol dm}^3$
- B.  $0.156\text{ mol dm}^3$
- C.  $0.104\text{ mol dm}^3$
- D.  $0.023\text{ mol dm}^3$

**21.** What volume of  $0.1\text{ mol dm}^3$  solution of tetraoxosulphate (VI) acid would be needed to dissolve  $2.86\text{g}$  of sodium trioxocarbonate (IV) decahydrate crystals? [ $H=1$ ,  $C=12$ ,  $O=16$ ,  $S=32$ ,  $Na=23$ ]

- A.  $20\text{cm}^3$
- B.  $40\text{cm}^3$
- C.  $80\text{cm}^3$
- D.  $100\text{cm}^3$

**22.** The solution with the lowest pH value is \_\_\_\_\_

- A.  $5\text{ ml}$  of  $M/10\text{ HCL}$
- B.  $10\text{ ml}$  of  $M/10\text{ HCL}$

C. 15 ml of  $M/5$  HCL

D. 20 ml of  $M/8$  HCL

**23.** In which order are the following salts sensitive to light?

A. AgI > AgCl > AgBr

B. AgCl > AgI > AgBr

C. AgBr > AgCl > AgI

D. AgCl > AgBr > AgI

**24.** A metal m displaces Zinc from Zinc chloride solution. This shows that \_\_\_\_\_

A. M is more electronegative than Zinc

B. Zinc is above hydrogen in the series.

C. M is more electropositive than zinc.

D. electrons flow from zinc to m

**25.** Steam changes the colour of anhydrous cobalt (II) chloride from \_\_\_\_\_

A. blue to pink

B. white to red

C. white to green

D. blue to white

**26.** When at equilibrium, which of the reactions below will shift to the right if the pressure is increased and the temperature is kept constant?

A.  $2\text{SO}_{3(g)} \rightleftharpoons 2\text{SO}_{2(g)} + \text{O}_{2(g)}$

B.  $2\text{CO}_{2(g)} \rightleftharpoons 2\text{CO}_{(g)} + \text{O}_{2(g)}$

C.  $2\text{H}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{H}_2\text{O}_{(g)}$

D.  $2\text{NO}_{(g)} \rightleftharpoons \text{N}_{2(g)} + \text{O}_{2(g)}$

**27.**  $2\text{CO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{CO}_{2(g)}$

Given that  $\Delta H$  [CO] is  $-110.4 \text{ kJmol}^{-1}$  and  $\Delta H$  [CO<sub>2</sub>] is  $-393.0 \text{ kJmol}^{-1}$ , the energy change for the reaction above is \_\_\_\_\_

A.  $-503.7 \text{ kJ}$

B.  $-282.6 \text{ kJ}$

C.  $+282.6 \text{ kJ}$

D.  $+503.7 \text{ kJ}$

**28.** Which of these properties gives a solid its definite shape?

A. Strong intermolecular attraction

- B. High melting point
- C. High boiling point
- D. Weak intermolecular attraction

**29.** When a crystal was added to the clear solution of its salt, the crystal did not dissolve and the solution remained unchanged. This showed that the solution was \_\_\_\_\_

- A. supersaturated
- B. concentrated
- C. unsaturated
- D. saturated

**30.** If the electron configuration of an element is  $1s^2 2s^2 2p^5$ , how many unpaired electrons are there?

- A. 2
- B. 5
- C. 1
- D. 4

**31.** The substance that is used in the steel industry for the removal of carbon, sulphur and phosphorus impurities from pig iron is \_\_\_\_\_

- A. oxygen
- B. chlorine
- C. nitrogen
- D. hydrogen

**32.** Hydrogen sulphide gas can act as \_\_\_\_\_

- A. an oxidizing agent
- B. a dehydrating agent
- C. a bleaching agent
- D. a precipitating agent

**33.** Which of the following is used as a rocket fuel?

- A.  $\text{HNO}_3$
- B.  $\text{CH}_3\text{COOH}$
- C.  $\text{H}_2\text{SO}_4$
- D.  $\text{HCl}$

**34.** The bleaching action of chlorine is effective due to the presence of \_\_\_\_\_

- A. Hydrogen chloride
- B. Water
- C. Air
- D. Oxygen

**35.** Mineral acids are usually added to commercial hydrogen peroxide to \_\_\_\_\_

- A. Oxidize it
- B. decompose it
- C. minimize its decomposition
- D. reduce it to water and oxygen

**36.** Aluminium containers are frequently used to transport trioxonitrate (v) acid because aluminium \_\_\_\_\_

- A. has a low density
- B. does not react with the acid
- C. does not corrode
- D. has a silvery-white appearance

**37.** Ethyne is passed through a hot tube containing organo-nickel catalyst to produce \_\_\_\_\_

- A. Isoprene
- B. polythene
- C. ethanol
- D. benzene

**38.** The process of converting starch to ethanol is \_\_\_\_\_

- A. cracking
- B. distillation
- C. fermentation
- D. oxidation

**39.** An endothermic reaction is one during which heat is \_\_\_\_\_ and can be represented by the symbol \_\_\_\_\_. Which of the following combinations can be used accurately to complete the above definition?

- A. liberated,  $-\Delta H$
- B. liberated,  $+\Delta H$
- C. absorbed,  $-\Delta H$
- D. absorbed,  $+\Delta H$

**40.** Consider the following exothermic reaction  $2\text{SO}_{2(g)} + \text{O}_{2(g)} = 2\text{SO}_{3(g)}$ . If the temperature of the reaction is reduced from  $800^{\circ}\text{C}$  to  $500^{\circ}\text{C}$ , and no other change takes place, then \_\_\_\_\_

- A. the reaction rate increases



- B. concentration of  $\text{SO}_2$  decreases
- C. concentration of  $\text{SO}_2$  increases
- D.  $\text{SO}_2$  gas becomes unreactive

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## JAMB CHEMISTRY PAST QUESTIONS (PT.3)

1. What is the concentration of a solution containing 2g of NaOH in 100cm<sup>3</sup> of solution?

[Na = 23, O = 16, H = 1]

- A. 0.40 mol dm<sup>-3</sup>
- B. 0.50 mol dm<sup>-3</sup>
- C. 0.05 mol dm<sup>-3</sup>
- D. 0.30 mol dm<sup>-3</sup>

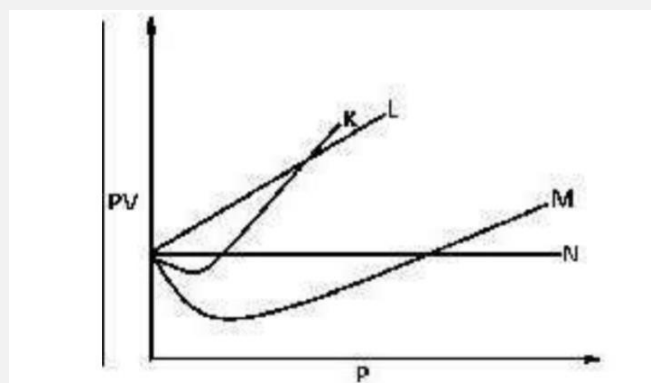
2. Which of the following properties is NOT peculiar to matter?

- A. kinetic energy of particles increases from solid to gas
- B. Random motion of particles increases from liquid to gas
- C. Orderliness of particles increases from gas to liquid
- D. Random motion of particles increases from gas to solid

3. The principle of column chromatography is based on the ability of the constituents to \_\_\_\_\_

- A. move at different speeds in the column
- B. dissolve in each other in the column
- C. react with the solvent in the column
- D. react with each other in the column

4.



From the diagram above, an ideal can be represented by \_\_\_\_\_

- A. M
- B. N
- C. K
- D. L

5. Which of the following questions is correct about the periodic table?

A. The non-metallic properties of the elements tend to decrease across each period

B. The valence electrons of the elements increase progressively across the period

C. Elements in the same group have the same number of electron shells

D. Elements in the same period have the number of valence electrons

**6.** The process of converting starch to ethanol is \_\_\_\_\_

A. cracking

B. distillation

C. fermentation

D. oxidation

**7.** An isotope has an atomic number of 15 and a mass number of 31. The number of protons it contains is \_\_\_\_\_

A. 16

B. 15

C. 46

D. 31

**8.** The molecular lattice of iodine is held together by \_\_\_\_\_

A. dative bond

B. metallic bond

C. hydrogen bond

D. van der Waal's forces

**9.** The arrangement of particles in crystal lattices can be studied using \_\_\_\_\_

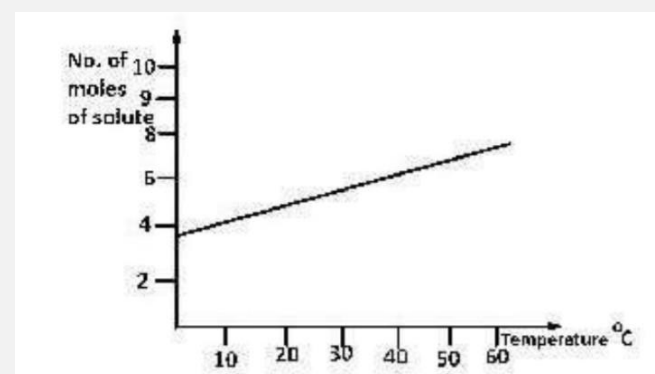
A. X - rays

B.  $\gamma$  - rays

C.  $\alpha$  - rays

D.  $\beta$  - rays

**10.**



From the diagram above, find the amount of solute deposited when

200 cm<sup>3</sup> of the solution is cooled from 55°C to 40°C.

