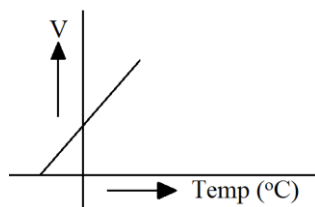


SEM – 2 (FULL COURSE) (B GROUP)

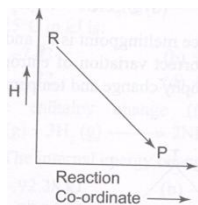
The following question contain 4 marks :

- Compound X is an anhydride of sulphuric acid. The number of sigma bonds and the number of pi bonds present in X are respectively.
a) 3, 3 b) 4, 2 c) 2, 4 d) 4, 3
- If the molecule of HCl was totally polar, the expected value of dipole moment was 6, 12 D but the experimental value of dipole moment calculated was 1.03 D. Calculate the percentage ionic character.
a) 0 b) 17 c) 50 d) 90
- The correct order of the lattice energies for the following ionic compounds is:
a) $\text{Al}_2\text{O}_3 > \text{CaO} > \text{MgBr}_2 > \text{NaCl}$ b) $\text{MgBr}_2 > \text{Al}_2\text{O}_3 > \text{CaO} > \text{NaCl}$
c) $\text{Al}_2\text{O}_3 > \text{MgBr}_2 > \text{CaO} > \text{NaCl}$ d) $\text{NaCl} > \text{MgBr}_2 > \text{CaO} > \text{Al}_2\text{O}_3$
- Among the following, the molecule with the highest dipole moment is:
a) CH_3Cl b) CH_2Cl_2 c) CHCl_3 d) CCl_4
- In which of the following pairs, the critical temperature of latter gaseous species is higher than the first?
a) CO_2, H_2 b) H_2, NH_3 c) NH_3, He d) CO_2, He
- 0.1 mole of gas absorbs 41.75 J of heat, the rise in temperature occurs 20°C , the gas must be:
a) Triatomic b) Diatomic c) Monoatomic d) (b) and (c) both
- A gas has double the average velocity of SO_2 gas at any temperature. The gas may be:
a) CO_2 b) C_2H_4 c) CH_4 d) O_2
- The following graph illustrates:

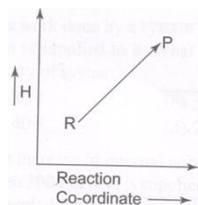


- a) Boyle's law b) Charles law c) Dalton's law d) Lussac's law
- Positive deviation from ideal behaviour takes place because of:
a) Molecular interaction between atoms and $\frac{PV}{nRT} > 1$
b) Molecular interaction between atoms and $\frac{PV}{nRT} < 1$
c) Finite size of atoms and $\frac{PV}{nRT} > 1$
d) Finite size of atoms and $\frac{PV}{nRT} < 1$
 - For a reversible adiabatic ideal gas expansion $\frac{dp}{p}$ is equal to:
a) $\frac{dV}{V}$ b) $-\gamma \frac{dV}{V}$ c) $\left(\frac{\gamma}{\gamma-1}\right) \frac{dV}{V}$ d) $\gamma \frac{dV}{V}$
 - 2 mole of an ideal gas at 27°C temperature is expanded reversibly from 2 L to 20 L. Find entropy change in cal. ($R = 2 \text{ cal/mol K}$):
a) 92.1 b) 0 c) 4 d) 9.2

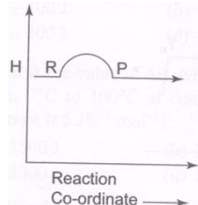
12. Which plot represent an exothermic process?



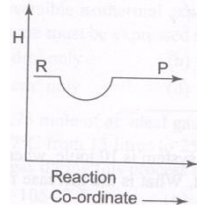
a)



b)



c)



d)

13. In thermodynamics, a process is called reversible when:

- Surroundings and system change into each other
- There is no boundary between system and surroundings
- The surroundings are always in equilibrium with the system
- The system changes into the surroundings spontaneously

14. If 0.75 mole of an ideal gas is expanded isothermally at 27°C from 15n litres to 25 litres, then work done by the gas during this process is ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

