



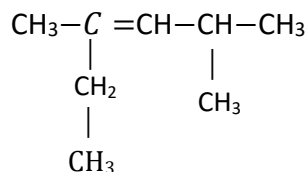
UNN POST UTME PAST QUESTIONS AND ANSWERS
FOR CHEMISTRY

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CHEMISTRY 2005/2006 QUESTION

- Which of the following is a mixture?
A. sodium chloride B. sea water C. iron filling D. granulate sugar
- two elements, X and Y, have atomic numbers 8 and 13 respectively, the formula for the possible compound found between X and Y is A. Y_2X_3 B. XY_2 C. X_3Y_2 D. X_2Y_2
- 3g of a mixture of CaO and CaCO₃ was heated to a constant mass. If 0.44g of CO₂ was liberated calculate the percentage of CaO in the mixture. A 33.3% B.50% C.66.67% D. 25%
- An alkanic acid has a molecular mass of 88. Its molecular formula is A. C₄H₉COOH B. C₅H₁₁COOH C. C₃H₅COOH D. C₃H₇COOH
- if the rate of diffusion of oxygen is taken as 1cm³s⁻¹, what will be the rate of diffusion of methane whose relative molecular mass is 16? A. 2.0 B.1.8 C.1.4 D. 1.0
- An increase in temperature causes an increase in the pressure of a gas in a fixed volume due to an increase in the A. number of molecules of the gas B. density of the gas molecules C. number of collisions between the gas molecules D. number of collisions between the gas molecules and the walls of the container
- in electrolysis, the chemical reaction which take place at the anode is A. dissociation B. Hydrolyses C. Oxidation D. Reduction
- in the electrolysis to brine, it is essential to prevent the mixing of the products because A. sodium and chlorine readily combine B. chlorine gives a green coloration C. chlorine readily recombines with sodium hydroxide D. sodium hydroxide forms a carbonates in the presence of air and chlorine
- In what way is equilibrium constant for the forward reaction related to that of the reverse reaction? A. The two equilibrium constants are identical B. The product of the two is always greater than one C. The product of

- the two is expected to be one D. the addition of the two is expected to be one
- When chlorine water is exposed to sunlight, the gas evolved is A. Cl₂ B. O₂ C. HCl D. CO₂
 - PbCl₂ does not dissolve in liquid ammonia while AgCl does. This is because A. Pb is not a transition metal while Ag is B. Ag is not a transition metal while Pb is C. AgCl turns grey to exposure to light D. AgCl dissolves in hot water
 - When sodium hydroxide pellets are exposed to the atmosphere, that first gas they absorb is A. CO₂ B. water vapour C. Oxygen D. Nitrogen
 - What is the IUPAC name of the hydrocarbon



- 2-ethyl-4-methyl pent-2-ene
 - 3,5 dimethyl hex-3-ene
 - 2, 4 dimethyl hex-3-ene
 - 3-methyl 2-ethyl hex-2-ene
- Which of the following is NOT a monomer of benzene?
A.
 - Which of the following behaves like ethyne?
A. CH₃CH=CHCH₃
B. CH₃CH₂CH₂CH₂CH=CH₂
C. CH₂=CH₂
D. CH₃CH₃

CHEMISTRY 2005/2006 ANSWERS

1. A mixture is a material system made up two or more different substances which are mixed together but are not combined chemically. It is the physical combination of top or more substances the identities of which are retained and are mixed in the form of alloys, solutions. Suspensions and colloids. Sodium chloride is compound chemically Produced sea water is a mixture of sand, water and salts, iron fillings is an element existing alone. Granulated sugar is a sample compound. **Ans. B**

2. Recall that the valency of an element is the combining power of the element. An element X with atomic number 8 is a non-metal with a valency -2 while an element Y, with atomic number 13 is a metal with a valency of +3. When X and Y combine, their valencies are interchanged to form the compound: Y_2X_3 **Ans. A**