- A. 0.10 mole
- B. 0.20mole
- C. 0.01 mole
- D. 0.02 mole

**11.** The importance of sodium aluminate (III) in the treatment of water is to \_\_\_\_\_

- A. cause coagulation
- B. neutralize acidity
- C. prevent goitre and tooth decay
- D. kill germs

**12.** What type of bond exists between an element X with atomic number 12 and Y with atomic number 17?

- A. Electrovalent
- B. Metallic
- C. Covalent
- D. Dative

**13.** Hardness of water is mainly due to the presence of \_\_\_\_\_

- A. calcium hydroxide or magnesium hydroxide
- B. calcium trioxocarbonate (IV) or calcium tetraoxosulphate (VI)
- C. sodium hydroxide or magnesium Hydroxide
- D. calcium chloride or sodium chloride salts

**14.** A suitable solvent for iodine and naphthalene is \_\_\_\_\_

- A. carbon (IV) sulphide
- B. ethanol
- C. water
- D. benzene

**15.** Which of the following noble gases is commonly found in the atmosphere?

- A. Xenon
- B. Neon
- C. Helium
- D. Argon

**16.**  $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{2(g)}$   $\Delta H = +ve$

In the reaction above, an increase in temperature will \_\_\_\_\_

- A. increase the value of the equilibrium constant
- B. decreases the value of the equilibrium constant
- C. increase in the reactant production
- D. shift the equilibrium to the left

**17.**  $\text{CH}_3\text{COOH}_{(\text{aq})} + \text{OH}^{-}_{(\text{aq})} \rightleftharpoons \text{CH}_3\text{COO}^{-}_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$ . In the reaction above,  $\text{CH}_3\text{COO}^{-}_{(\text{aq})}$  is \_\_\_\_\_

- A. conjugate base
- B. acid
- C. base
- D. conjugate acid

**18.** How many cations will be produced from a solution of potassium aluminium tetraoxosulphate (VI)?

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

**19.** Which of the following is NOT an alkali?

- A.  $\text{NH}_3$
- B.  $\text{Mg}(\text{OH})_2$
- C.  $\text{Ca}(\text{OH})_2$
- D.  $\text{NaOH}$

**20.** An effect of thermal pollution on water bodies is that the \_\_\_\_\_

- A. volume of water reduces
- B. volume of chemical waste increase
- C. level of oxides of nitrogen increase
- D. level of oxygen reduces

**21.** Which of the following is a deliquescent compound?

- A.  $\text{Na}_2\text{CO}_3$
- B.  $\text{CaCl}_2$
- C.  $\text{CuO}$
- D.  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

**22.** A chemical reaction which the hydration energy is greater than

the lattice energy is referred to as \_\_\_\_\_

- A. a spontaneous reaction
- B. an endothermic reaction
- C. an exothermic reaction
- D. a reversible reaction

**23.** The function of zinc electrode in a galvanic cell is that it \_\_\_\_\_

- A. undergoes reduction
- B. serves as the positive electrode
- C. production electrons
- D. uses up electrons

**24.**  $\text{CH}_{4(g)} + \text{Cl}_{2(g)} \rightarrow \text{CH}_3\text{Cl}_{(s)} + \text{HCl}_{(g)}$

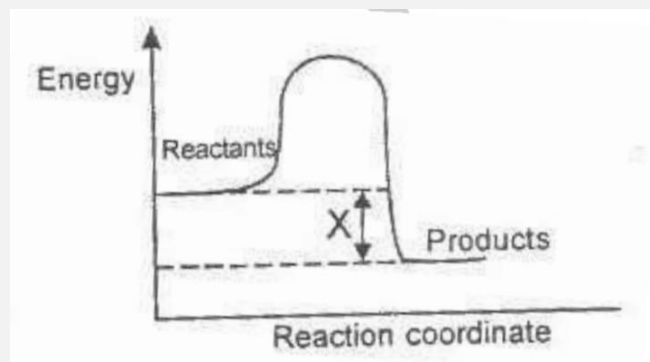
The major factor that influence the rate of the reaction above is \_\_\_\_\_

- A. catalyst
- B. temperature
- C. concentration
- D. light

**25.** The condition required for corrosion to take place is the presence of \_\_\_\_\_

- A. water and carbon (IV) oxide
- B. water, carbon (IV) oxide and oxygen
- C. oxygen and carbon (IV) oxide
- D. water and oxygen

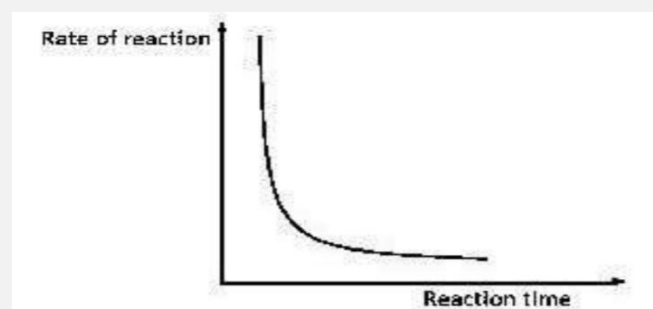
**26.**



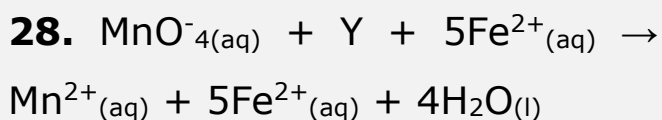
In the diagram above, X is the \_\_\_\_\_

- A. enthalpy
- B. enthalpy change
- C. activation energy
- D. activated complex

**27.** The diagram below best illustrates the effect of decrease in \_\_\_\_\_



- A. concentration
- B. temperature
- C. surface area
- D. pressure



In the equation above, Y is \_\_\_\_\_

- A.  $5\text{H}^{+}(\text{aq})$
- B.  $4\text{H}^{+}(\text{aq})$
- C.  $10\text{H}^{+}(\text{aq})$
- D.  $8\text{H}^{+}(\text{aq})$

**29.** Given that M is the mass of a substance deposited during electrolysis and Q is the quantity of electricity consumed, then Faraday's first law can be written as \_\_\_\_\_

*[Electrochemical equivalent]*

- A.  $M = \frac{E}{Q}$
- B.  $M = EQ$
- C.  $M = \frac{Q}{E}$
- D.  $M = \frac{E}{2Q}$

**30.** The impurities formed during the laboratory preparation of chlorine gas are removed by \_\_\_\_\_

- A.  $\text{H}_2\text{O}$
- B.  $\text{NH}_3$
- C.  $\text{H}_2\text{SO}_4$
- D.  $\text{HCl}$

**31.** The effect of the presence of impurities such as carbon and sulphur on iron is that they \_\_\_\_\_

- A. give it high tensile strength
- B. make it malleable and ductile
- C. increase its melting point
- D. lower its melting point

**32.** A few drops of concentrated  $\text{HNO}_3$  is added to an unknown solution and boiled for a while. If this produces a brown solution, the cation presents are likely to be \_\_\_\_\_

- A.  $\text{Pb}^{2+}$
- B.  $\text{Cu}^{2+}$
- C.  $\text{Fe}^{3+}$

D.  $\text{Fe}^{2+}$

**33.** The bleaching action of chlorine gas is effective due to the presence of \_\_\_\_\_

- A. hydrogen chloride
- B. water
- C. air
- D. oxygen

**34.** In the laboratory preparation of oxygen, dried oxygen is usually collected over \_\_\_\_\_

- A. hydrochloric acid
- B. mercury
- C. calcium chloride
- D. tetraoxosulphate (VI) acid

**35.** The property of concentrated  $\text{H}_2\text{SO}_4$  that makes it suitable for preparing  $\text{HNO}_3$  is its \_\_\_\_\_

- A. boiling point
- B. density
- C. oxidizing properties
- D. dehydrating properties

**36.** Bronze is preferred to copper in the making of medals because it \_\_\_\_\_

- A. is stronger
- B. can withstand low temperature
- C. is lighter
- D. has low tensile strength

**37.** The constituents of baking powder that makes the dough to rise is \_\_\_\_\_

- A.  $\text{NaHCO}_3$
- B.  $\text{NaOH}$
- C.  $\text{Na}_2\text{CO}_3$
- D.  $\text{NaCl}$

**38.** Which of the following compound is used as a gaseous fuel?

- A.  $\text{CH}_3 - \text{C} = \text{CH}$
- B.  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$
- C.  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
- D.  $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$   
|  
OH



**39.** The ability of carbon to form long chains is referred to as \_\_\_\_\_

- A. alkylation
- B. acylation
- C. catenation
- D. carbonation

**40.** Which of the following compounds will undergo polymerization reaction?

- A.  $C_2H_4$
- B.  $C_2H_5COOH$
- C.  $C_2H_6$
- D.  $C_2H_5OH$

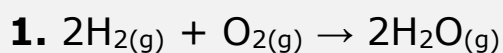
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## JAMB CHEMISTRY PAST QUESTIONS (PT.4)



In the reaction above, what volume of hydrogen would be left over when  $300\text{cm}^3$  of oxygen and  $1000\text{cm}^3$  of hydrogen are exploded in a sealed tube?