- 1054.2 J
- 896.4 J
- 954.2 J
- 1254.3 J

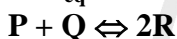
15. 0.16 g of methane is subjected to combustion at 27°C in a bomb calorimeter system. The temperature of the calorimeter system (including water) was found to rise by 0.5°C. Calculate the heat of combustion of methane at constant volume. The thermal capacity of the calorimeter system is 177 kJ K⁻¹ ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$):

- 695 kJ mol⁻¹
- 1703 kJ mol⁻¹
- 890 kJ mol⁻¹
- 885 kJ mol⁻¹

16. The enthalpies of solution of BaCl₂ (s) and BaCl₂ · 2H₂O (s) are -20.6 and 8.8 kJ mol⁻¹ respectively. The enthalpy change for the hydration of BaCl₂ (s) is:

- 29.8 kJ
- 11.8 kJ
- 20.6 kJ
- 29.4 kJ

17. If K_{eq} for the reaction is 81



If we start with 1 mole each of P and Q. What is the mole fraction of R at equilibrium:

- 1/9
- 11/9
- 4/9
- 9/11

18. For the $N_2 + 3H_2 \rightleftharpoons 2NH_3$, the initial mole ratio of N₂ : H₂ is 1 : 3. If at equilibrium only 50% has reacted and equilibrium pressure is P. Find the value of P_{NH_3} at equilibrium.

- $\frac{P}{3}$
- $\frac{P}{5}$
- $\frac{P}{9}$
- $\frac{P}{6}$

19. If K_p of the reaction $A(g) + 2B(g) \rightleftharpoons 2C(g) + D(g)$ is 0.05 at 1000 K, then the value K_c of the reaction:

- 20000 R
- 0.02 R
- $5 \times 10^{-5}/R$
- $5 \times 10^{-5} R$

20. For the hypothetical reactions, the equilibrium constant (K) values are given:

- $A \rightleftharpoons B$ $K_1 = 2$
- $B \rightleftharpoons C$ $K_2 = 4$
- $C \rightleftharpoons D$ $K_3 = 3$

The equilibrium constant (K) for the reaction: $A \rightleftharpoons D$ is

- 3
- 6
- 12
- 24

21. A certain buffer solution contains equal concentration of X⁻ and HX. The K_p for X⁻ is 10⁻¹⁰. The pH of the buffer is:

- 6
- 10
- 4
- 14

22. pK_a value of four acids are given below. The strongest acid is:

- 4.0
 - 3.5
 - 2.5
 - 2
- 1
 - 2
 - 3
 - 4

23. 40 ml of 0.1 M ammonia solution is mixed with 20 ml of 0.1 M HCl. What is the pH of the mixture? (pK_b of ammonia solution is 4.74)

- 4.74
- 2.26
- 9.26
- 5.00

24. The solubility of AgCl in 0.2 M NaCl is

$K_{sp} \text{ AgCl} = 1.8 \times 10^{-10}$:

- $1.8 \times 10^{-11} \text{ M}$
- $9 \times 10^{-10} \text{ M}$
- $6.5 \times 10^{-12} \text{ M}$
- $5.6 \times 10^{-11} \text{ M}$

25. In the reaction $B_2H_6 + 2KOH + 2X \rightarrow 2Y + 6H_2$

X and Y are respectively

- HCl, KBO₃
- H₂, H₃BO₃
- H₂O, KBO₂
- H₂O, KBO₃

26. Ga is below Al in the periodic table, but atomic radius of Ga is less than Al. It is because of
 a) Lanthanoid contraction b) Poor screening effect c) Inert pair effect d) None of these

27. Which of the following statement is correct?

- a) Al forms $[AlF_6]^{3-}$ ion but B does not form $[BF_6]^{3-}$ ion
 b) Boron and aluminium halides behave as Lewis acids.
 c) The $p\pi - p\pi$ back bonding occurs in the halides of boron and not in those of aluminium
 d) All of these

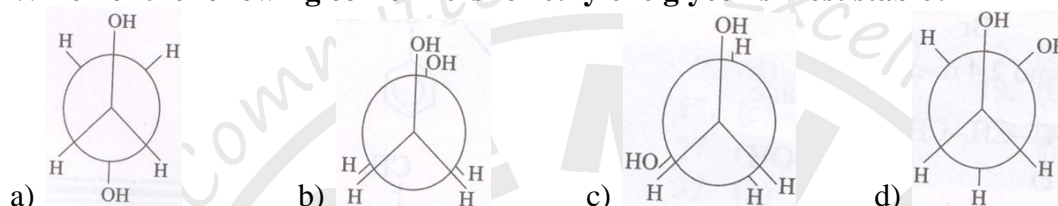
28. $[SiO_4]^{4-}$ has tetrahedral structure and the silicate formed by using three oxygen has a:

