1. ♥ STUDY CHECK

A solution is prepared by mixing 1g of glucose (MW=180g/mol) in 50g of water to give a final volume of 100mL. Calculate: (a) The percent by mass of solute (b) The mole fraction of solute (c) The molarity of the solution (d) The molality of the solution (e) The density of the solution

► Answer: (a) 1.96% (b) 2×10^{-3} (c) 0.05M (d) 0.11m (e) 0.51g/mL

2. ♥ STUDY CHECK

For a 0.11m glucose (MW=180g/mol) solution with density 0.51g/mL, calculate: (a) The percent by mass of solute (b) The mole fraction of solute (c) The molarity of the solution

► Answer: (a) 1.76% (b) 1.78×10^{-3} (c) 0.05M

3. ♥ STUDY CHECK

We prepare a solution by weighting 1g of solute and adding liquid until 100mL of solution in order to prepare a 2M solution. Calculate the molar mass of the solute.

Answer: 5g/mol

4. ♥ STUDY CHECK

Break down the following chemicals into ions, if possible: H₂O₍₁₎, NH₃₍₁₎, AgNO_{3(aq)}.

► Answer: $H_2O_{(1)}$, $NH_{3(1)}$, $Ag_{(aq)}^+$, NO_3^- _(aq).

5. ♥ STUDY CHECK

The percent dissociation of a 0.1M weak electrolyte is 40%. Calculate the effective ion concentration.

Answer: 0.04M

6. ♥ STUDY CHECK

For a solution of 5 g of NaCl (MW=58g/mol) in 100 g of acetic acid, CH₃COOH: (a) Calculate its molality (b) Given that the boiling point of acetic acid is 118°C, and that k_b = 3.08 °C/m, calculate the boiling point and the boiling point elevation of the solution. (c) Given that the freezing point of acetic acid is 17°C, and that k_f = 3.59 °C/m, calculate the freezing point and the freezing point depression of the solution.

► Answer: (a) 50m (b) 123.3°C; 5.29°C (c) 10.82°C; -6.17°C

7. ♥ STUDY CHECK

Calculate the vapor-pressure lowering of a 3m I_2 (MW=254g/mol) solution in cyclohexane at 279K given that the vapor pressure of cyclohexane at that temperature is 5.164 kPa and the solution density is 1.3 g/mL.

►Answer: $\chi = 0.05$; $\Delta P_{vap} = -0.26kPa$

8. ♥ STUDY CHECK

The following two sets of data report the change in boiling point of a solution. Assess the date to calculate the boiling elevation constant, and if possible, calculate colligative constant and the boiling point of the pure solvent.

Set A		Set B	
T(°C)	m	T(°C)	m
17.02	1	817.21	1
15.21	2	14.42	2
11.10	3	11.63	3
7.65	4	8.84	4
6.05	5	6.05	5

▶Answer: Data set B, $k_f = 2.79$ °C, $T_f^{solvent} = 20$ °C

9. ♥ STUDY CHECK

We prepare a 0.1M solution of a weak electrolyte with i=3. Given that the degree of dissociation of the electrolyte is 95%, calculate the osmotic pressure of the solution at 298K.

Answer: 7.23atm

10. ♥ STUDY CHECK

We prepare a solution by adding 5g of solute—a non-electrolyte—into 50mL of water. The solution experience a boiling point elevation of 5.3° C. Given the boiling elevation constant of water, 1.86° C/m, calculate the molar mass of the solute. Mind the density of water is 1g/mL.

▶Answer: 35.09g/mol

11. ♥ STUDY CHECK

Calculate the solubility of nitrogen in water after exposing water to a 5 atm nitrogen pressure, given that Henry's constant is $6.1\times10^{-4} M/atm$.

►Answer: 3.05×10^{-3} M