Parishram (2025)

Chemistry

Solutions

DPP: 5

Q1 Henry's law constant for molality of methane in benzene at 298 K is 4.27×10^5 mm Hg. The mole fraction of methane in benzene at 298 K under 760 mm Hg is;
(A) 1.78×10^{-3}
(B) 17.43
(C) 0.114
(D) 2.814

Q2 How much oxygen is dissolved in 100 mL water at 298 K if partial pressure of oxygen is 0.5 atm and $K_H = 1.4 \times 10^{-3}$ mol/L/atm?
(A) 22.4 mg (B) 22.4 g
(C) 2.24 g (D) 2.24 mg

Q3 Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea (NH_2CONH_2) is dissolved in 850 g of water. Calculate the vapour pressure of water for this solution and its relative lowering.

Q4 An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molar mass of the solute?

Q5 The vapour pressure of water is 12.3 kPa at 300 K. Calculate vapour pressure of 1 molal solution of a non-volatile solute in it.

Q6 The unit of ebullioscopic constant is _____.
(A) K kg mol^{-1} or $K(molal)^{-1}$
(B) mol kg K^{-1} or $K^{-1}(molal)$
(C) kg mol^{-1} K^{-1} or $K^{-1}(molal)^{-1}$
(D) K mol kg^{-1} or K(molal)

Q7 Boiling point of water at 750 mm Hg is 99.63°C. How much sucrose is to be added to 500 g of water such that it boils at 100°C.

Answer Key

Q1 (A)

Q2 (D)

Q3 P_S = (23.3 – 23.4)
RLVP = (0.017 – 0.018)

Q4 (41 – 42)

Q5 (12 – 12.1)

Q6 (A)

Q7 (121.6 – 121.8)