- a) Two dimensional sheet structure b) Pyrosilicate structure
 c) Linear polymeric structure d) Three dimensional structure

29. Select correct statement:

- a) GeO_2 , SnO_2 and PbO_2 are all acidic oxides
 b) Oxides of carbon family (MO_2) are all network solids with octahedral coordination
 c) Silicon dioxide (silica) is a network solid with octahedral coordination and is a giant molecule.
 d) None of these

30. Which of the following conformers for ethylene glycol is most stable?



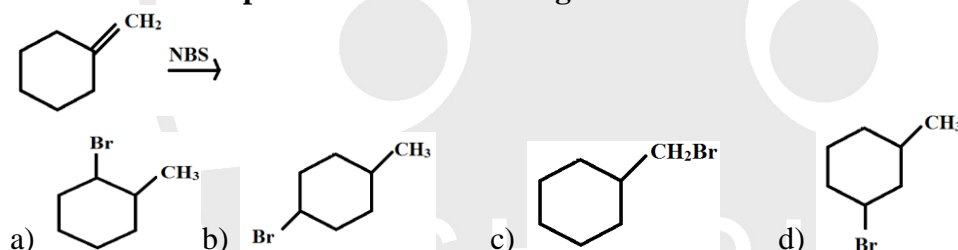
31. Reductive ozonolysis of the alkene, $CH_3 - CH = C = CH_2$ will give:

- a) Only CO_2 b) Only CH_2O c) Only $CH_3 - CHO$ d) Mixture of CH_3CHO , $HCHO$ and CO_2

32. $R-CH=CH_2 + CCl_4 \xrightarrow{PEROXIDE} A$. Here, A is

- a) b) c) Both are correct d) Reaction does not take place

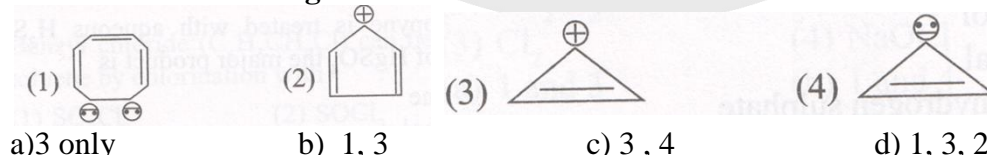
33. What will be the product in the following reaction?



34. $\begin{matrix} CHCOONa \\ || \\ CHCOONa \end{matrix} \xrightarrow{\text{Electrolysis}} [A] \xrightarrow[\text{liquid } NH_3]{I_2} [B]$, Here, [B] is:

- a) $CH \equiv CH$ b) $NaC \equiv CNa$ c) $I - C \equiv C - I$ d) $IC \equiv CNa$

35. Which of the following are aromatic here:



36. Cyclooctatetraene is not aromatic. The most important reason for this is that:

- a) It is a planar molecule and has $4n + 2 \pi$ electrons
 b) It has eight π - electrons and non planar structure
 c) Its structure cannot be described by more than the canonical forms
 d) Its structure is not that of regular octagon

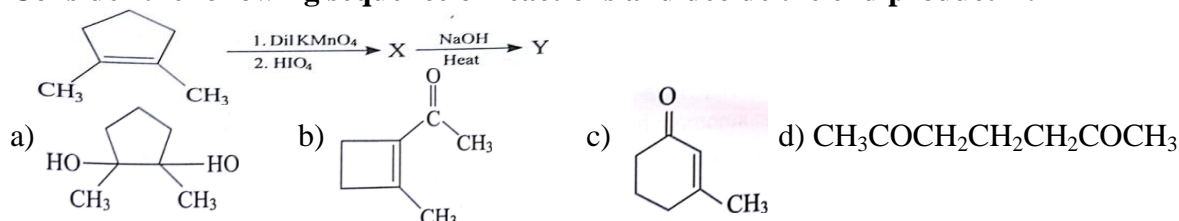
37. Cold and dil. $KMnO_4$ combines with but - 2 - yne to form:

