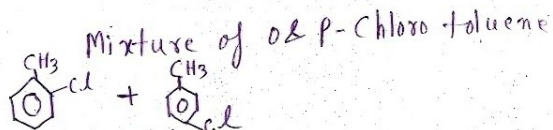62. Which one of the following is an unsaturated fatty acid?
    a) Palmitic acid
    b) Lauric acid   [C]   Linolenic acid
    c) Linolenic acid
    d) Myristic acid

63. When chlorine is passed through boiling toluene we get
    a) o – Chloro toluene
    b) p – Chloro toluene
    c) Mixture of o & p – Chloro toluene
    d) Benzyl chloride

    Mixture of o& p-Chloro toluene

64. The standard temperature used in thermo chemical calculations is
    a) 273 K
    b) 298 K $273 + 25 = 298 K$
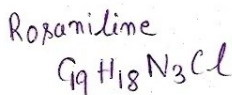   c) 297 K
    d) 303 K

65. Which of the following is an intensive property?
    a) Enthalpy
    b) Entropy   Density
    c) Density
    d) Mass

66. Schiff's reagent contains
    a) Rochelle salt
    b) Resorcinol   Rosaniline
    c) Rosaniline $C_{19}H_{18}N_3Cl$
    c) α naphthol

67. The formula of chromyl chloride is
    a) CrCl
    b) $CrCl_3$ CrO_2Cl_2
    c) $CrOCl_2$
    d) CrO_2Cl_2

68. Horn silver is
    a) Oxide ore
    b) Sulfide ore   Halide ore
    c) Halide ore
    d) Carbonate ore

Space for calculation / rough work

$m - m = \dfrac{m}{V}$

12

69.

70.

71

Physics and Chemistry

69. Tetrahedral structure is formed by
    a) Sp² hybridization
    b) Sp³ hybridization
    c) dsp² hybridization
    d) d²sp³ hybridization

Sp^3 hybridization

70. NO⁺ ligand is
    a) nitronium
    b) nitrosyl
    c) nitrosonium
    d) nitro

nitrosonium
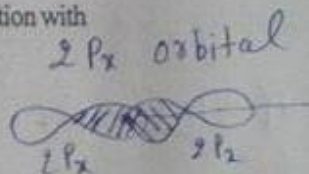
71. Cationic Complex is
    a) hexa amino platinum chloride
    b) potassium ferro cyanide
    c) sodium argento cyanide
    d) nickel carbonyl

hexa amino platinum chloride

72. $2p_x$ atomic orbital undergoes linear combination with
    a) $2p_y$ orbital
    b) $2p_z$ orbital
    c) Both $2p_y$ and $2p_z$ orbitals
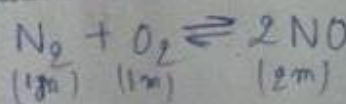   d) $2p_x$ orbital

$2p_x$ orbital

$2p_x$ $2p_z$

73. In a first order reaction, molar concentration of a reactant decreases from 0.1 to 0.01 in 100 seconds, The rate constant of the reaction is
    a) 2.3030
    b) 0.02303
    c) 0.2303
    d) 0.002303

$$K = \frac{2 \cdot 303}{t} \log \frac{a}{a-x} = \frac{2 \cdot 303}{100} \log \frac{0 \cdot 1}{0 \cdot 01} = 0 \cdot 02303$$

74. In which one of the following equillibria, pressure has no effect
    a) $PCl_5 \rightleftarrows PCl_3 + Cl_2$
    b) $2NH_3 \rightleftarrows N_2 + 3H_2$
    c) $2SO_2 + O_2 \rightleftarrows 2SO_3$
    d) $N_2 + O_2 \rightleftarrows 2NO$

$N_2 + O_2 \rightleftarrows 2NO$
$(1m) \quad (1m) \qquad (2m)$

75. Conductivity of a solution is not affected by
    a) Addition of water
    b) Process of heating
    c) Addition of acetic acid
    d) Addition of ethanol

