Full Name: February 23, 2023

0.1 Calculate the boiling point increase of a 8m $C_6H_{12}O_6$ aqueous solution. $T_b^{solvent}$=100°C and k_b=0.512°C/m.

0.2 Calculate the boiling point of a 3m $C_6H_{12}O_6$ aqueous solution. $T_b^{solvent}$=100°C and k_b=0.512°C/m.

0.3 Calculate the boiling point increase of a 8m KCl aqueous solution. $T_b^{solvent}$=100°C and k_b=0.512°C/m.

0.4 Calculate the boiling point of a 3m $CaCl_2$ aqueous solution. $T_b^{solvent}$=100°C and k_b=0.512°C/m.

0.5 Calculate the freezing point depression of a 2m I_2 solution on benzene. $T_f^{solvent}$=5.5°C and k_f=4.9°C/m.

0.6 Calculate the freezing point of a 2m I_2 solution on benzene. $T_f^{solvent}$=5.5°C and k_f=4.9°C/m.

0.7 The vapor pressure of cyclohexane is 100hPa at 20°C. Calculate the vapor pressure lowering of the solution resulting of mixing 3moles of cyclohexane and 4 moles of I_2.

0.8 The vapor pressure of cyclohexane is 100hPa at 20°C. Calculate the vapor pressure of the solution resulting of mixing 3moles of cyclohexane and 4 moles of I_2.

0.9 The vapor pressure of cyclohexane is 100hPa at 20°C. Calculate the vapor pressure of the solution resulting of mixing 6moles of cyclohexane and 1 moles of I_2.

0.10 The vapor pressure of cyclohexane is 100hPa at 20°C. Calculate the vapor pressure lowering of the solution resulting of mixing 3moles of cyclohexane and 3 moles of I_2.

0.11 Calculate the osmotic pressure of a 3M NaCl solution at 298K.

0.12 The vapor pressure of cyclohexane is 100hPa at 20°C. Calculate the vapor pressure lowering of the solution resulting of mixing 6moles of cyclohexane and 1 moles of I_2.

0.13 A semipermeable membrane separate two solutions, 0.2M NaCl (on the left) and 0.1M $CaCl_2$ (on the right). What side of the membrane will receive an osmotic flow of water?

0.14 A semipermeable membrane separate two NaCl solutions with concentration 0.2M (on the left) and 0.1M (on the right). What side of the membrane will receive an osmotic flow of water?

0.15 The solubility of a gas in water at 298K when its partial pressure is 1.9atm is 2.65×10^{-4}M. Calculate: (a) Henry's law constant at that temperature (b) The solubility at a partial pressure of 0.9atm

0.16 The solubility of a gas in water at 298K when its partial pressure is 0.9atm is 1.26×10^{-3}M. Calculate: (a) Henry's law constant at that temperature (b) The solubility at a partial pressure of 0.5atm

0.17 For the following colloids, indicate the nature of the dispersed and dispersing medium (liquid, solid or gas) : (a) pumice stone lava (b) cheese (c) paint (d) clouds

0.18 For the following colloids, indicate the nature of the dispersed and dispersing medium (liquid, solid or gas) : (a) soda water (b) cake (c) midst (d) smoke (e) froth

0.19 Break down the following electrolytes in ions, if possible: (a) $SnCl_4$ (b) $CuCl_2$ (c) $Ba(OH)_2$ (d) $CuSO_3$ (e) $MgSO_4$

0.20 Break down the following electrolytes in ions, if possible: (a) CaI_2 (b) KNO_3 (c) $CaSO_4$ (d) $FeSO_4$

0.21 Calculate the i factor for the following chemicals: (a) $Mg(NO_3)_2$ (b) $CuSO_4$ (c) $FeCl_3$

0.22 Calculate the i factor for the following chemicals: (a) $NaNO_3$ (b) NaCl (c) CaI_2 (d) $MgCl_2$

0.23 We dissolve 0.5 moles of solute in 1L of solution reaching a effective concentration of solute particles of 0.9M. Calculate the Van't Hoff factor.

0.24 We dissolve 3 moles of solute in 1L of solution. Given that Van't Hoff factor of the solute is 3, calculate the nominal solute concentration and the effective concentration of particles on solution.

