UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: B. Sc. Chemical Energetics, E & F.G Org. Chem.I		**Semester:II**
Course Code: CHEM1008	**Time: 3 hrs**	
Programme: B.Sc. H Maths and Physics	**Max. Marks:**	

Instructions: Section A questions carry 2 marks each. The weightage of questions in section B is mentioned against them.

Section-A

1. For exothermic reactions ΔH is -------------- while for endothermic reactions it is -----------------
   a. Positive, negative
   b. positive, positive
   c. negative, negative
   d. negative, positive

2. The change in the enthalpy that takes place when one mole of the compound is formed from its elements is called

a. heat of formation of compound

b. heat of synthesis

c. heat of combustion

d. standard heat of formation

3. The entropy of a pure crystal is zero at absolute zero. This is statement of

a. First law of thermodynamics

b. second law of thermodynamics

c. Third law of thermodynamics

d. Hess's law

4. A spontaneous reaction is not possible if

a. ΔH and TΔS are both negative

b. ΔH and TΔS are both positive

c. ΔH is +ive and TΔS is -ive

d. ΔH is –ive and TΔS is +ive

5. Which of the following set of conditions makes a process spontaneous at all temperatures?

a. $\Delta H=0$, $\Delta S<0$

b. $\Delta H=0$, $\Delta S>0$

c. $\Delta H>0$, $\Delta S>0$

d. $\Delta H<0$, $\Delta S<0$

6. which of the following will change the equilibrium constant for a reaction mixture

a. Changing temperature

b. adding an inert gas

c. increasing pressure by decreasing volume

d. all of these

7. The yield of AB (g) in the reaction; A(g) + B(g)-------$\rightarrow$ AB (g) + heat

   Would be increased by

   a. decreasing the pressure
   b. adding additional AB to the reaction mixture
   c. decreasing the temperature
   d. adding a non-reactive liquid to the reaction mixture

8. For which of the following reactions is the value of K_{eq} depends only on one substance in the reaction

a. $C(s)+CO_2(g) \rightleftharpoons 2CO(g)$

b. $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl (g)$

c. $CaCO_2(s) \rightleftharpoons CaO(s)+CO_2(g)$

d. $N_2O_4 (g) \rightleftharpoons 2NO_2(g)$

9. for the following reaction at 500 K

$C(s)+CO_2(g) \rightleftharpoons 2CO(g)$; the equilibrim mixture conatained CO_2 and CO at partial pressures of 7.6 atm and 3.2 atm respectively. The value of K_p is

   a. 2.4 atm
   b. 18.1 atm
   c. 0.6 atm

d. 1.0 atm

10. if s is the solubility of AgCl in water the solubility product K_{sp} is given by

a. $K_{sp} = s$

b. $K_{sp} = s^2$

c. $K_{sp} = s^3$

d. $K_{sp} = s^{1/2}$

11. When HCl is passed through a saturated solution of NaCl, the solubility of NaCl

a. will increase

b. will remain unchanged

c. will decrease

d. will become zero

12. A solution is unsaturated if its

a. ionic product $< K_{sp}$

b. ionic product $= K_{sp}$

c. ionic product $> K_{sp}$

d. ionic product $= 0$

13. When calcium oxide is dissolved in water, following reaction takes place

$O^{2-} + H_2O \ \text{------}\rightarrow 2OH^-$; the Bronsted acid is

    a. O^{2-}
    b. H_2O
    c. OH^-
    d. H_2O and OH^-

14. the pH of a solution of HCl is 1. The amount of acid present in one litre of the solution will be

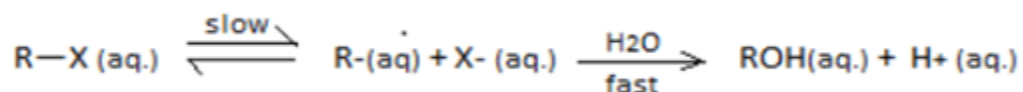a. 3.65 g/l

b. 0.365 g/l

c. 36.5 g/l

d. 1.0 g/l

15. The pOH of 0.1 M KOH is

a. 0.1

b. 1.0

c. -1.0

d. 13

Q16. On heating aqueous solution of benzene diazonium chloride, which of the following is formed?
a) benzene
b) chlorobenzene
c) phenol
d) aniline

Q17. S_N1 reaction undergoes through a carbocation intermediate as follows:

$$R-X\ (aq.) \overset{slow}{\underset{}{\rightleftharpoons}} R\text{-}(aq) + X\text{-}\ (aq.) \xrightarrow[fast]{H2O} ROH(aq.) + H+ (aq.)$$