- A.  $200\text{ cm}^3$
- B.  $400\text{ cm}^3$
- C.  $600\text{ cm}^3$
- D.  $700\text{ cm}^3$

2.

I. Evaporation.    II. Sublimation.  
III. Diffusion.    IV. Brownian motion

Which of the above can correctly be listed as evidences for the particulate nature of matter?

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

3. If the elements X and Y have atomic numbers 11 and 17 respectively, what type of bond can they form?

- A. Dative
- B. Covalent
- C. Ionic
- D. Metallic

4. A hydrogen atom which has lost an electron contains \_\_\_\_\_

- A. one proton only
- B. one neutron only
- C. one proton and one neutron
- D. one proton, one electron and one neutron

5. The electronic configuration of  $\text{Mg}^{2+}$  is \_\_\_\_\_

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

6. Group VII elements are \_\_\_\_\_

- A. monoatomic
- B. good oxidizing agents
- C. highly electropositive
- D. electron donors

**7.** Which of the following is used to study the arrangement of particles in crystal lattices?

- A. Alpha-particles
- B. Beta-particles
- C. Gamma-rays
- D. X-rays

**8.**

**I.** *It has a varied composition from one place to another.*

**II.** *Its constituents can be separated by physical means*

**III.** *It contains unreactive noble gases which of the above shows that air is a mixture?*

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

**9.** The chemicals used to soften hard water involves the addition of \_\_\_\_\_

A. insoluble sodium compounds which form soluble solutions of calcium and magnesium

B. soluble sodium compounds which form soluble solutions of calcium and magnesium ions

C. soluble sodium compounds which form insoluble precipitates of calcium and magnesium ions

D. insoluble precipitates of calcium and magnesium ions

**10.** Chlorination of water for town supply is carried out to \_\_\_\_\_

- A. make the water colourless
- B. remove germs from the water
- C. make the water tasteful
- D. remove odour from the water

**11.** The solubilities of different solutes in a given solvent can be compared by \_\_\_\_\_

- A. plotting their solubility curves on separate axes
- B. plotting their solubility curves on the same axes
- C. plotting some of the solubility curves on the x-axis and others on the y-axis

D. plotting their solubility curves on the x-axis only

**12.** Potassium trioxochlorate (V) has a solubility of  $1.5 \text{ mol dm}^{-3}$  at  $45^\circ\text{C}$ . On cooling this solution to a temperature of  $20^\circ\text{C}$ , the solubility was found to be  $0.5 \text{ mol dm}^{-3}$ . What mass of  $\text{KClO}_3$  was crystalized out?

[K=39, Cl=35.5 O=16]

- A. 1.00g
- B. 10.00g
- C. 12.25g
- D. 122.50g

**13.** Which of the following pollutants is associated with brain damage?

- A. Carbon (II) oxide
- B. Radioactive fallout
- C. Biodegradable waste
- D. Sulphur (IV) oxide

**14.** Which of the following will produce a solution with pH less than 7 at equivalent point?

- A.  $\text{HNO}_3 + \text{NaOH}$
- B.  $\text{H}_2\text{SO}_4 + \text{KOH}$
- C.  $\text{HC} + \text{Mg}(\text{OH})_2$
- D.  $\text{HNO}_3 + \text{KOH}$

**15.** The number of hydroxonium ions produced by one molecule of an acid in aqueous solution is its \_\_\_\_\_

- A. basicity
- B. acid strength
- C. pH
- D. concentration

**16.** During a titration experiment, 0.05 moles of carbon (IV) oxide is liberated. What is the volume of gas liberated?

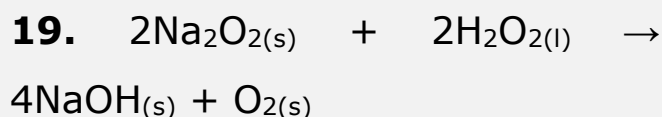
- A.  $22.40 \text{ dm}^3$
- B.  $11.20 \text{ dm}^3$
- C.  $2.24 \text{ dm}^3$
- D.  $1.12 \text{ dm}^3$

**17.** A major factor considered in selecting a suitable method for preparing a simple salt is its \_\_\_\_\_

- A. Crystalline form
- B. melting point
- C. reactivity with dilute acids
- D. solubility in water

**18.** The oxidation number of boron in  $\text{NaBH}_4$  is \_\_\_\_\_

- A. -3
- B. -1
- C. +1
- D. +3



The substance that is oxidized in the reaction above is \_\_\_\_\_

- A.  $2\text{NaO}_{2(s)}$
- B.  $\text{NaOH}_{(aq)}$
- C.  $\text{H}_2\text{O}_{(l)}$
- D.  $\text{O}_{2(g)}$

**20.** What number of moles of  $\text{Cu}^{2+}$  will be deposited by 360 coulombs of electricity? [ $f = 96500 \text{ C mol}^{-1}$ ]

- A.  $5.36 \times 10^{-4}$  mole
- B.  $1.87 \times 10^{-3}$  mole

- C.  $9.35 \times 10^{-4}$  mole
- D.  $3.73 \times 10^{-3}$  mole

**21.** A metal M displaces zinc from  $\text{ZnCl}_2$  solution. This shows that \_\_\_\_\_

- A. electrons flow from zinc to M
- B. M is more electropositive than zinc
- C. M is more electronegative than zinc
- D. zinc is more electropositive than M

**22.**  $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{CO}_{2(g)} + \text{H}_{2(g)}$   
Calculate the standard heat change of the reaction above, if the standard enthalpies of formation of  $\text{CO}_{2(g)}$ ,  $\text{H}_2\text{O}_{(g)}$  and  $\text{CO}_{(g)}$  in  $\text{KJ mol}^{-1}$  are -394, -242 and -110 respectively.

- A. + 262  $\text{KJ mol}^{-1}$
- B. - 262  $\text{KJ mol}^{-1}$
- C. + 42  $\text{KJ mol}^{-1}$
- D. - 42  $\text{KJ mol}^{-1}$

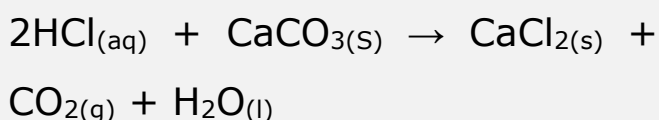
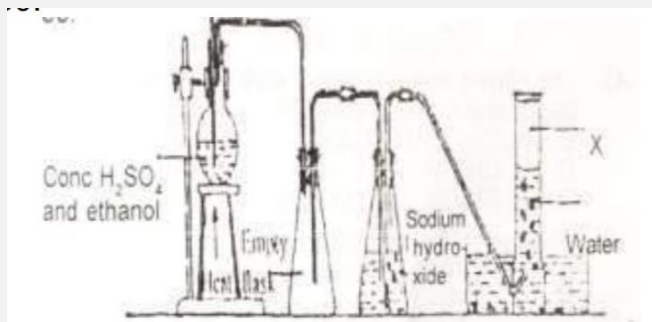
**23.** An increase in entropy can best be illustrated by \_\_\_\_\_

- A. mixing of gases
- B. freezing of water
- C. the condensation of vapour
- D. solidifying candle wax

**24.** The highest rate of production of carbon (IV) oxide can be achieved using \_\_\_\_\_

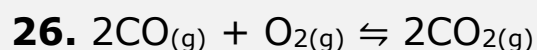
- A.  $0.05 \text{ mol}^{-3} \text{ HCl}$  and 5g powdered  $\text{CaCO}_3$
- B.  $0.05 \text{ mol}^{-3} \text{ HCl}$  and 5g lump  $\text{CaCO}_3$
- C.  $0.10 \text{ mol}^{-3} \text{ HCl}$  and 5g powdered  $\text{CaCO}_3$
- D.  $0.025 \text{ mol}^{-3} \text{ HCl}$  and 5g powdered  $\text{CaCO}_3$

**25.**



From the reaction above, which of the curves represents the production of  $\text{CO}_2$  gas as dilute  $\text{HCl}$  is added?