0.25 Can the percent dissociation of a electrolyte be more than 2? Elaborate.

0.26 Can the percent dissociation of a electrolyte be negative? Elaborate.

0.27 Calculate the molality for: (a) a solution made of 5moles of NaBr(MW=103g/mol) in 200g of water (b) a solution made of 20g of NaBr(MW=103g/mol) in 200g of water (c) a solution made of 10g of NaBr(MW=103g/mol) in 20mL of water

0.28 Calculate: (a) the percent by mass of a solution made of 5g of NaBr in 70g of solution (b) the percent by mass of a solution made of 5g of NaBr with 20g of water(c) the percent by mass of a solution made of 5g of NaBr with 10mL of water

0.29 Calculate the mole fraction of solute of a solution: (a) containing 3g of solute (MW=16g/mL) and 100g of water (b) containing 2 moles of solute and 30 moles of solvent (c) containing 4 moles of solute and 45 moles of solution

0.30 Calculate the density of a solution: (a) containing 3g of solute and 100g of water in 101mL (b) containing 1g of solute and 100mL of water in 103mL

0.31 Calculate: (a) the molarity of a 20% solution of density 1.1g/mL made of a Na_2SO_4(MW=142g/mol) (b) the mole fraction of a 20% aqueous solution of density 1.1g/mL made of a Na_2SO_4(MW=142g/mol) (c) the percent by mass of an aqueous solution of density 1.1g/mL and 0.4mole fraction, made of a Na_2SO_4(MW=14

0.32 Calculate: (a) the molarity of a 0.2m solution of density 1.2g/mL made of a NaCl(MW=58g/mol) (b) the molality of a 0.2M solution of density 1.2g/mL made of a NaCl(MW=58g/mol) (c) the percent by mass of a 0.1M solution of density 1.2g/mL made of a NaCl(MW=58g/mol)

0.33 We prepare an $C_6H_{12}O_6$ (MW=180g/mL) solution by mixing 5g of solute in 100mL of water giving 102mL of solution. Calculate: (a) the percent by mass (b) the mole fraction

0.34 We prepare an $C_6H_{12}O_6$ (MW=180g/mL) solution by mixing 5g of solute in 100mL of water giving 102mL of solution. Calculate: (a) the molarity (b) the molality

0.35

0.36

Answers v. 26 **0.1** 4.01°C **0.2** 101.5°C **0.3** 8.19°C **0.4** 104.07°C **0.5** -4.3°C **0.6** -4.3°C **0.7** -42.85hPa **0.8** 42.8hPa **0.9** 85.71hPa **0.10** -50hPa **0.11** 146.62atm **0.12** -14.28hPa **0.13** none **0.14** The more concentrated (left side). **0.15** (a) 1.4×10^{-4} M/atm (b) 1.2×10^{-4}M **0.16** (a) 1.4×10^{-3} M/atm (b) 7.00×10^{-4}M **0.17** (a) pumice stone lava (dispersed: gas ; dispersing: solid) (b) cheese (dispersed: liquid ; dispersing: solid) (c) paint (dispersed: solid ; dispersing: liquid) (d) clouds (dispersed: liquid ; dispersing: gas) **0.18** (a) soda water (dispersed: gas ; dispersing: liquid) (b) cake (dispersed: gas ; dispersing: solid) (c) midst (dispersed: liquid ; dispersing: gas) (d) smoke (dispersed: solid ; dispersing: gas) (e) froth (dispersed: gas ; dispersing: liquid) **0.19** (a) $SnCl_4$ (Sn^{4+}+ $4Cl^-$) (b) $CuCl_2$ (Cu^{2+} + $2Cl^-$) (c) $Ba(OH)_2$ (Ba^{2+} + $2OH^-$) (d) $CuSO_3$ (Cu^{2+} + $SO_3{}^{2-}$) (e) $MgSO_4$ (Mg^{2+} + $SO_4{}^{2-}$) **0.20** (a) CaI_2 (Ca^{2+} +$2I^-$) (b) KNO_3 (K^+ + $NO_3{}^-$) (c) $CaSO_4$ (Ca^{2+} + $SO_4{}^{2-}$) (d) $FeSO_4$ (Fe^{2+} + $SO_4{}^{2-}$) **0.21** (a) $Mg(NO_3)_2$ (b) $CuSO_4$ (c) $FeCl_3$ **0.22** (a) $NaNO_3$ (b) NaCl (c) CaI_2 (d) $MgCl_2$ **0.23** 1.8 **0.24** $c^{nominal}$=9M; $c^{effective}$=9M **0.25** No as the maximum value should be one. **0.26** No as the maximum value should be one. **0.27** (a) 25m (b) 0.97m (c) 4.85m **0.28** (a) 7.14% (b) 20% (c) 33.3% **0.29** (a) 0.03 (b) 0.06 (c) 0.09 **0.30** (a) 1.02g/mL (b) 0.98g/mL **0.31** (a) 1.55M (b) 0.03 (c) 84% **0.32** (a) 0.26M (b) 0.27M (c) 0.45% **0.33** (a) 4.76% (b) 0.005 **0.34** (a) 0.27M (b) 0.28m **0.35** 162g/mol **0.36** 155g/mol