

KANHA MAKHAN PUBLIC SCHOOL

Important Questions - II
Class – XI (CHEMISTRY)

Chapter - Thermodynamics

Very Short questions (1 mark):

- Predict the sign of ΔS^0 for the following reaction:
 $2\text{H}_2\text{S}(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) + 2\text{SO}_2(\text{g})$
- Classify the following as extensive and intensive properties:
Molar heat capacity, Temperature, Enthalpy and Volume.
- When is the entropy of a perfectly crystalline solid zero ?
- What happens to the internal energy of the system if :
 - work is done on the system?
 - work is done by the system?
- One mole of acetone requires less heat to vaporize than 1 mole of water. Which of the two liquids has higher enthalpy of vaporization?

Short questions (2 marks):

- Define the following terms:
 - Enthalpy of neutralization
 - Hess's law of constant heat summation
- Calculate the heat of combustion of glucose from the following data
 $\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}); \quad \Delta H = - 395.0 \text{ kJ mol}^{-1}$
 $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}); \quad \Delta H = - 269.4 \text{ kJ mol}^{-1}$
 $6\text{C}(\text{graphite}) + 6\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6(\text{s}); \quad \Delta H = - 1169.8 \text{ kJ mol}^{-1}$
- Calculate the standard enthalpy of formation of $\text{CH}_3\text{OH}(\text{l})$ from the following data:
 - $\text{CH}_3\text{OH}(\text{l}) + \frac{3}{2} \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \quad \Delta_r H^0 = - 726 \text{ kJ mol}^{-1}$
 - $\text{C}(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}); \quad \Delta_c H^0 = - 393 \text{ kJ mol}^{-1}$
 - $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}); \quad \Delta_f H^0 = - 286 \text{ kJ mol}^{-1}$

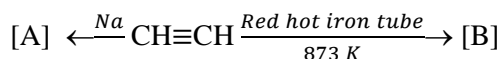
Chapter – Some Basic Principles and Techniques

Very short questions (1 mark):

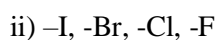
- Write IUPAC name of the following organic compound:
 $\text{CH}_3 - \text{C}(\text{CH}_3)_2 - \text{CH} = \text{CH}_2$
- Write structural formula of 3, 4, 4 5- tetramethylheptane
- $(\text{CH}_3)_3\text{C}^+$ is more stable than $(\text{CH}_3)_2\text{CH}$. Explain why.

Short Questions (2 marks):

- Mention the type of hybridization of each carbon in the compound $\text{CH}_3 - \text{CN}$.
 - Draw the structure of 2-methylpropan-2-ol.
- Identify 'A' and 'B' in the following:



- Arrange the following :



- Explain the following giving example:

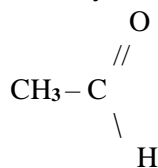
- Inductive effect
- Electrophile

- Identify electrophilic centre in the following CH_3CHO and CH_3CN .

- Name a suitable technique of separation of the components from a mixture of calcium sulphate and camphor.

17. i) Which of the following species act as nucleophiles?

+
NH₃, BF₃, NO₂ and C₂H₅O⁻
ii) Identify the electrophilic centre in



18. What are hybridization states of each carbon atom in the following compounds:

CH₂=C=O, CH₃CH=CH₂
(CH₃)₂CO, CH₂=CHCN, C₆H₆

19. Indicate the σ and π bonds in the following molecules:

C₆H₆, C₆H₁₂, CH₂Cl₂, CH₂=C=CH₂, CH₃NO₂, HCONHCH₃

20. Write bond line formulae for :

Isopropyl alcohol, 2,3-Dimethyl butanal, Heptan-4-one

21. Draw the resonance structures for the following compounds. Show the electron shift using curved-arrow notation.

i) C₆H₅OH ii) C₆H₅NO₂ iii) CH₃CH=CHCHO

iv) C₆H₅-CHO v) C₆H₅-CH vi) CH₃CH=CHCH₂

22. Which of the following carbocation is most stable?

i) (CH₃)₃CCH₂⁺ ii) (CH₃)₃C⁺ iii) CH₃CH₂CH₂⁺ iv) CH₃CHCH₂CH₃⁺

Short Questions (3 marks):

23. i) Arrange the following in order of property mentioned against each:

a) (CH₃)₃C⁺, CH₃CH₂CH⁻ and CH₃CH₂CH₂CH₂⁺ [Increasing stability order]
 $\begin{array}{c} | \\ \text{CH}_3 \end{array}$

b) CH₃CH₂COOH, (CH₃)₂CHCOOH and (CH₃)₃CCOOH [Increasing acidic strength]

24. i) What are electrophiles and nucleophiles? Give one example of each.

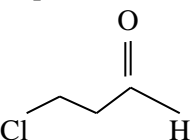
ii) Which of the following carbocations is most stable :

(CH₃)₃C⁺CH₂; (CH₃)₃C⁺; CH₃CH₂C⁺H₂; CH₃C⁺CH₂CH₃

25. What is hyper conjugation effect? How does it differ from resonance effect?

26. How are free radicals, carbocations and carbanions produced?

27. i) Explain electrophile and nucleophile with one example each.

ii) Write the IUPAC name of : 

Chapter - Hydrocarbons

Very short questions (1 mark):

28. Explain why n-pentane has higher boiling point than neo-pentane.

29. What is the number of σ and π bonds in N≡C-CH=CH-C≡N?

30. How many secondary carbons are there in 2, 2-dimethylbutane?

31. Why does cis-2-butene have a higher boiling point than trans-2-butene?

32. Which type of isomerism is present in CH₃CH₂OH and CH₃OCH₃?

33. Arrange HCl, HBr, HI and HF in order of decreasing reactivity towards alkene.

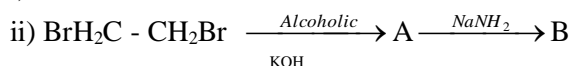
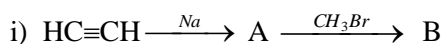
34. Which is more acidic: ethene or ethyne? Why?

