



## DPP-1 [Entropy(calculations)]

“Assignment se bhagoge toh paper se kaise ladoge?” — Weird Chemist

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**Q1. Unit of entropy is –**

- (1)  $\text{J K}^{-1} \text{mol}^{-1}$
- (2)  $\text{J mol}^{-1}$
- (3)  $\text{J}^{-1} \text{K}^{-1} \text{mol}^{-1}$
- (4)  $\text{JK mol}^{-1}$

**Q2. For a sample of perfect gas when its pressure is changed isothermally from  $P_1$  to  $P_2$ , the entropy change is –**

- (1)  $\Delta S = nR \ln \frac{P_1}{P_2}$
- (2)  $\Delta S = nR \ln \frac{P_2}{P_1}$
- (3)  $\Delta S = RT \ln \frac{P_1}{P_2}$
- (4)  $\Delta S = RT \ln \frac{P_2}{P_1}$

**Q3. 5 mole of an ideal gas expanded reversibly from a volume of  $8 \text{ dm}^3$  to  $80 \text{ dm}^3$  at  $300 \text{ K}$ . The change in entropy is –**

- (1)  $41.57 \text{ J K}^{-1}$
- (2)  $95.73 \text{ J K}^{-1}$
- (3)  $-41.57 \text{ J K}^{-1}$
- (4)  $-95.73 \text{ J K}^{-1}$

**Q4. The entropy change involved in the isothermal reversible expansion of 2 moles of an ideal gas from  $10 \text{ dm}^3$  to  $100 \text{ dm}^3$  at  $300 \text{ K}$  is –**

- (1)  $32.3 \text{ J mol}^{-1} \text{K}^{-1}$
- (2)  $42.3 \text{ J mol}^{-1} \text{K}^{-1}$
- (3)  $38.3 \text{ J mol}^{-1} \text{K}^{-1}$
- (4)  $35.8 \text{ J mol}^{-1} \text{K}^{-1}$

**Q5. 2 mole of ideal gas at  $27^\circ\text{C}$  temperature is expanded reversibly from 2 L to 20 L. Find entropy change ( $R = 2 \text{ cal mol}^{-1} \text{K}^{-1}$ ).**

- (1) 92.1
- (2) 0
- (3) 4.1
- (4) 9.2

**Q6. If the enthalpy change for the transition of liquid to gas is  $30 \text{ KJ/mole}$  of liquid at  $27^\circ\text{C}$ , the entropy changes for the process would be –**

- (1)  $10 \text{ J K}^{-1} \text{mol}^{-1}$
- (2)  $1 \text{ J K}^{-1} \text{mol}^{-1}$
- (3)  $0.1 \text{ J K}^{-1} \text{mol}^{-1}$

(4)  $100 \text{ J K}^{-1} \text{ mol}^{-1}$

**Q7. The enthalpy of vaporisation of water is  $18.6 \text{ kJ mol}^{-1}$ . The entropy of its vaporisation will be –**

- (1)  $50.0 \text{ J K}^{-1} \text{ mol}^{-1}$
- (2)  $10.1 \text{ J K}^{-1} \text{ mol}^{-1}$
- (3)  $15.1 \text{ J K}^{-1} \text{ mol}^{-1}$
- (4)  $20.0 \text{ J K}^{-1} \text{ mol}^{-1}$

**Q8. The enthalpy of vaporisation per mole of ethanol (b.p. =  $78.5^\circ\text{C}$  and  $\Delta S = 109.8 \text{ J K}^{-1} \text{ mol}^{-1}$ ) is –**

- (1)  $37.8 \text{ J mol}^{-1}$
- (2)  $42.37 \text{ J mol}^{-1}$
- (3)  $27.35 \text{ J mol}^{-1}$
- (4)  $32.19 \text{ J mol}^{-1}$

**Q9. If  $900 \text{ J/g}$  of heat is exchanged at boiling point of water, then what is increase in entropy?**

- (1)  $4.3 \text{ J K}^{-1} \text{ mol}^{-1}$
- (2)  $43.4 \text{ J K}^{-1} \text{ mol}^{-1}$
- (3)  $900 \text{ J K}^{-1} \text{ mol}^{-1}$
- (4)  $0 \text{ J K}^{-1} \text{ mol}^{-1}$

**Q10. Standard enthalpy of vaporisation  $\Delta H_{vap}^\circ$  for water at  $100^\circ\text{C}$  is  $40.66 \text{ kJ mol}^{-1}$ . The internal energy of vaporisation of water at  $100^\circ\text{C}$  in  $\text{kJ mol}^{-1}$  is –**

- (1)  $+43.76$
- (2)  $+37.56$
- (3)  $+40.66$
- (4)  $-43.76$

**Q11. The enthalpy of fusion of water is  $1.435 \text{ kcal mol}^{-1}$ . The molar entropy change during melting of ice will be –**