- a) Butane - 1, 3 - diol b) Butane - 2, 3 - diol c) Butane - 2, 3 - dione d) Butan - 2 - one

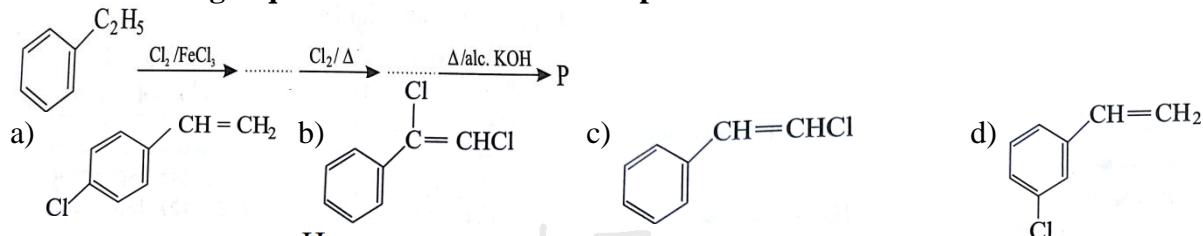
38. DDT is :

- a) A non degradable pollutant b) A fertilizer
 c) An antibiotic d) Dichloro difluoro titanium

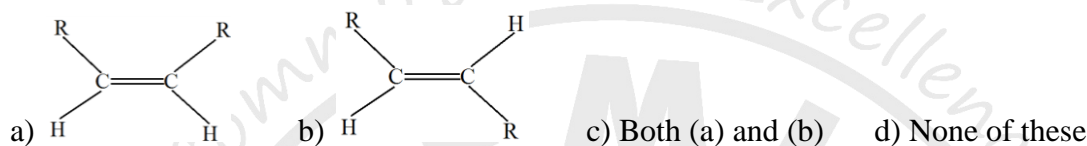
39. Consider the following sequence of reactions and decide the end product Y.



40. In the following sequence of reactions the end product P is:



41. $\text{R}-\text{C}\equiv\text{C}-\text{R} \xrightarrow[\text{Lindlar catalyst}]{\text{H}_2} ?$



42. The rapid change of pH near the stoichiometric point of an acid – base titration is the basis of indicator detection. pH of the solution is related to the concentrations of the conjugate acid (HIn) and base (In⁻) forms of the indicator can be expressed by:

a) $\log \frac{[\text{In}^-]}{[\text{HIn}]} = pK_{in} - pH$
 b) $\log \frac{[\text{HIn}]}{[\text{In}^-]} = pK_{in} + pH$

 c) $\log \frac{[\text{HIn}]}{[\text{In}^-]} = pH - pK_{in}$
 d) $\log \frac{[\text{In}^-]}{[\text{HIn}]} = pH - pK_{in}$

43. Buffer solutions have constant acidity and alkalinity because:

- They have fixed value of pH
- These give unionized acid or base on reaction with added acid or alkali
- They have large excess of H⁺ or OH⁻ ions
- Acids and alkalies in these solutions are shielded from attack by order ions

44. Acid rain:

- Retards the growth of trees
- Effects big marble constructions
- Results in loss of flora and fauna
- All of these

45. Proper management for disposal of household and industrial wastes can be done by:

- Sewage treatment
- Recycling the waste material to give useful products again
- Burning and incineration of combustible waste
- All of these

46. Ozone is an important constituent of stratosphere because it:

- Removes poisonous gases of the atmosphere by reacting with them
- Destroys bacteria which are harmful to human life
- Prevents the formation of smog over large cities
- Absorbs ultraviolet radiation which is harmful to human life

47. BOD is connected with:

- Microbes
- Organic matter
- Both a and b
- None of these

48. Water is often treated with chlorine to:

- Kill germs
- Remove hardness
- Increase oxygen content
- Remove suspended particles

49. Which of the following is not a greenhouse gas?

- Water vapour
- CO₂
- O₂
- CH₄

50. Which one of the following orders of acid strength is correct?

- RCOOH > HC ≡ CH > HOH > ROH
- RCOOH > ROH > HOH > HC ≡ CH
- RCOOH > HOH > ROH > HC ≡ CH
- RCOOH > HOH > HC ≡ CH > ROH