35. What is electrophile in sulphonation?

36. Write down following name reaction. Friedel-Crafts reaction.

Short Questions (2 marks):

37. Write the structures of products (A and B) of the following reactions:



38. Write short notes on (Give at least one example):

i) Friedel-Crafts acylation

ii) Markovnikov rule

39. i) Indicate the number σ and π bonds in HCONHCH_3 .

ii) Out of benzene, m-dinitrobenzene and toluene, which will undergo nitration most easily and why?

40. How will you convert benzene into

i) p-nitrobromobenzene

ii) p-nitrochlorobenzene

iii) p-nitrotoluene?

iv) acetophenone?

41. How would you convert the following compounds into benzene?

i) Ethyne

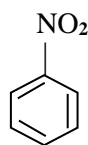
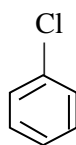
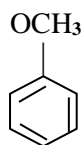
ii) Ethene

iii) Hexane

42. Why does benzene undergo electrophilic substitution reaction easily and nucleophilic substitutions with difficulty?

43. Why do alkenes prefer to undergo electrophilic addition reaction while arenes prefer electrophilic substitution reactions? Explain.

44. Arrange the following set of compounds in the order of their decreasing relative reactivity with an electrophile. Give reason.

**Short Questions(3 marks)**

45. i) Give reasons:

a) Alkynes are acidic in nature (Give chemical equation to support your answer).

b) = CH₂ is not aromatic.

ii) What happens when 2-bromobutane is being treated with KOH (alcoholic)?

46. i) Write one chemical equation each to illustrate the following reactions :

a) Friedel-Crafts alkylation

b) Decarboxylation

ii) Propanal and pentan-3-one are the ozonolysis products of an alkene. What is the structural formula of the alkene.

47. Explain the following:

i) Anti-Markovnikov rule

ii) Kolbe's Electrolytic

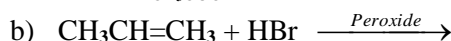
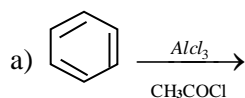
iii) β -Elimination

iv) Wurtz reaction

48. i) Write down geometrical isomer of $\text{CHCl}=\text{CHCl}$

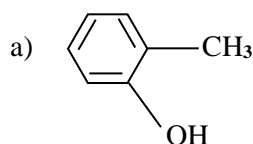
ii) Draw the eclipsed and staggered form of butane in Newman's projection.

iii) Complete the following reaction:



Long Questions(5 marks)

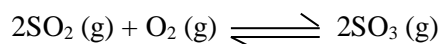
49. i) How can you convert the following:
a) Acetylene to nitrobenzene?
b) 2-Bromopropane to I-bromopropane?
ii) Give a brief account for the following statements:
a) N-Pentane has greater boiling point than isopentane
b) CH₄ cannot be synthesized by Wurtz reaction.
50. Write the major products of the following:
i) $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{(ii) H}_2\text{O/Zn}]{\text{(i) O}_3}$
ii) $\text{C}_6\text{H}_6 + \text{Cl}_2 \xrightarrow{\text{Light}}$
iii) $\text{HC} \equiv \text{CH} \xrightarrow[\text{HgSO}_4]{\text{dil. H}_2\text{SO}_4}$
iv) $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{peroxide}]{\text{HBr}}$
v) $\text{C}_2\text{H}_5\text{Br} + \text{KOH (alc.)} \rightarrow$
51. i) How will you convert (Do any two)
a) Ethyne to benzene?
b) Benzene to p-nitrotoluene?
c) Methyl bromide to ethane?
ii) What effect does branching of an alkane chain have on its boiling point?
iii) Write IUPAC name of



- b) $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{CH}_3$
52. i) Give two reactions to show acidic character of alkynes.
ii) Complete the following reactions:
a) $\text{CH}_3\text{CH} = \text{CH}_2 + \text{O}_3 \rightarrow$
b) $\text{CH}_2 = \text{CH}_3 + \text{H}_3\text{O} + [\text{O}] \xrightarrow{\text{dil. KMnO}_4}$

Chapter - Equilibrium

53. Define Law of Mass Action.
54. Derive Relation between K_p and K_c.
55. What is the effect of change in temperature and pressure on equilibrium reaction.
56. Write the expression for K_p and K_c and write its unit
i) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$
ii) $\text{FeO}(\text{s}) + \text{CO}(\text{g}) \rightleftharpoons \text{Fe}(\text{s}) + \text{CO}_2(\text{g})$
iii) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightleftharpoons \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$
57. State Le Chatelier's principle. What is the effect of increase of concentration of reactant on equilibrium?
58. At 450 K, $K_p = 2 \times 10^{10} \text{ bar}^{-1}$ for the given reaction at equilibrium :-



What is the value of K_c at this temperature?

59. The equilibrium constant expression for a gas reaction is

$$\frac{[\text{NH}_3]^4 [\text{O}_2]^5}{[\text{NO}] [\text{H}_2\text{O}]^6}$$

60. What is the equilibrium concentration of each of the substances in the equilibrium when the initial concentration of ICl was 0.78 M?
 $2\text{ICl}(\text{g}) \rightleftharpoons \text{I}_2(\text{g}) + \text{Cl}_2(\text{g}); K_c = 0.14$