- A. L
- B. M
- C. N
- D. P



In the reaction above, high pressure will favour the forward reaction because \_\_\_\_\_

- A. high pressure favours gas formation
- B. the reaction is in dynamic equilibrium
- C. the reaction is exothermic
- D. the process occurs with a decrease in volume

**27.** A piece of filter paper moistened with lead (II) ethanoate solution turns black when the paper is dropped into a gas likely to be \_\_\_\_\_

- A. sulphur (VI) oxide
- B. hydrogen chloride
- C. sulphur (VI) oxide
- D. hydrogen sulphide

**28.** Which of the following gases has a characteristic pungent smell, turns red litmus paper blue and forms dense white fumes with hydrogen chloride gas?

- A.  $N_2$
- B.  $N_2O$
- C.  $Cl_2$
- D.  $NH_3$

**29.** Commercial bleaching can be carried out using \_\_\_\_\_

- A. sulphur (IV) oxide and ammonia
- B. hydrogen sulphide and chlorine
- C. chlorine and sulphur (IV) oxide
- D. ammonia and chlorine

**30.** Mineral acids are usually added to commercial hydrogen peroxide to \_\_\_\_\_

- A. oxidize it

- B. decompose it
- C. minimize its decomposition
- D. reduce it to water and oxygen

**31.** Which of the following compounds will burn with a brick-red colour in a nonluminous Bunsen flame?

- A.  $LiCl$
- B.  $NaCl$
- C.  $CaCl_2$
- D.  $MgCl_2$

**32.** The purest form of iron which contains only about 0.1% carbon is \_\_\_\_\_

- A. pig iron
- B. wrought iron
- C. cast iron
- D. iron pyrite

**33.** A common characteristic between zinc and the other transition elements is the ability to \_\_\_\_\_

- A. have variable oxidation states

- B. from complex ions
- C. act as a catalyst
- D. from coloured ions

**34.** Which of the following metals is the least reactive?

- A. Pb
- B. Sn
- C. Hg
- D. Au

**35.** Geometric isomerism can exist in \_\_\_\_\_

- A. hex-3-ene
- B. hexane
- C. prop-1-ene
- D. 3-methyl but -1-ene

**36.** Alkanals can be distinguished from alkanones by the reaction with \_\_\_\_\_

- A. Sudan (III) stain
- B. starch iodide paper
- C. lithium tetrahydrido aluminate (III)
- D. Fehling's solution

**37.** The isomers of  $C_3H_8O$  are

- A. 1 - propanol and 2 - propanol
- B. 1 - propanol and 1 - propanol
- C. 2 - propanol and 2 - propanone
- D. 2 - propanol and 1 - propanol

**38.** Carbohydrates are large molecules with the molecular formula  $C_x(H_2O)_y$ . In which of the following pairs is x not equal to y?

- A. glucose and starch
- B. maltose and starch
- C. sucrose and fructose
- D. maltose and starch

**39.** A compound contains 40.0% C, 6.7% H 53.3% O. If the molecular mass of the compound is 180, its molecular formula is \_\_\_\_\_

[C=12, H=1, O=16]

- A.  $CH_2O$
- B.  $C_3H_6O_3$
- C.  $C_6H_6O_3$
- D.  $C_6H_{12}O_6$



**40.** The alkyne that will give a white precipitate silver trioxonitrate (V) is \_\_\_\_\_

- A.  $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CCH}_2\text{CH}_3$
- B.  $\text{CH}_3\text{C}\equiv\text{CCH}_2\text{CH}_2\text{CH}_3$
- C.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}\equiv\text{CH}$
- D.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{CCH}_2\text{CH}_3$

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## JAMB CHEMISTRY PAST QUESTIONS (PT.5)

**1.** The bond formed between two elements with electron configurations  $1s^2 2s^2 2p^6 3s^2$  and  $1s^2 2s^2 2p^4$  is \_\_\_\_\_

- A. metallic
- B. covalent
- C. dative
- D. ionic

**2.** The constituent of air that acts as a diluent is \_\_\_\_\_

- A. nitrogen
- B. carbon (IV) oxide
- C. noble gases
- D. oxygen

**3.** Steam changes the colour of anhydrous cobalt (II) chloride from \_\_\_\_\_

- A. white to red
- B. blue to white
- C. blue to pink
- D. white to blue

**4.** An example of a hygroscopic substance is \_\_\_\_\_

- A.  $\text{CuO}_{(s)}$ .
- B.  $\text{MgCl}_{2(s)}$ .
- C.  $\text{CaCl}_{2(s)}$ .
- D.  $\text{NaOH}_{(s)}$ .

**5.** If 24.4g of Lead (II) trioxonitrate (V) were dissolved in 42g of distilled water at  $20^\circ\text{C}$ ; calculate the solubility of the solute in  $\text{gdm}^{-3}$

- A. 581.000
- B. 0.581
- C. 5.810
- D. 58.100

**6.** The solvent used for removing grease stain is \_\_\_\_\_

- A. turpentine
- B. ammonia solution
- C. ethanol
- D. solution of borax in water

**7.** In a water body, too much sewage leads to \_\_\_\_\_

A. a decrease in the temperature of the water which cause in death of aquatic animals

B. an increase in the number of aquatic animals in the water

C. an increase in the bacterial population which reduces the level of oxygen in the water

D. a decrease in the bacterial population which increases the level of oxygen in the water

**8.**  $10.0 \text{ dm}^3$  of water was added to  $2.0 \text{ mol dm}^{-3}$  of  $2.5 \text{ dm}^3$  solution of HCl. What is the concentration of the final solution in  $\text{mol dm}^{-3}$ ?

A. 0.4

B. 8.0

C. 2.0

D. 0.5

**9.** Three drops of a  $1.0 \text{ mol dm}^{-3}$  solution of HCl was added to  $20 \text{ cm}^3$  of a solution of pH 6.4. The pH of the resulting solution will be \_\_\_\_\_

A. close to that of pure water

B. less than 6.4

C. greater than 6.4

D. unaltered

**10.** Which of the following substances is not a salt?

A. Aluminium oxide

B. Sodium hydrogen trioxosulphate (V)

C. Sodium trioxocarbonate (V)

D. Zinc chloride

**11.** An insoluble salt can be prepared by \_\_\_\_\_

A. the reaction of trioxocarbonate (V) with an acid

B. double decomposition

C. the action of dilute acid on an insoluble base

D. the reaction of metals with an acid

**12.**  $2\text{H}_2\text{O}_{(l)} + 2\text{F}_{2(g)} \rightarrow 4\text{HF}_{(aq)} + \text{O}_{2(g)}$

In the reaction above, the substance that is being reduced is \_\_\_\_\_

A.  $\text{O}_{2(g)}$

B.  $\text{H}_2\text{O}_{(l)}$

C.  $F_{2(g)}$

D.  $HF_{(aq)}$

**13.**  $Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$

In the reaction above, the oxidizing agent is \_\_\_\_\_

A.  $CuSO_{4(aq)}$

B.  $ZnSO_{4(aq)}$

C.  $Cu_{(s)}$

D.  $Zn_{(s)}$

**14.** In an electrochemical cell, polarization is caused by \_\_\_\_\_

A. chlorine

B. oxygen

C. tetraoxosulphate (VI) acid

D. hydrogen

**15.** Calculate the volume in  $cm^3$  of oxygen evolved as s.t.p. when a current of 5 A is passed through acidified water for 193s.

( $F=96500 \text{ Cmol}^{-1}$ , Molar volume of a gas at s.t.p.= $22.4 \text{ dm}^3$ )

A.  $224.000 \text{ dm}^3$

B.  $0.056 \text{ dm}^3$

C.  $0.224 \text{ dm}^3$

D.  $56.000 \text{ dm}^3$

**16.** In an endothermic reaction, if there is a loss in entropy the reaction will \_\_\_\_\_

A. be indeterminate

B. be spontaneous

C. not be spontaneous

D. be at equilibrium

**17.**  $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$

$\Delta H = -395.7 \text{ kJmol}^{-1}$

In the reaction above, the concentration of  $SO_{3(g)}$  can be increased by \_\_\_\_\_

A. decreasing the pressure

B. decreasing the temperature

C. increasing the temperature

D. the addition of catalyst

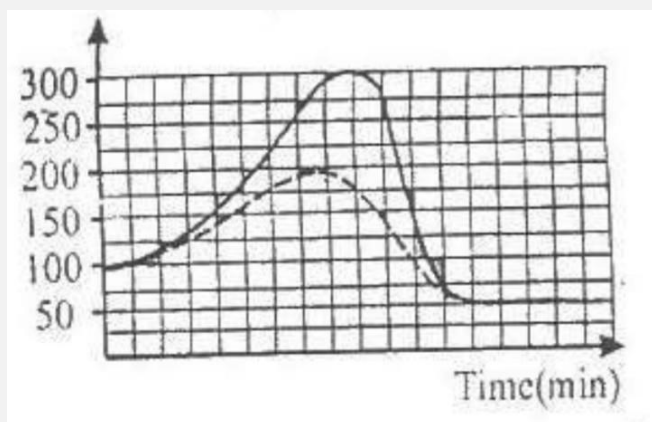
**18.** The minimum amount of energy required for a reaction to take place is \_\_\_\_\_