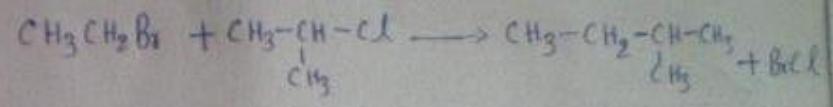Addition of ethanol

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Space for calculation / rough work

$s \cdot p$

$K = \frac{2 \cdot 303}{100} \log \frac{0 \cdot 1 \, 100}{0 \cdot 01}$

$= 2 \cdot 303 \div 0 \cdot 002$

Physics and Chemistry

76. The lowering in vapour pressure is maximum for
    a) 0.1M urea
    b) 0.1M NaCl
    c) 0.1M $MgCl_2$
    d) 0.1M $K_4[Fe(CN)_6]$
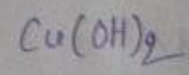
77. Bromo ethane and isopropyl chloride with metallic sodium in ether forms
    a) Pentane
    b) 2-methyl butane
    c) 3-methyl butane
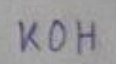   d) 2:3 dimethyl butane

    $CH_3CH_2Br + CH_3-CH-Cl \longrightarrow CH_3-CH_2-CH-CH_3 + BrCl$
    with CH_3 below and CH_3 below product

78. To dry ammonia gas the drying agent used is
    a) Con. H_2SO_4
    b) P_2O_5
    c) soda lime
    d) anhydrous $CaCl_2$

    The moisture present in ammonia cann't be dried by Conc. H_2SO_4, anhydrous $CaCl_2$ and P_2O_5.

79. The metal hydroxide which is soluble in excess of ammonium hydroxide is
    a) $Fe(OH)_2$
    b) $Fe(OH)_3$
    c) $Cu(OH)_2$
    d) $Al(OH)_3$

    $Cu(OH)_2$

80. Potassium dichromate can be converted to potassium chromate by adding
    a) KOH
    b) Con. H_2SO_4
    c) NH_4OH
    d) acetic acid

    KOH

81. 0.5g of an acid is neutralized by 40cc of 0.125N NaOH. The equivalent mass of the acid is
    a) 50
    b) 100
    c) 40
    d) 80

    100 ; Eqr weigth of NaOH = 40

82. 5 liters of NaOH solution of pH 12 contains
    a) 200g
    b) 0.2g
    c) 20g
    d) 2g

    $pOH = 2$; $[OH^-] = 1\times10^{-2} M$
    Weigth (NaOH) = 40g
    In 5 liter ≡ $5 \times 40 \times 1 \times 10^{-2} = 2g$

Space for calculation / rough work

83. 50cc of oxalic acid is oxidized by 25cc of 0.20 N KMnO₄ The mass of oxalic acid present in 500cc of the solution is
    - a) 3.15g
    - b) 31.5g
    - c) 6.3g
    - d) 63g

    (handwritten)
    $$C\ O\ O\ H$$
    $$|$$
    $$C\ O\ O\ H$$
    (oxalic acid)
    (90 gram)

84. Pure water is neutral because
    - a) PH = 7
    - b) Litmus has no effect
    - c) It is free from dissolved salts
    - d) PH = 0

    (handwritten) pH = 7

85. In the titration of Mohr salt against $KMnO_4$ the indicator used is
    - a) diphenyl amine
    - b) $KMnO_4$
    - c) phenolphthalein
    - d) Methyl orange

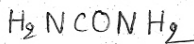   *(handwritten)* KMnO4 ; Mohr salt against KMnO4, doesn't need any external indicator.