3. $CaCO_3 \rightarrow CaO + CO_2$

100g of $CaCO_3 = 44g$ of CO_2 1g of $CaCO_3 = 0.44g$ of CO_2
therefore, 1 g of $CaCO_3$ is in the mixture. Percentage of $CaCO_3$
 $= \frac{x}{100} \times 100\%$
 $= x \times 100\%$
66.67% **Ans. C**

4. Recall that alkanolic acids form a homologous series with the general molecular formula of $C_nH_{2n+1}COOH$. From the general formula, we have that $(12xn) + [1x(2n+1)] + 12 + 16 + 1 = 88$

$$12n + 2n + 1 + 45 = 88$$

$$14n + 46 = 88$$

$$14n = 88 - 46 = 42$$

$$n = 3$$

we therefore obtain the molecular formula by substituting for n in the general formula, i.e C_3H_7COOH **Ans. D**

$$5. \frac{R_O}{R_M} = \sqrt{\frac{D_M}{D_0}}$$

$$\frac{1}{R_M} = \sqrt{\frac{16}{32}}$$

$$\frac{1}{R_M} = \sqrt{\frac{32}{16}} = 1.41 \text{ **Ans. D**}$$

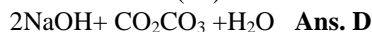
5. According to the kinetic theory of gases, the gas molecules move randomly in straight lines, colliding with one another and with the walls of the container. These collisions constitute the gas pressure. An increase in temperature leads to an increase in

kinetic energy of the gas particles, an increases in the frequency (or number) of collisions and an increase pressure.

Ans. D

6. The anode is the positive electrode which is connected to the positive terminal of the electric source. It is the electrode through which electrons leave the electrolyte loss of electron is oxidation. **Ans. C**

7. Note that brine is the name give to sodium chloride solution. The industrial process for the electrolysis of brine is referred to as the chloroalkali process. Depending on the method used, several products are prevented from mixing. Chlorine and sodium hydroxide are the products. If mixing of products is allowed, the sodium hydroxide produced attacks liberate carbon (IV) oxide to form carbonate.



8. Equilibrium constant is defined as the ratio of the rate of forward reaction to that of backward reaction. In writing equilibrium constant for forward reactions, the product for forward reactions, the products are placed as the numerator while the reactant are placed as the denominator. In writing reverse or backward equilibrium constant, reactants form the numerator while products form the denominator. Consider the "reaction" below;

X (Reactants) \rightleftharpoons Y (products) if forward equilibrium constant = k_f reverse equilibrium constant =

$$K_c = \frac{[products]^y}{[Reactants]^x} \quad k_{cl} = \frac{[Reactants]^x}{[products]^y}$$

This shows that the equilibrium constant of the forward reaction is the inverse (or opposite) of that of the reverse reaction. That is $\frac{1}{k_f} \rightarrow k_c \times k_{cl} = 1$

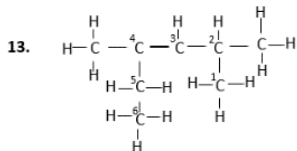
Therefore, the product of the low is expected to be one. **Ans. C**

10. Note that chlorine water is the name given to chlorine. Under the action of light, chlorine water gives oxygen and hydrochloric acid

Ans. B

11. **Ans. A**

12. Sodium hydroxide is a white crystalline solid. It is deliquescent and melts at about 320°C without decomposing. It readily absorbs carbon (V) to form sodium trioxocarbonate (iv) **Ans. A**



2,4-dimethyl hex-3-ene **Ans. C**

14. **Ans. A**

15. **Ans. C**

SUMMARY OF ANSWERS

1.B 2.A 3.C 4.D 5.C 6.D 7.C 8.D 9.C 10.B 11.A 12.A

13.C 14.C 15.C

CHEMISTRY 2006/07 QUESTIONS

Indicate the correct option in each of the following questions.