A. lattice energy

B. ionization energy

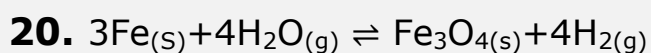
- C. activation energy
- D. kinetic energy

**19.**



In the graph above, the activation energy of the catalyzed reaction is \_\_\_\_\_

- A. 100KJ
- B. 300KJ
- C. 250KJ
- D. 200KJ



The equilibrium constant, K, of the reaction above is represented as \_\_\_\_\_

- A.  $\frac{[\text{Fe}_3\text{O}_4][\text{H}_2]}{[\text{Fe}][\text{H}_2\text{O}]}$
- B.  $\frac{[\text{H}_2\text{O}]^4}{[\text{H}_2]^4}$

- C.  $\frac{[\text{H}_2]^4}{[\text{H}_2\text{O}]^4}$
- D.  $\frac{[\text{Fe}]^3[\text{H}_2\text{O}]^2}{[\text{Fe}_3\text{O}_4][\text{H}_2]^4}$

**21.** Which of the following compounds is a neutral oxide?

- A. Carbon (IV) oxide
- B. Sulphur (VI) oxide
- C. Sulphur (IV) oxide
- D. Carbon (II) oxide

**22.** In the laboratory preparation of ammonia, the flask is placed in a slanting position so as to \_\_\_\_\_

- A. prevent condensed water from breaking the reaction flask
- B. enable the proper mixing of the reactions in the flask
- C. enhance the speed of the reaction
- D. prevent formation of precipitate

**23.** Which of the gases is employed as an anaesthesia?

- A.  $\text{N}_2\text{O}$
- B.  $\text{NO}_2$

C.  $\text{NH}_3$

D. NO

**24.** Sulphur (IV) oxide is a strong reducing agent in the presence of water due to the formation of \_\_\_\_\_

A. hydroxide ion

B. sulphur (VI) oxide

C. hydrogen sulphide

D. trioxosulphate (IV) salt

**25.** A metal that forms soluble trioxosulphate (IV) ion is \_\_\_\_\_

A. barium

B. potassium

C. manganese

D. aluminium

**26.** Copper is displaced from the solution of its salts by most metals because it \_\_\_\_\_

A. is a transition element

B. is at the bottom of the activity series

C. is very reactive

D. has completely filled 3d-orbitals

**27.** The coloured nature of transition metal ions are associated with their partially filled \_\_\_\_\_

A. f- orbital

B. s- orbital

C. p-orbital

D. d-orbital

**28.** Aluminium containers are frequently used to transport trioxonitrate (V) acid because aluminium \_\_\_\_\_

A. has a silvery-white appearance

B. has a low density

C. does not react with the acid

D. does not corrode

**29.** 2-methylbutan-2-ol is an example of a \_\_\_\_\_

A. dihydric alkanol

B. tertiary alkanol

C. secondary alkanol

D. primary alkanol

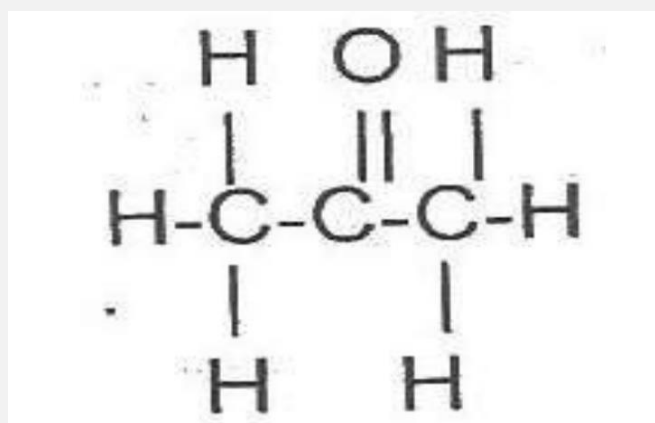
**30.** The reaction between ammonia and ethyl ethanoate produces \_\_\_\_\_

- A. propanol and ethanamide
- B. propanol and propanamide
- C. ethanol and propanamide
- D. ethanol and ethanamide

**31.** The decarboxylation of ethanoic acid will produce carbon (IV) oxide and \_\_\_\_\_

- A. methane
- B. ethane
- C. propane
- D. butane

**32.**



The compound above is an \_\_\_\_\_

- A. alkanone

B. alkanoate

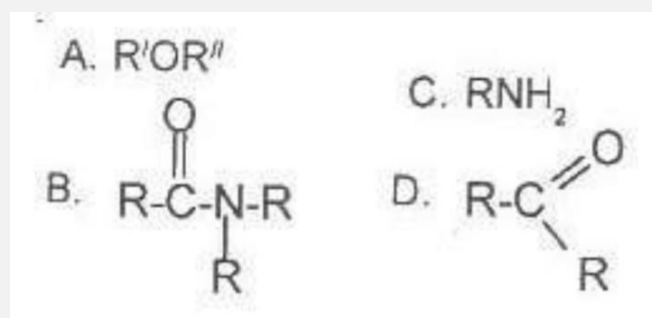
C. alkanal

D. alkanol

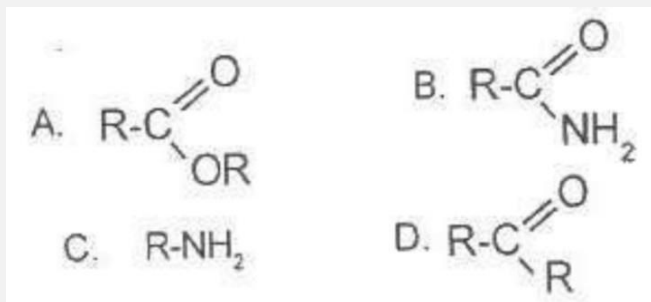
**33.** The compound that will react with sodium hydroxide to form salt and water is \_\_\_\_\_

- A.  $\text{C}_6\text{H}_{12}\text{O}_6$
- B.  $(\text{CH}_3)_3\text{COH}$
- C.  $\text{CH}_3\text{CH}=\text{CH}_2$
- D.  $\text{CH}_3\text{CH}_2\text{COOH}$

**34.** Which of the following compounds in solution will turn red litmus paper blue?



**35.** The dehydration of ammonium salt of alkanoic acids produces a compound with the general formula \_\_\_\_\_



**36.** Which of the following fraction is used as raw material for the cracking process?

- A. kerosene
- B. lubricating oil
- C. bitumen
- D. diesel oils

**37.** An organic compound with a pleasant smell is likely to have a general formula \_\_\_\_\_

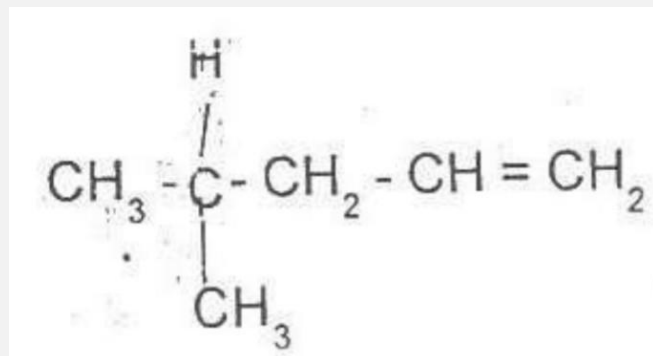
- A.  $\text{C}_n\text{H}_{2n+1}\text{CHO}$
- B.  $\text{C}_n\text{H}_{2n+1}\text{COOH}$
- C.  $\text{C}_n\text{H}_{2n+1}\text{COOC}_n\text{H}_{2n+1}$
- D.  $\text{C}_n\text{H}_{2n+1}\text{COC}_n\text{H}_{2n+1}$

**38.** A primary amide is generally represented by the formula \_\_\_\_\_

- A.  $\text{RCOOR}$
- B.  $\text{RCONH}_2$
- C.  $\text{RCONHR}$

D.  $\text{RCONR}_2$

**39.**



The IUPAC nomenclature for the compound above is \_\_\_\_\_

- A. 4-methylpent-1-ene
- B. 3-methylpent-2-ene
- C. 2-methylpent-1-ene
- D. 2-methylpent-4-ene

**40.** An organic compound contains 60% carbon, 13.3% hydrogen and 26.7% oxygen. Calculate the empirical formula (C=12, H =1, O=16)

- A.  $\text{C}_5\text{H}_{12}\text{O}$
- B.  $\text{C}_3\text{H}_8\text{O}$
- C.  $\text{C}_6\text{H}_{13}\text{O}_2$
- D.  $\text{C}_4\text{H}_9\text{O}$



## JAMB CHEMISTRY PAST QUESTIONS (PT.6)

**1.** An element X has two isotopes  $^{20}_{10}\text{X}$  and  $^{22}_{10}\text{X}$  present in the ratio 1:3. The relative atomic mass of x would be \_\_\_\_\_

- A. 20.5
- B. 21.0
- C. 21.5
- D. 22.0

**2.**  $200\text{cm}^3$  of oxygen diffuse through a porous plug in 50 seconds. How long, will  $80\text{cm}^3$  of methane ( $\text{CH}_4$ ) take to diffuse through the same porous plug under the same conditions?