86. The relationship between half life of a reaction and the order of reaction is
    - a) $t_{\frac{1}{2}} \propto \dfrac{1}{a^{(n+1)}}$
    - b) $t_{\frac{1}{2}} \propto \dfrac{1}{a^{(n+2)}}$
    - c) $t_{\frac{1}{2}} \propto \dfrac{1}{a^{n}}$
    - d) $t_{\frac{1}{2}} \propto \dfrac{1}{a^{(n-1)}}$

    (handwritten) $t_{1/2} \propto \dfrac{1}{a^{(n-1)}}$

87. 6gm of urea is dissolved in 90g of water. Relative lowering of vapour pressure is
    - a) 0.02
    - b) 0.2
    - c) 0.002
    - d) 0.04

    (handwritten) $H_2 N CON H_2$

88. 6.84g of sucrose is dissolved in 200g of water. The molality of the solution is
    - a) 0.2M
    - b) 0.3M
    - c) 0.1M
    - d) 0.02M

    (handwritten) Molecular Weight of Sucrose $(C_{12}H_{22}O_{11})$ = 342
    1000g of water = 5 × 6.84 = 34.2
    molality = $\dfrac{34.2}{342}$ = 0.01M

Space for calculation / rough work

(handwritten rough work)
n × 500 = 25 × 0.20
n = $\dfrac{25 × 0.20}{500}$ = $\dfrac{20}{20 × 100}$ = 10⁻²

When common salt is added to a saturated solution of soap, soap is precipitated. This is based on the principle of

a) Common ion effect
b) Principle of solubility product
c) Adsorption from solution
d) Peptisation

Common ion effect

Highest osmotic pressure is shown by a solution of

a) 0.1M Aluminium sulfate
b) 0.1M Potassium Nitrate
c) 0.1M Magnesium Chloride
d) 0.1M Barium Chloride

0.1M Aluminium sulfate

1. 50% of a first order reaction is completed in 30min. The velocity constant of the reaction is

a) 0.231
b) 2.31
c) 0.00231
d) 0.0231

$t_{1/2} = 30 min$

$K = \dfrac{0.693}{30} = 0.0231$

2. The ebullioscopic constant is the elevation in boiling point produced by

a) 1 Molar solution
b) 1 Molal solution
c) 1N solution
d) 10% solution

1 Molal Solution

3. The mass of glucose to be dissolved in 50g of water to get 0.3 Molal solution is

a) 27g
b) 0.27g
c) 2.7g
d) 5.4g

4. 25ml of 0.08N Mohr salt solution is Oxidised by 20ml of $K_2Cr_2O_7$ in acid medium. The Mass of Mohr salt present in 500cc is

a) 3.96g
b) 19.6g
c) 39.6g
d) 39.2g

19.6 g

95. A reaction is spontaneous at all temperature when

a) ΔH is -ve and ΔS is +ve
b) ΔH is +ve and ΔS is -ve
c) Both ΔH & ΔS are -ve
d) Both ΔH & ΔS are +ve

ΔH is -ve and ΔS is +ve

Space for calculation / rough work

$Al_2(SO_4)_3$ P.U.R.

mg $k = \dfrac{9.303}{30} log$

$K = \dfrac{0.693}{30}$

$\Delta G = \Delta H - T\Delta S < 0.0231$

$0.3 = \dfrac{9}{80 \times 50}$

$g = 400 \times 0.3$

$= \dfrac{120}{1000}$

$0.3 = \dfrac{g}{16}$

S_2O_8

$25 \times 0.08 = 20 \times \frac{N}{?}$

$\dfrac{16}{\sqrt{12}}$ $\sqrt{112}$ 48

0.12

$m = \dfrac{0.27 \, mass}{16} \times 60 \times 98$

96. The coordination number of sodium chloride is
    a) 4
    b) 8
    c) 6
    d) 12

97. Conjugate acid of NH_2^- is
    a) NH_3
    b) NH_4^+
    c) N^{---}
    d) NH_2^+

    $NH_2^- + H^+ \longrightarrow NH_3$

98. Highest molar conductivity is given by
    a) 0.005 M NaCl
    b) 0.1 M NaCl
    c) 0.05 M NaCl
    d) 0.01 M NaCl

    Molar Conductivity is defined as the conductivity of an electrolyte solution divided by molar concentration.