1. A mixture of iron and sulphur can be separated by dissolving the mixture in A. steam B. Dilute hydrochloric acid C. Dilute sodium hydroxide D. Benzene

2. If 67.5g of oxide of lead was reduced to 61.2 g of metal, calculate the formula of the oxide (Pb = 207, O = 16) A. PbO B. Pb_2O_3 C. Pb_3O_4 D. Pb_2O_3

3. Calculate the minimum volume of the oxygen that is required for complete combustion of a mixture of 20cm³ of CO and 10cm³ of hydrogen. A. 5cm³ B. 10cm³ C. 15cm³ D. 20cm³

4. $\text{HNO}_3 + \text{H}_2\text{O} = \text{H}_3\text{O}^+ + \text{NO}_3^-$ in the reaction action above, NO_3^- is the A. Conjugate B. Acid C. Conjugate base D. Base

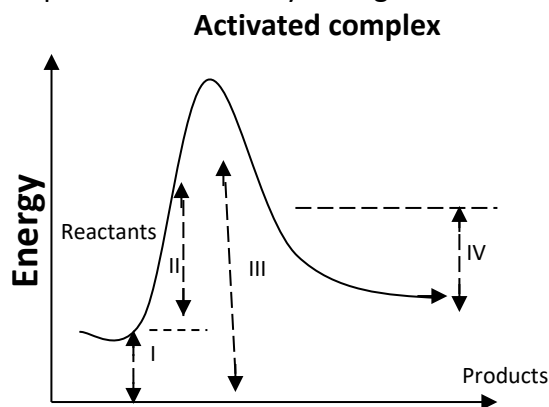
5. The pH range of a neutralization product of CH_3COOH and KOH is A. 1-3 B. 7-8 C. 6-7 D. 12-14

6. How much NaOH is required to make 250cm³ of 0.1mol/dm³ solution? A. 10g B. 1.0g C. 0.1g D. 4g

7. $2\text{PbO} \rightarrow 2\text{Pb} + \text{O}_2$ in the equation above, the oxidizing agent is A. Pb^{3+} B. Pb^{2+} C. O^{2-} D. O_2

8. A current of 0.5A flows for 1930 seconds and deposits 0.325g of metal M. if the charge is +2, the relative molecular mass is A. 65g B. 32g C. 24g D. 40g

9. emission of chlorofluorocarbon (CFC) into the atmosphere causes A. global warming Acid Rain B. depletion of ozone layer C. greenhouse effect



The diagram above shows the reaction path of an exothermic reaction. The heat of reaction is represented by A. I B. II C. III D. IV

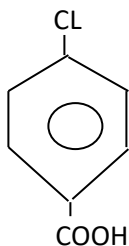
11. Which of the following samples will react fastest with dilute HCL? A. 10g of lumps of CaCO_3 at 25°C B. 10g of powdered CaCO_3 at 25°C C. 10g of lumps of CaCO_3 at 50°C D. 10g of powdered CaCO_3 at 50°C

12. the colour exhibited by copper in a flame test is A. green B. lilac C. Blue-green D. Crimson

13. Which of the following statements is correct? A. chlorine bleaches by oxidation while sulphur (iv) oxide bleaches by reduction B. Chlorine bleaches by reduction while sulphur (iv) oxide bleaches by

Oxidation C. both of them bleach by oxidation D.
both of the bleach by reduction

14. The IUPAC name for



- A. 1-chlorobenzoic acid
- B. 3-chlorobenzoic acid
- C. M-chlorobenzoic acid
- D. P-chlorobenzoic acid

15. 2-methylbenzoic acid is an isomer of A. pent-1-ene B. 2-methylpent-2-ene C. Hex-3-ene D. 2-methylprop-1-ene

CHEMISTRY 2006/07 ANSWERS

1. Both iron and sulphur attack steam to form oxides. Iron reacts very slowly with dil. HCL to liberate hydrogen while sulphur dissolves in dil. HCL to form sulphide. Both have no reaction with benzene sulphur reacts with sodium hydroxide to form sodium sulphide but iron has no reaction with sodium hydroxide. Hence, are separated by dissolving the mixture in dil. NaOH . **Ans. C**

