CLASS XI CHE CH: 5

SET 3 –

1. The first law of thermodynamics fails to explain –
   a) Conservation of energy
   b) Direction of a process
   c) Conversion of heat to work
   d) Pressure-volume work

2. The second law of thermodynamics explains –
   a) Direction of spontaneous change
   b) Conservation of mass
   c) Energy equivalence
   d) All of these

3. The second law introduces the concept of –
   a) Enthalpy
   b) Entropy
   c) Internal energy
   d) Heat capacity

4. Entropy is a measure of –
   a) Energy of system
   b) Disorder or randomness
   c) Pressure of system
   d) Heat content

5. Symbol of entropy is –
   a) H
   b) S
   c) G
   d) T

6. Unit of entropy in SI is –
   a) J mol^{-1} K^{-1}
   b) J mol^{-1}
   c) kJ mol^{-1}
   d) cal K^{-1}

7. When disorder increases, entropy –
   a) Increases
   b) Decreases
   c) Remains constant
   d) Becomes zero

8. When a gas expands freely, entropy –
   a) Increases

b) Decreases
c) Remains same
d) Becomes negative

9. For a reversible process, change in entropy (ΔS) is –
a) Maximum
b) Minimum
c) Zero
d) Undefined

10. For an irreversible process, total entropy change is –
a) Positive
b) Negative
c) Zero
d) Undefined

11. Entropy change (ΔS) for a reversible process is given by –
a) $\Delta S = q / T$
b) $\Delta S = q / P$
c) $\Delta S = qT$
d) $\Delta S = T / q$

12. For an isothermal reversible expansion of an ideal gas, ΔS = –
a) $nR \ln(V_2/V_1)$
b) $nR \ln(V_1/V_2)$
c) $nR \ln(P_1/P_2)$
d) $nR \ln(T_2/T_1)$

13. If ΔS of universe > 0, the process is –
a) Spontaneous
b) Non-spontaneous
c) Equilibrium
d) None

14. For an isolated system at equilibrium, ΔS of universe is –
a) Zero
b) Positive
c) Negative
d) Infinite

15. For a spontaneous process, entropy of system –
a) Increases
b) Decreases
c) Remains constant
d) None

CLASS XI CHE CH: 5

16. The second law can be expressed as –
    a) ΔS universe ≥ 0
    b) ΔS universe = 0
    c) ΔS system = 0
    d) ΔS surroundings = 0

17. Which process increases entropy?
    a) Melting of ice
    b) Freezing of water
    c) Condensation
    d) Crystallization

18. Which process decreases entropy?
    a) Sublimation
    b) Evaporation
    c) Condensation
    d) Melting

19. In a reversible process, the system and surroundings –
    a) Are in equilibrium at every stage
    b) Are far from equilibrium
    c) Change abruptly
    d) Do not change

20. Entropy change of the universe for a reversible process is –
    a) Zero
    b) Positive
    c) Negative
    d) Infinite

21. Entropy change of the universe for an irreversible process is –
    a) Positive
    b) Negative
    c) Zero
    d) None

22. The total entropy change for spontaneous process is –
    a) Greater than zero
    b) Less than zero
    c) Zero
    d) Infinite

23. Which law states that the entropy of a perfect crystal at 0 K is zero?
    a) First law
    b) Second law
    c) Third law

CLASS XI CHE CH: 5

d) Hess's law

24. The third law of thermodynamics helps to calculate –
    a) Absolute entropy
    b) Relative entropy
    c) Gibbs energy
    d) Work done

25. For an ideal gas, the entropy change is given by –
    a) $\Delta S = nR \ln(V_2/V_1)$
    b) $\Delta S = nR \ln(P_2/P_1)$
    c) $\Delta S = nR \ln(T_2/T_1)$
    d) None

26. Entropy change when ice melts to water is –
    a) Positive
    b) Negative
    c) Zero
    d) None

27. Entropy change when steam condenses to water is –
    a) Positive
    b) Negative
    c) Zero
    d) None

28. If the disorder decreases, ΔS is –
    a) Positive
    b) Negative
    c) Zero
    d) Infinite

29. In a spontaneous process –
    a) ΔS universe > 0
    b) ΔS universe < 0
    c) ΔS universe = 0
    d) ΔS system = 0

30. The expression $\Delta S = q_{rev} / T$ is valid only for –
    a) Reversible process
    b) Irreversible process
    c) Both
    d) None

31. Entropy change for vaporization of liquid is –
    a) Positive
    b) Negative

c) Zero
d) None

32. Entropy change for freezing of liquid is –
a) Positive
b) Negative
c) Zero
d) None

33. In which case will entropy be maximum?
a) Gas
b) Liquid
c) Solid
d) Crystal

34. When two gases mix spontaneously, the entropy –
a) Increases
b) Decreases
c) Remains same
d) Becomes zero

35. The equation $\Delta G = \Delta H - T\Delta S$ is known as –
a) Gibbs equation
b) Nernst equation
c) Clausius equation
d) Joule–Thomson equation

36. For a spontaneous process, ΔG is –
a) Negative
b) Positive
c) Zero
d) Infinite

37. For a non-spontaneous process, ΔG is –
a) Negative
b) Positive
c) Zero
d) Undefined

38. At equilibrium, ΔG is –
a) Zero
b) Positive
c) Negative
d) Infinite

39. If ΔH = negative and ΔS = positive, then ΔG –
a) Always negative

b) Always positive
c) Zero
d) Variable

40. If ΔH = positive and ΔS = negative, then ΔG –
a) Always positive
b) Always negative
c) Zero
d) Variable

41. ΔG = 0 indicates –
a) Spontaneous reaction
b) Non-spontaneous reaction
c) Equilibrium condition
d) None

42. Gibbs free energy is defined as –
a) G = H – TS
b) G = H + TS
c) G = T – HS
d) G = U – PV

43. The unit of Gibbs free energy is –
a) J mol^{-1}
b) kJ mol^{-1}
c) Both (a) and (b)
d) None

44. When ΔG < 0, reaction is –
a) Spontaneous
b) Non-spontaneous
c) Equilibrium
d) Endothermic

45. When ΔG > 0, reaction is –
a) Spontaneous
b) Non-spontaneous
c) Equilibrium
d) Exothermic

46. If ΔH and ΔS both are positive, reaction is spontaneous at –
a) High temperature
b) Low temperature
c) Zero Kelvin
d) Never spontaneous

CLASS XI CHE CH: 5

47. If ΔH and ΔS both are negative, reaction is spontaneous at –
    a) High temperature
    b) Low temperature
    c) 25°C
    d) Never spontaneous

48. For an endothermic reaction to be spontaneous –
    a) ΔS should be positive and large
    b) ΔS should be negative
    c) ΔG should be positive
    d) None

49. Entropy is a measure of –
    a) Energy dispersion
    b) Orderliness
    c) Work capacity
    d) Potential energy

50. The second law of thermodynamics can also be stated as –
    a) All spontaneous processes increase entropy of the universe
    b) All spontaneous processes decrease entropy of the universe
    c) Entropy remains constant
    d) None

✅ ANSWER KEY – SET 3

1–b 2–a 3–b 4–b 5–b 6–a 7–a 8–a 9–c 10–a
11–a 12–a 13–a 14–a 15–a 16–a 17–a 18–c 19–a 20–a
21–a 22–a 23–c 24–a 25–a 26–a 27–b 28–b 29–a 30–a
31–a 32–b 33–a 34–a 35–a 36–a 37–b 38–a 39–a 40–a
41–c 42–a 43–c 44–a 45–b 46–a 47–b 48–a 49–a 50–a