99. In the detection of III group basic radicals NH_4OH is added after NH_4Cl to
    a) increase in the ionization of NH_4OH
    b) increase in the ionization of salt solution
    c) decrease in the ionization of salt solution
    d) decrease in the ionization of NH_4OH

    decrease in the ionization of NH_4OH

100. Just before attaining the chemical equilibrium
    a) Rate of forward reaction decreases & Rate of backward reaction increases.
    b) Rate of forward reaction increases & Rate of backward reaction decreases.
    c) No change in the rates of forward & backward reactions.
    d) Rate of forward reaction equals the rate backward reaction.

101. Which one of the following shows highest magnetic moment?
    a) Fe^{-}
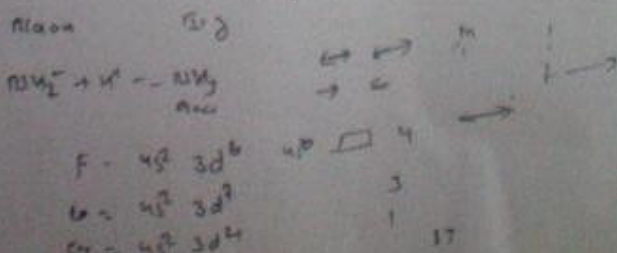   b) Co^{++}
    c) Cr^{+++}
    d) Ni^{++}

    Fe^{2+}; bcoz it has 4 unpaired electrons.

102. In 3d series as we move from scandium to zinc the paramagnetism
    a) increases
    b) decreases
    c) first increases to a maximum & then decreases
    d) first decreases to a minimum & then increases

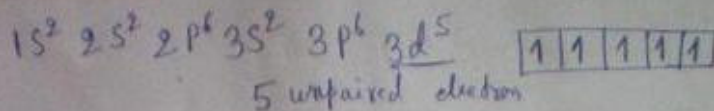   "C"; Paramagnetism in the transition elements is caused by the presence of unpaired electrons in the 'd' suborbital.

Space for calculation / rough work

NaoH $\vec{2} \cdot \vec{3}$

$NH_4^+ + H^- \rightarrow NH_3$

$F = 4s^2 \ 3d^6$
$b = 4s^2 \ 3d^7$
$cr = 4s^2 \ 3d^4$

17

103. The number of unpaired electrons in Fe^{+++} is
    a) 2
    b) 3
    c) 4
    d) 5

$1s^2 \; 2s^2 \; 2p^6 \; 3s^2 \; 3p^6 \; \underline{3d^5}$ ☐☐☐☐☐ (1 1 1 1 1)

5 unpaired electron

104. The IUPAC name of $K_4[Fe(CN)_6]$ is
    a) Potassium ferri cyanide
    b) Potassium ferro cyanide
    c) Potassium Hexa cyano ferrate (II)
    d) Potassium Hexa cyano ferrate (III)

Potassium Hexa cyano ferrate (II)

105. The adsorption of an inert gases on activated charcoal increases with
    a) decrease of pressure
    b) increase of temperature
    c) decrease of atomic mass
    d) decrease of temperature

decrease of temperature

106. Electrolysis of brine gives a mixture of
    a) H_2, Na, Cl_2
    b) Cl_2, H_2, NaOH
    c) H_2, O_2, NaOH
    d) O_2, Cl_2, NaOH

107. Sucrose is a non reducing sugar due to
    a) 1 - 2 linkage
    b) 1 - 4 linkage
    c) 1 - 5 linkage
    d) 1 - 6 linkage

1 - 2 linkage

108. Sulfur containing amino acid is
    a) alanine
    b) proline
    c) tyrosine
    d) cystein

109. Lysine is
    a) Neutral amino acid
    b) Acidic amino acid
    c) Basic amino acid
    d) Heterocyclic amino acid

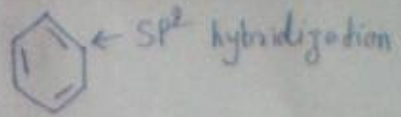Basic amino acid

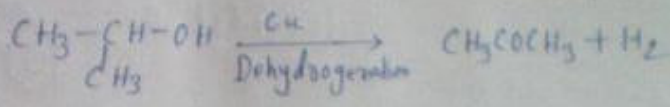*Space for calculation / rough work*

$-6 = -7$
2

18

110. In the Molisch reagent, the substance used is
    a) β naphthol in alcohol
    b) α naphthol in alcohol
    c) Resorcinol in alcohol
    d) Rosaniline in water