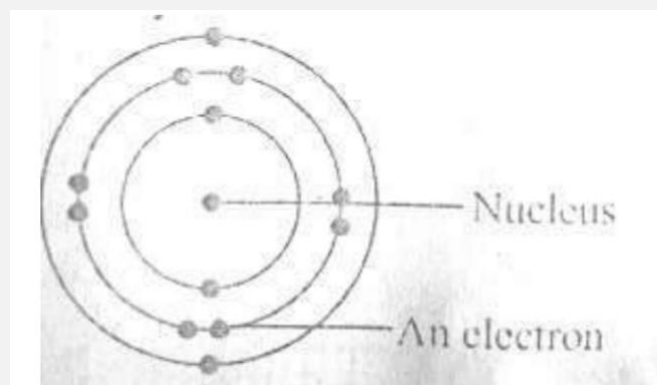
- A. 40sec
- B. 20sec
- C. 14sec
- D. 7sec

**3.** Which of the following terms indicates the number of bonds that can be formed by an atom?

- A. oxidation number
- B. Valence

- C. Atomic number
- D. Electronegativity

**4.**



The diagram above represents an atom of \_\_\_\_\_

- A. magnesium
- B. helium
- C. chlorine
- D. neon

**5.** Which of the following gases is the most dangerous pollutant?

- A. Hydrogen sulphide.
- B. Carbon Monoxide
- C. Sulphur (IV) oxide
- D. Carbon Dioxide

**6.** A Side effect or Soft water is that \_\_\_\_\_

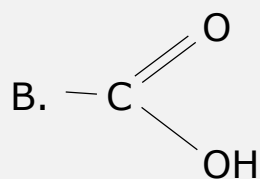
- A. It gives offensive taste
- B. excess calcium is precipitated
- C. it attacks lead contained in pipes
- D. it encourages the growth of bacteria

**7.** Farmlands affected by crude oil spillage can be decontaminated by \_\_\_\_\_

- A. adding acidic solutions
- B. using aerobic bacteria
- C. pouring water on the affected area
- D. burning off the oil from the area

**8.** Which of the following functional groups will give gas bubbles when treated with a saturated solution of sodium hydrogen trioxocarbonate (iv)?

A.  $\text{—NH}_3$



C.  $\text{—OH}$

D.  $>\text{C}=\text{O}$

**9.** The oxidation state of Cr in  $\text{K}_2\text{Cr}_2\text{O}_7$  is \_\_\_\_\_

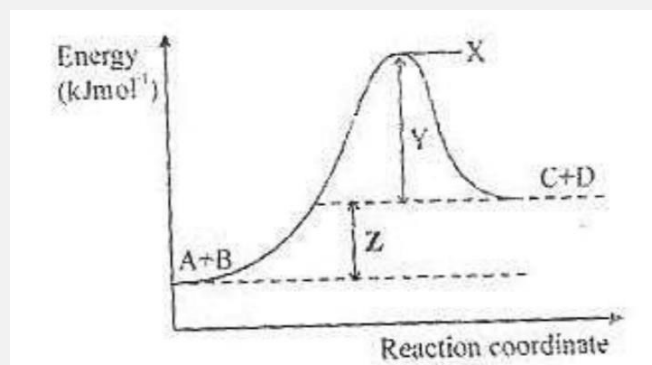
- A. +7
- B. +6
- C. +5
- D. 4

**10.**  $2\text{Na}_2\text{O}_{2(s)} + 2\text{H}_2\text{O}_{(l)} \rightarrow 4\text{NaOH}_{(s)} + \text{O}_2$

The substance that is oxidized in the reaction above is \_\_\_\_\_

- A.  $2\text{Na}_2\text{O}_{2(s)}$
- B.  $\text{NaOH}_{(aq)}$
- C.  $\text{H}_2\text{O}_{(l)}$
- D.  $\text{O}_{2(g)}$

**11.**



Z in diagram above represents \_\_\_\_\_

- A. heat of reaction
- B. activation energy
- C. free energy

D. entropy of reaction

**12.** The nucleus of an atom contains \_\_\_\_\_

- A. protons only
- B. neutrons only
- C. protons and electrons
- D. protons and neutrons

**13.** Which of the following does NOT happen when a Zinc rod is introduced into a solution of Copper (II) sulphate?

- A. Electrons flow towards the zinc rod
- B. The Zinc rod dissolves
- C. The temperature of the solution changes
- D. The blue colour of the solution gradually disappears

**14.** Which of the following statements is correct during the electrolysis of a caustic soda solution using platinum electrodes?

A. Oxygen gas is given off at the cathode

B. Hydrogen gas is given off at the anode

C. Sodium metal is deposited at the cathode

D. Alkalinity at the cathode increases

**15.** Which of the following statements is incorrect?

A. Fractional distillation of crude petroleum will give the following hydrocarbon fuels in order of increasing boiling point. Butane < Petrol < Kerosene

B.  $\text{H}_2\text{C} = \text{CH}_2$  will serve as a monomer in the preparation of polythene

C. both but-1-ene and but-1-yne will decolourize bromine readily

D. Calcium carbide will react with water to form any alkyne

**16.** The iron (iii) oxide impurity in bauxite can be removed by \_\_\_\_\_

- A. fractional crystallization in acid solution
- B. dissolution in sodium hydroxide and filtration
- C. extraction with concentrated ammonia and reprecipitation
- D. electrolysis of molten mixture

**17.** Aluminium is extracted commercially from its ore by \_\_\_\_\_

- A. heating aluminium oxide with coke in a furnace
- B. the electrolysis of fused aluminium oxide in cryolite
- C. treating cryolite with sodium hydroxide solution under pressure
- D. heating sodium aluminium silicate to a high temperature.

**18.** Which of the following compounds gives a yellow residue when heated and also reacts with aqueous sodium hydroxide to give a white gelatinous precipitate soluble in excess sodium hydroxide solution?

- A.  $(\text{NH}_4)_2\text{CO}_3$

- B.  $\text{ZnCO}_3$
- C.  $\text{Al}_2(\text{SO}_4)_3$
- D.  $\text{PbCO}_3$

**19.** The least easily oxidized of the metals below is \_\_\_\_\_

- A. Cu
- B. Na
- C. Zn
- D. Al

**20.** Which of the following chlorides would exhibit the least ionic character?

- A.  $\text{MgCl}_2$
- B.  $\text{CaCl}_2$
- C.  $\text{LiCl}$
- D.  $\text{AlCl}_3$

**21.** Which of the following CANNOT be obtained by fractional distillation of petroleum?

- A. Ether
- B. Methane
- C. Butane
- D. Hydrogen

**22.** Which of the following is used as an antiknock in automobile engines?

- A. tetramethylsilane
- B. lead tetraethyl
- C. Glycerol
- D. n-heptane

**23.** The Avogadro number of 24g of magnesium is the same as that of \_\_\_\_\_

- A. 1g of hydrogen molecules
- B. 16g of oxygen molecules
- C. 32g of oxygen molecules
- D. 35.5g of chlorine molecules.

**24.** In an electrolyte set-up to protect iron from corrosion, the iron is \_\_\_\_\_

- A. made the cathode
- B. made the anode
- C. used with a metal of lower electropositive potential
- D. initially coated with tin

**25.** The removal of rust from iron by \_\_\_\_\_ treatment with tetraoxosulphate (vi) acid is based on the \_\_\_\_\_

- A. hydrolysis of the iron
- B. reaction of acid with base
- C. oxidation of the rust
- D. dehydration of the iron

**26.** The substance often used for vulcanization of rubber is \_\_\_\_\_

- A. Chlorine
- B. hydrogen peroxide
- C. Sulphur
- D. tetraoxosulphate (vi) acid

**27.** Metals of the first transition series have special properties which are different from those of groups I and II elements because they have partially filled \_\_\_\_\_

- A. s-orbitals
- B. p-orbitals
- C. d-orbitals
- D. f-orbitals

**28.** A particle that contains 11 protons, 12 neutrons and 10 electrons is probably a \_\_\_\_\_

- A. Neutral non-metal
- B. metallic ion
- C. non-metallic ion
- D. neutral metal

**29.** A catalyst increases the rate of a chemical reaction by providing a path that \_\_\_\_\_

- A. raises the activation energy
- B. increases the temperature
- C. lowers the activation energy
- D. increases the concentration

**30.** A metal M displaces Zinc from  $\text{ZnCl}_2$  solution. This shows that \_\_\_\_\_

- A. electrons flow from Zinc to M
- B. M is more electropositive than Zinc
- C. M is more electronegative than Zinc
- D. Zinc is more electropositive than M