[R = t-Bu, iso-Pr, Et, Me] (X = Cl, Br, I)
The correct statements are:
I. The decreasing order of rate of S_N1 reaction is t-BuX > iso-PrX > EtX > MeX
II. The decreasing order of ionization energy is MeX > EtX > iso-PrX > t-BuX
III. The decreasing order of energy of activation is t-BuX > iso-PrX > EtX > MeX
a) **I & II are correct**
b) I & III are correct
c) II and III are correct
d) I, II & III are correct

Q18. 4. When the nucleophile :OR attacks the RX, the resultant product will be _____
a) R – OH
b) ROR
c) R:CN
d) RNHR

Q19. What is the major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide?
a) Benzoic acid
b) Salicyladehyde
c) Salicylic acid
d) Phthalic acid

Q20.   Which of the following way is not a method of preparation of alcohol?
a) Grignard reaction
b) Reduction of an aldehyde, ketone, or carboxylic acid with the appropriate reducing agent
c) Substitution reaction of hydroxide or water on the appropriate alkyl halide
d) Haber's process

Q21.   The reactivity order of alkyl halides in S_N2 is _____
a) $CH_3 X > 1^0 > 2^0 > 3^0$
b) $CH_3 X > 2^0 > 1^0 > 3^0$
c) $CH_3 X > 3^0 > 1^0 > 2^0$
d) $CH_3 X > 3^0 > 2^0 > 1^0$

Q22.   What reagents will be used in the preparation of benzaldehyde via Gattermann Koch synthesis?
a) Carbon dioxide and HCl
b) Carbon monoxide and HCl
c) Oxygen and H_2SO_4
d) Carbon monoxide and H_2SO_4

23Q.   In which condensation an enol or an enolate ion reacts with a carbonyl compound to form a β-hydroxyaldehyde or β-hydroxyketone followed by dehydration to give a conjugated enone happens?
a) Aldol condensation
b) Claisen reduction
c) Henry condensation
d) Knoevenagel condensation

Q24.   The correct sequence of steps involved in the mechanism of Cannizzaro's reaction is _____.

(A) transfer of H^-, transfer of H^+ and nucleophilic attack

(B) nucleophilic attack, transfer of H^- and transfer of H^+

(C) electrophilic attack by OH^-, transfer of H^+ and transfer of H^-

(D) transfer of H^+, nucleophilic attack and transfer of H^-

Q25. Reaction between alkyl halide and sodium metal is called

   a) Wurtz reaction
   b) Kolbe's reaction
   c) Clemmensen's reaction
   d) Wurtz - Fittig's reaction

Q26 SN2 Mechanism proceeds through intervention of

   a) Carbocation
   b) Transition State
   c) Free radical
   d) Carbanion

Q27. Oppenaur oxidation is the reverse process of

  a) Wolff –Kishner reduction
  b) Rosenmund's reduction
  c) Clemmensen reduction
  d) Meerwein-Pondorf-Verely reduction

Q28. Which of the following method is used to convert ketone into hydrocarbon

  a) aldol condensation
  b) Reimer Tieman reaction
  c) Cannizzaro's reaction
  d) Clemmensen's reduction
)

Q29. When $CH_3CHBrCH_2CH_3$ is reacted with alcoholic KOH the major product is

  a) $CH_3CH=CHCH_3$
  b) $CH_2=CHCH_2CH_3$
  c) $CH_3CH(OH)CH_2CH_3$
  d) $CH_3CH_2CH_2CH_3$

Q30. Which compound gives iodoform by reaction between I2 and NaOH

a) CH_3OH
b) C_2H_5OH
c) C_3H_7OH
d) $C_2H_5OC_2H_5$

Section-B

Q1.   Calculate the degree of hydrolysis of decimolar solution of ammonium acetate at 25^0C.
       Dissociation constants of acetic acid and ammonium hydroxide are $1.75x10^{-5}$ and $1.81x10^{-5}$
       respectively. $K_w=1.008x10^{-14.}$ 10   CO1

Q2.   Calculate the pH of a $2x10^{-5}$ M solution of phenol at 25^0C. $K_a=1.008x10^{-14}$.   5   CO1

Q3.   Explain Le Chatelier's principle by providing suitable examples.   5   CO1

Q4.   Haloarenes are relatively unreactive towards nucleophilic substitution reaction as
       compared to haloalkanes. Explain.   5   CO2

Q5.   Discuss Lucas test to distinguish 1^0, 2^0 and 3^0 alcohol.   5   CO2

Q6.   Carry out the following conversions: 10   CO3

       a) Chloro benzene to Aniline
       b) Ethylmagnesium bromide to 2, 3-dimethylpentan-2-ol