- (1)  $5.260 \text{ cal mol}^{-1} \text{ K}^{-1}$
- (2)  $0.526 \text{ cal mol}^{-1} \text{ K}^{-1}$
- (3)  $10.52 \text{ cal mol}^{-1} \text{ K}^{-1}$
- (4)  $14.79 \text{ cal mol}^{-1} \text{ K}^{-1}$

**Q12. For the melting of NaCl heat required is  $7.26 \text{ kcal mol}^{-1}$  and  $\Delta S$  increases by  $6.73 \text{ cal mol}^{-1} \text{ K}^{-1}$ . The melting point of the salt is –**

- (1)  $805.7^\circ\text{C}$
- (2)  $500 \text{ K}$
- (3)  $1.77 \text{ K}$
- (4)  $4.177^\circ\text{C}$

**Q13. Entropy of vaporisation of water at  $100^\circ\text{C}$ , if molar heat of vaporisation is  $9710 \text{ cal mol}^{-1}$  will be –**

- (1)  $20 \text{ cal mol}^{-1} \text{ K}^{-1}$

- (2) 26 cal mol<sup>-1</sup> K<sup>-1</sup>
- (3) 28 cal mol<sup>-1</sup> K<sup>-1</sup>
- (4) 32 cal mol<sup>-1</sup> K<sup>-1</sup>

**Q14.** At 27°C latent heat of fusion of a compound is 2930 J mol<sup>-1</sup>. Entropy change is –

- (1) 9.77 J mol<sup>-1</sup> K<sup>-1</sup>
- (2) 0.107 J mol<sup>-1</sup> K<sup>-1</sup>
- (3) 9.07 J mol<sup>-1</sup> K<sup>-1</sup>
- (4) 0.977 J mol<sup>-1</sup> K<sup>-1</sup>

**Q15.** What is the entropy change (in J K<sup>-1</sup> mol<sup>-1</sup>) when one mole of ice is converted into water at 0°C? (The enthalpy change for the conversion of ice to liquid water is 6.0 kJ mol<sup>-1</sup> at 0°C)

- (1) 2.013
- (2) 2.198
- (3) 21.98
- (4) 219.8

**Q16.** The latent heat of vaporisation of water at 100°C is 540 cal g<sup>-1</sup>. Calculate the entropy increase when one mole of water at 100°C is evaporated.

- (1) 26 cal K<sup>-1</sup> mol<sup>-1</sup>
- (2) 367 cal K<sup>-1</sup> mol<sup>-1</sup>
- (3) 1.45 cal K<sup>-1</sup> mol<sup>-1</sup>
- (4) 1.82 cal K<sup>-1</sup> mol<sup>-1</sup>

**Q17.** Calculate enthalpy of vaporization per mole of ethanol at 78.5°C. Given  $\Delta S = 109.8 \text{ J K}^{-1} \text{ mol}^{-1}$  and B.P. of ethanol is 78.5°C.

- (1) Zero
- (2) 33.85 kJ mol<sup>-1</sup>
- (3) 38.594 kJ mol<sup>-1</sup>
- (4) None of these

**Q18.** If  $S^\circ$  for H<sub>2</sub>, Cl<sub>2</sub> and HCl are 0.13, 0.22 and 0.19 kJ K<sup>-1</sup> mol<sup>-1</sup> respectively. The total change in standard entropy for the reaction H<sub>2</sub> + Cl<sub>2</sub> → 2HCl is –

- (1) 30 J K<sup>-1</sup> mol<sup>-1</sup>
- (2) 40 J K<sup>-1</sup> mol<sup>-1</sup>
- (3) 60 J K<sup>-1</sup> mol<sup>-1</sup>
- (4) 20 J K<sup>-1</sup> mol<sup>-1</sup>

**Q19.** The standard entropies of N<sub>2</sub>(g), H<sub>2</sub>(g), and NH<sub>3</sub>(g) are 191.5, 130.5, and 192.6 J K<sup>-1</sup> mol<sup>-1</sup> respectively. The value of  $\Delta S^\circ$  for formation of ammonia gas is –

- (1) +129.4 J K<sup>-1</sup> mol<sup>-1</sup>
- (2) -98.9 J K<sup>-1</sup> mol<sup>-1</sup>
- (3) 0 J K<sup>-1</sup> mol<sup>-1</sup>
- (4) -29.4 J K<sup>-1</sup> mol<sup>-1</sup>

**Q20.** The conversion A → B is carried out by the following path: A → C → D → B. Given

$\Delta S_{AC} = +50 \text{ e.u.}$ ,  $\Delta S_{CD} = 30 \text{ e.u.}$ ,  $\Delta S_{BD} = 20 \text{ e.u.}$ . Then  $\Delta S_{AB}$  is –

- (1) +100 e.u.
- (2) +60 e.u.
- (3) –100 e.u.
- (4) –60 e.u.

**Q21.** 1 kg of nitrogen gas contained in a rigid container is heated from 400 K to 800 K. Find the change in entropy. (Given:  $C_p = 29.099 \text{ J mol}^{-1} \text{ K}^{-1}$ )

- (1) 512.86
- (2) 1025.736
- (3) 172.48
- (4) 256.43