**31.** Calculate the quantity of electricity in coulombs required to liberate 10g of copper from a copper compound.

$$[\text{Cu } 64 \text{ } F = 96500\text{c}]$$

- A. 32395.5
- B. 30156.3
- C. 60784.5
- D. 15196.6

**32.** The IUPAC names for the compounds  $\text{CH}_3\text{COOH}$  and  $\text{CH}_2=\text{CH}_2$  are respectively \_\_\_\_\_

- A. acetic acid and ethane
- B. ethanoic- acid and ethene
- C. methanoic acid and ethylene
- D. ethanol and ethene

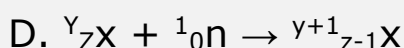
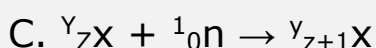
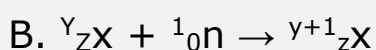
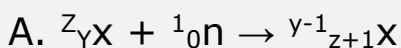
**33.** The boiling point of water is higher than that of methanol because \_\_\_\_\_

- A. water is an oxide while methanol is an alcohol
- B. inter-molecular forces in water are stronger than those in methanol

C. Water is an inorganic compound while methanol is organic

D. Water is a compound while methanol is a covalent compound

**34.** If an element  $x$  of atomic number  $Z$  and mass number  $y$  is irradiated by an intense concentration of neutrons, the relevant nuclear equation is \_\_\_\_\_



**35.** Which combination of the following statements is correct?

1. Lowering the activation energy
2. conducting the reaction in a gaseous state.
3. Increasing the temperature.
4. removing the products as soon as they are formed.
5. Powdering the reactant if solid.

A. 1, 2 and 3

B. 1, 3 and 5

C. 2, 3 and 5

D. 3 and 4

**36.** An element with atomic number twelve is likely to be \_\_\_\_\_

A. electrovalent with a valency of 1

B. electrovalent with a valency of 2

C. covalent with a valency of 2.

D. covalent with valency of 4.

**37.** Which of the following physical properties decreases across the periodic Table?

A. ionization potential

B. Electron affinity

C. Electronegativity

D. Atomic radius

**38.** If a gas occupies a container of volume  $146\text{cm}^3$  at  $18^\circ\text{C}$  and  $0.971\text{ atm}$ , its volume in  $\text{cm}^3$  at s.t.p is \_\_\_\_\_

A. 133

B. 146

C. 266

D. 292

**39.**  $50\text{cm}^3$  of carbon (ii) oxide was exploded with  $150\text{cm}^3$  of air containing 20% oxygen by volume, which of the reactants was in excess?

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

**40.** The formula  $\text{CH}_2\text{O}$  for ethanoic acid is regarded as its \_\_\_\_\_

- A. molecular formula
- B. general formula
- C. empirical formula
- D. Structural formula

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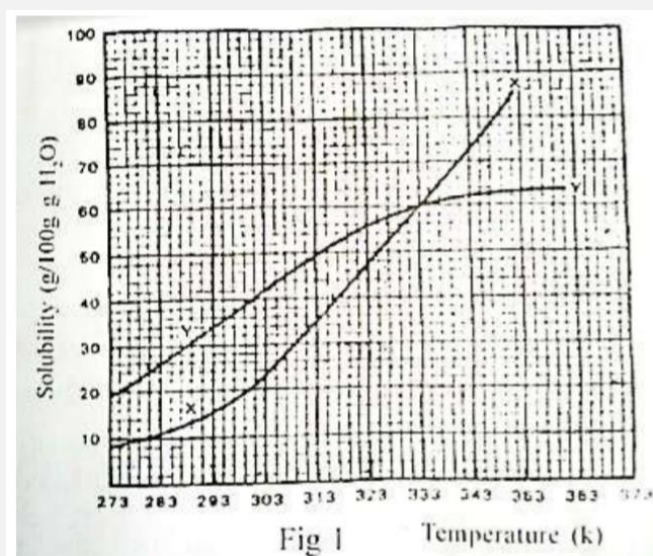


## JAMB CHEMISTRY PAST QUESTIONS (PT.7)

1. The flame used by welders in cutting metals is \_\_\_\_\_

- A. butane has flame
- B. acetylene flame
- C. Kerosene flame
- D. Oxy-acetylene flame

2. At room temperature (300k) in the graph below.



- A. Y is twice as soluble as X
- B. X is twice as soluble as Y
- C. X and Y are soluble to the same extent
- D. X is three times as soluble as Y

3. Tetraoxosulphate (vi) acid is prepared using the chemical reaction  $\text{SO}_{3(g)} + \text{H}_2\text{O}_{(s)} \rightarrow \text{H}_2\text{SO}_{4(l)}$ .

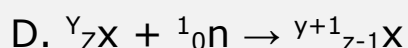
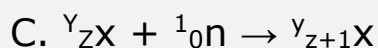
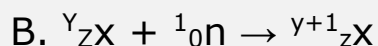
Given the heats of formation for  $\text{SO}_{3(g)}$ ,  $\text{H}_2\text{O}_{(l)}$  and  $\text{H}_2\text{SO}_{4(l)}$  as  $-395\text{KJmol}^{-1}$ ,  $-286\text{KJmol}^{-1}$  and  $-811\text{KJmol}^{-1}$  respectively, the enthalpy change accompanying this reaction is \_\_\_\_\_

- A.  $-1032\text{KJ}$
- B.  $-130\text{KJ}$
- C.  $+130\text{KJ}$
- D.  $+1032\text{KJ}$

4. In two separate experiments 0.36g and 0.71g of chlorine combined with a metal X to give Y and Z, an analysis showed that Y and Z contain 0.20g and 0.40g of X respectively. The data above represents the law of \_\_\_\_\_

- A. multiple proportion
- B. conservation of mass
- C. constant composition
- D. reciprocal proportion

**5.** If an element  $x$  of atomic number  $z$  and mass number  $y$  is irradiated by an intense concentration of neutrons, the relevant nuclear equation is \_\_\_\_\_



**6.** The vapour density of a gas may be defined as \_\_\_\_\_

A. the mass of a unit volume of the gas compared to an equal volume of water vapour.

B. the mass of a unit volume of the gas compared to an equal volume of hydrogen.

C. the mass of a unit volume of the gas compared to an equal volume of oxygen.

D. The mass of a unit volume of the gas minus the vapour pressure of water.

**7.**  $30\text{cm}^3$  of oxygen at 10 atmosphere pressure is placed in a

$20\text{dm}^3$  container. Calculate the new pressure if temperature is kept constant.

A. 6.7 atm

B. 15.0 atm

C. 60.0 atm

D. 66.0 atm

**8.** A liquid begins to boil when \_\_\_\_\_

A. its vapour pressure is equal to the vapour pressure of its solid at the given temperature

B. molecules start escaping its surface

C. its vapour pressure equals the atmospheric pressure

D. its volume is slightly increased

**9.** Four elements W, X, Y and Z have atomic numbers 2, 6, 16 and 20 respectively. Which of these elements is a metal?

A. X

B. W

C. Z

D. Y

**10.** When cathode rays are deflected unto the electrode of an electrometer, the instrument becomes \_\_\_\_\_

- A. negatively charged
- B. positively charged
- C. neutral
- D. bipolar

**11.** When large hydrocarbon molecules are heated at high temperature in the presence of a catalyst to give smaller molecules, the process is known as \_\_\_\_\_

- A. disintegration
- B. Polymerization
- C. cracking
- D. degradation

**12.** If concentrated sulphuric acid is added to sugar and warmed gently, the sugar changes from white to brown and finally to a black mass of carbon. In this

reaction, concentrated sulphuric acid is acting as \_\_\_\_\_

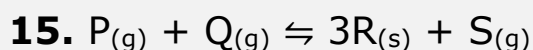
- A. a drying agent
- B. an oxidizing agent
- C. a dehydrating agent
- D. a reducing agent.

**13.** Smoke consists of \_\_\_\_\_

- A. solid particles dispersed in liquid
- B. solid or liquid particles dispersed in gas
- C. gas or liquid particles dispersed in liquid
- D. Liquid particles dispersed in liquid

**14.** In the electrolysis of dilute sulphuric acid using platinum electrodes, the products obtained at the anode and cathode are \_\_\_\_\_

<b>Anode</b>	<b>Cathode</b>
A. sulphur	hydrogen
B. hydrogen	oxygen
C. oxygen	hydrogen
D. hydrogen	sulphate ions



*$\Delta H$  is negative.*

Which of the following will increase the yield of R?

- A. using a larger closed vessel
- B. increasing the temperature
- C. Removing some **S**
- D. Adding a positive catalyst

**16.** The mass of silver deposited when a current of 10A passed through a solution of silver salt for 4830s is \_\_\_\_\_

- A. 108.0g
- B. 54. 0g
- C. 27.0g
- D. 13.5g

**17.**  $CO_{(g)} + H_2O_{(g)} \rightarrow CO_{2(g)} + H_{2(g)}$   
from the reaction above, calculate the standard heat change if the standard enthalpies of formation of  $CO_{2(g)}$ ,  $H_2O_{(g)}$  and  $CO_{2(g)}$  in  $KJmol^{-1}$  are -394, -242 and -110 respectively.