2. mass of oxide of lead = 67.5g mass of metal = 61.2g

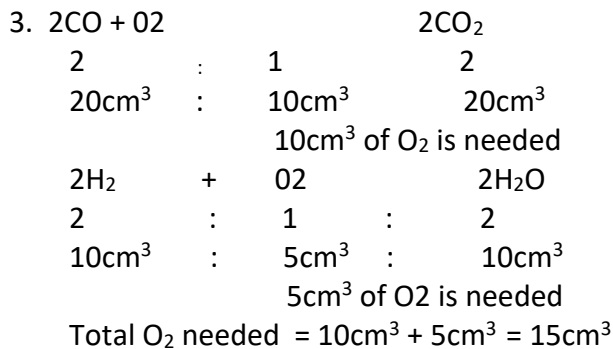
Mass of oxygen = 67.5-61.2 = 6.3g

Element	Pb	O
Relative mass	61.2g	6.3g

Mole ratio = $\frac{\text{Reacting mass}}{\text{molar mass}} = \frac{61.2}{207} = 0.3$ $\frac{6.3}{16} = 0.4$

$\frac{\text{mole ratio}}{\text{smallest mole ratio (i.e.0.3)}} = 1 \quad 1.33 \approx 1$

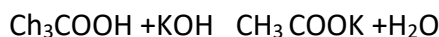
Therefore, the formula of the oxide is PBO **Ans. A**



Ans. C

4. Considering the reverse reaction, we notice that NO₃ can gain a proton from H₃O⁺. hence, it is the conjugate base **Ans. C**

5. Note that the two neutralization products of CH₃COOH and KOH are CH₃COOK and H₂O i.e. salt and water



CH₃COOK is a salt of weak acid and strong base. The salt will basic when dissolved in water because the strengths of acid and base are not equal. Therefore CH₃COOK when dissolved in water will have all the properties of KOH (a base) **Ans. D**

6. $\text{g/dm}^3 = \text{mol/dm}^3 \times \text{molar mass g/dm}^3 = \text{mass conc.} = 0.1 \text{ mol/dm}^3$. This implied that, 4g of NaOH is needed for 1000cm³ of NaOH is needed for 250cm³ $\times = 4 \times \frac{250}{1000} = 1 \text{g} = 1000 \text{cm}^3$ **Ans. B**

7. Considering redox in terms of oxygen, we note that a species is said to have been reduced if it lose oxygen from left to right of an equation. This reduced species is also the oxidizing agent. In another way, the oxidizing agent is usually defined as the oxygen donor while the oxygen acceptor is the reducing agent. So the oxidized species is the one that gains oxygen from left to right of an equation. In the given equation, the reduced species is Pb⁴⁺ (i.e. from Pb²⁺): hence, it is the oxidizing agent **Ans. A**

8. $i = 0.5A$, $t = 1930s$, $m = 0.32g$, valency = +2

1mole = 1 farad x valency

Where 1 farad = 96500C

1 mole of metal = 96500 x 2 = 193. 000C

But 0.325g of metal = it

=0.5 x 1930 = 965C

I.e. 0.325g of metal =96C

X= 193.000C

$$X = \frac{0.325 \times 193,000}{965}$$

X = 65g **Ans. A**

9. $O_3 + Cl - ClO_2 + O^2$

(from CFC)

Ans. C

10. Heat of reaction is the amount of heat evolved or absorbed when a chemical reaction occurs between molar quantities of the substances as represented in the equation of reaction under standard conditions **Ans. D**

11. At high temperatures, rate of reaction is high and powdered reactants provide greater surface area for reactions. **Ans. D**

12. All copper (II) salts impart a characteristic bluish-green colour to a non-luminous flame. **Ans. C**

13. Ans. A

14. Ans. A

15. Ans. A

SUMMARY OF ANSWERS (CHEMISTRY 2006/07)

1. A 2.A 3.C 4.C5.D 6.B 7.A 8.A 9.C 10.D 11.D 12.C

13.A 14.A 15.A

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