    α napthol in alcohal

111. In benzene, each carbon atom undergoes
    a) sp hybridization
    b) sp² hybridization
    c) sp³ hybridization
    d) dsp² hybridization

    ← SP² hybridization

112. When vapours of isopropyl alcohol is passed over heated copper we get acetone, It is an example for
    a) dehydration
    b) dehalogenation
    c) dehydrohalogenation
    d) dehydrogenation

    $CH_3 - CH-OH \xrightarrow[Dehydrogenation]{Cu} CH_3COCH_3 + H_2$
    $\quad\quad |$
    $\quad\quad CH_3$

113.
    CH_3
    $\quad |$
    $CH_3 - N - CH_3$ is the IUPAC name of

    a) tri methyl amine
    b) 2 methyl ethanamine
    c) N – N dimethyl methanamine
    d) trimethyl ammonia

    N – N dimethyl methanamine

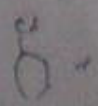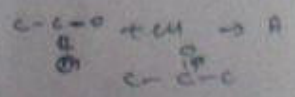114. When Benzaldehyde is condensed with acetic anhydride is presence of fused sodium acetate we get
    a) Crotonic acid
    b) Cinnamic acid
    c) Aspartic acid
    d) Salicylic acid

    $(C_6H_5CHCOOH)$

115. When a mixture of Calcium Benzoate & Calcium formate is dry distilled, we get
    a) Formaldehyde
    b) Acetaldehyde
    c) Benzaldehyde
    d) Salicylaldehyde

    Benzaldehyde

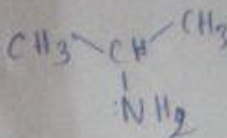
Space for calculation / rough work

$n \times 50 = 25$
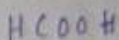
$n = \dfrac{25 \times 10}{50}$

$010 = \dfrac{5}{10^{-1}}$

19

116. Which one of the following is strongly basic?
    a) Dimethyl amine
    b) Methyl amine
    c) Ammonia
    d) Aniline

$CH_3 - CH - CH_3$
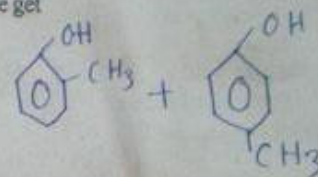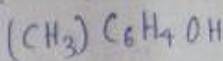 |
    NH_2

117. Which one of the following is bi functional compound?
    a) Formic acid
    b) Acetic acid
    c) Benzoic acid
    d) Cinnamic acid

$HCOOH$

118. When phenol is treated with Chloro methane in presence of $AlCl_3$ we get
    a) o – cresol
    b) m – cresol
    c) p – cresol
    d) mixture of o & p – cresol

$(CH_3) C_6H_4 OH$

119. In the synthesis of ammonia $N_2 + 3H_2 \rightleftarrows 2NH_3$
    a) $K_p = K_c RT$
    b) $K_p = K_c$
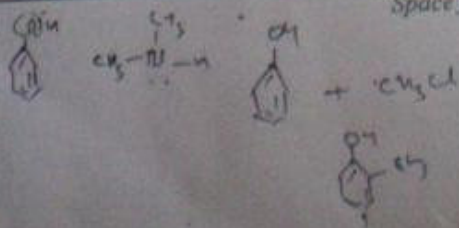   c) $K_p = K_c (RT)^{-2}$
    d) $K_p = K_c (RT)^{-1}$

$\Delta n = -2$

$K_p = K_c (RT)^{-2}$

120. When the same amount of electricity is passed through solutions of silver nitrate and copper sulfate, 0.4g copper is deposited. The amount of silver deposited is
    a) 1.35g
    b) 2.7g
    c) 5.1g
    d) 5.4g

* * *