- A.  $-282KJmol^{-1}$

- B.  $-42KJmol^{-1}$

- C.  $+42KJmol^{-1}$

- D.  $+262KJmol^{-1}$

**18.** If the electron configuration of an element is  $1S^2 2S^2 2p^5$ , how many unpaired electrons are there?

- A. 2
- B. 5
- C. 1
- D. 4

**19.** Which of the following gases can best be used for demonstrating the fountain experiment?

- (i) Nitrogen
- (ii) Ammonia
- (iii) Nitrogen (I) oxide
- (iv) Hydrogen chloride

- A. (ii) and (iii)
- B. (i) and (iii)
- C. (ii) and (iv)
- D. (ii) only

**20.** The coloured nature of transition metal ions are associated with their partially filled \_\_\_\_\_

- A. f-orbital
- B. S-orbital
- C. P-orbital
- D. d-orbital

**21.** Which of the following separation processes is most likely to yield high quality ethanol ( $\geq 95\%$ ) from palm wine?

- A. fractional distillation without a dehydrant
- B. simple distillation with a dehydrant
- C. fractional distillation with a dehydrant
- D. column chromatography

**22.** What volume of carbon (II) oxide is produced by reacting excess carbon with  $10\text{dm}^3$  of oxygen?

- A.  $5\text{ dm}^3$

- B.  $20\text{ dm}^3$
- C.  $15\text{ dm}^3$
- D.  $10\text{ dm}^3$

**23.** In the reaction:  $3\text{CuO} + 2\text{NH}_3 \rightarrow 3\text{Cu} + 3\text{H}_2\text{O} + \text{N}_2$  how many electrons are transferred for each mole of copper produced?

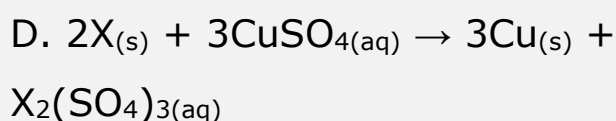
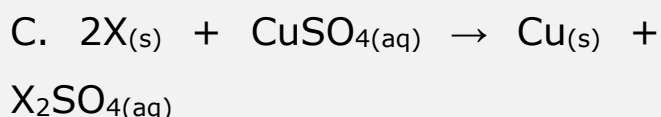
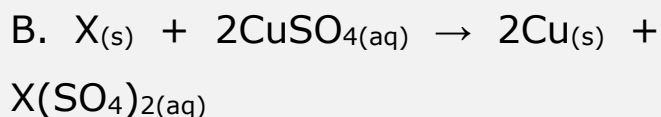
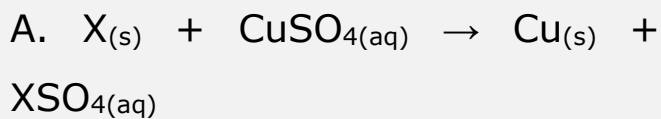
- A.  $4.0 \times 10^{-23}$
- B.  $3.0 \times 10^{-23}$
- C.  $1.2 \times 10^{24}$
- D.  $6.0 \times 10^{24}$

**24.** The electronic configuration of an element is  $1s^2 2s^2 2p^6 3s^2 3p^3$ . How many unpaired electrons are there in the element?

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

**25.** *8.0 g of an element X reacted with an excess of copper (II) tetraoxosulphate (VI) solution to deposit 21.3g of copper.*

The correct equation for the reaction is \_\_\_\_\_



[Cu = 64]

**26.** In the manufacture of iron in the blast furnace, iron (III) oxide is mixed with coke and limestone, and different reactions occur in the process. Which of the following, statements are true with respect to these reactions?

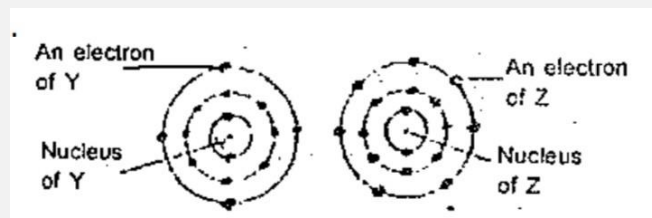
A. The coke is a powerful reducing agent and easily converts the iron oxide to iron.

B. The calcium carbonate reacts with  $SiO_2$ , an earthly impurity in the ore, to form calcium silicate

C. The coke will react with the iron produced to form steel

D. The calcium carbonate decomposes to give calcium oxide, which then forms calcium silicate with the earthly impurity.

**27.**



The electrons of two atoms Y and Z are arranged in shells as shown above. The bond formed between the atoms of Y and Z is \_\_\_\_\_

- A. ionic
- B. covalent
- C. dative
- D. metallic

**28.** A gas sample with an initial volume of  $3.25 \text{ dm}^3$  is heated and allowed to expand to  $9.75 \text{ dm}^3$  at constant pressure. What is the ratio of the final absolute temperature to the initial absolute temperature?

- A. 3:1
- B. 5:2
- C. 5:4
- D. 8:3

**29.** The chemical used for coagulation in water purification is \_\_\_\_\_

- A. aluminium tetraoxosulphate (VI)
- B. copper tetraoxosulphate (VI)
- C. sodium tetraoxosulphate (VI)
- D. calcium tetraoxosulphate (VI)

**30.** A liquid that will dissolve fat is \_\_\_\_\_

- A. hydrochloric acid
- B. calcium hydroxide
- C. kerosene
- D. water

**31.** When air, which contains the gases: oxygen, nitrogen, carbon dioxide, water vapour and the rare gases, is passed through alkaline pyrogallol and then over

quicklime, the only gases left are \_\_\_\_\_

- A. nitrogen and carbon dioxide
- B. the rare gases
- C. nitrogen and oxygen
- D. nitrogen and the rare gases

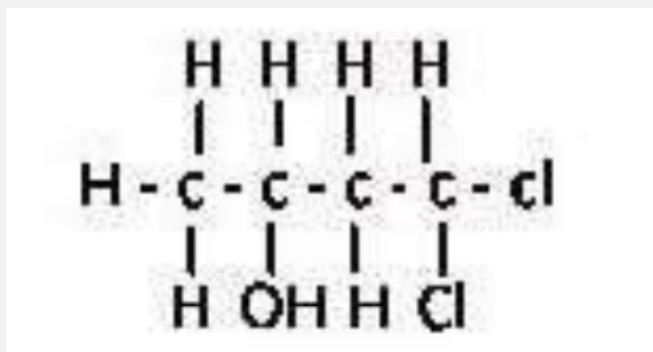
**32.** The number of atoms in one mole of a substance is equal to \_\_\_\_\_

- A. the atomic number
- B. the Avogadro number
- C. the gas constant
- D. the number of electrons

**33.** Which of the following terms indicates the number of bonds that can be formed by an atom?

- A. Oxidation number
- B. Valence
- C. Atomic number
- D. Electronegativity

36.



The functional groups present in the compound above are \_\_\_\_\_

- A. alkene and halo-group
- B. hydroxyl and chloro-group
- C. alkene and chloro-group
- D. hydroxyl and halo-group

35. Environmental pollution is worsened by the release from automobile exhausts of \_\_\_\_\_

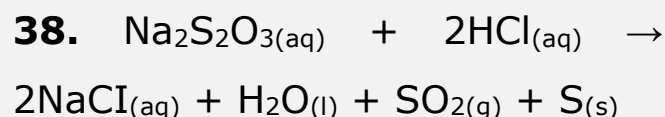
- A. water vapour
- B. steam
- C. smoke
- D. heavy metals

36. What volume of  $0.5 \text{ mol dm}^{-3}$   $\text{H}_2\text{SO}_4$  will exactly neutralize  $20\text{cm}^3$  of  $0.1 \text{ mol dm}^{-1}$   $\text{NaOH}$  solution?

- A.  $2.0 \text{ cm}^3$
- B.  $5.0 \text{ cm}^3$
- C.  $6.8 \text{ cm}^3$
- D.  $8.3 \text{ cm}^3$

37. Which of the following is an electrolyte?

- A. Alcohol
- B. Sodium acetate solution
- C. Solid potassium hydroxide
- D. Mercury



Which of the following would introduce the greatest increase in the rate of the chemical reaction above?

- A. An increase in temperature and a decrease in the concentration of the reactants.
- B. A decrease in volume and an increase in the pressure of the reactants.



C. A decrease in temperature and an increase in the concentration of the reactants.

D. An increase in temperature and an increase in the concentration of the reactants.

**39.** Which of the following substances has the lowest vapour density?

*[O=16, Cl = 35.5, H = 1, C = 12]*

A. Ethanoic acid

B. Propanol

C. Dichloromethane

D. Ethanal

**40.** The presence of an impurity in a substance will cause the melting point to \_\_\_\_\_

A. be zero

B. reduce

C. increase

D. be stable

## **~~DISCLAIMER~~**

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