

Additional Concentration Units & Colligative Properties

Name: _____ Per. ____

1. What is the molality of a solution containing 10.0 g Na_2SO_4 dissolved in 1000.0 g of water?
2. What is the molality of a solution containing 30.0 g C_{10}H_8 dissolved in 500.0 g of toluene?

3. Calculate the molality of the following solutions:

a. 15.7 g NaCl in 100.0g H_2O

b. 20.0 g CaCl_2 in 700.0 g H_2O

c. 3.76 g NaOH in 0.850 L H_2O

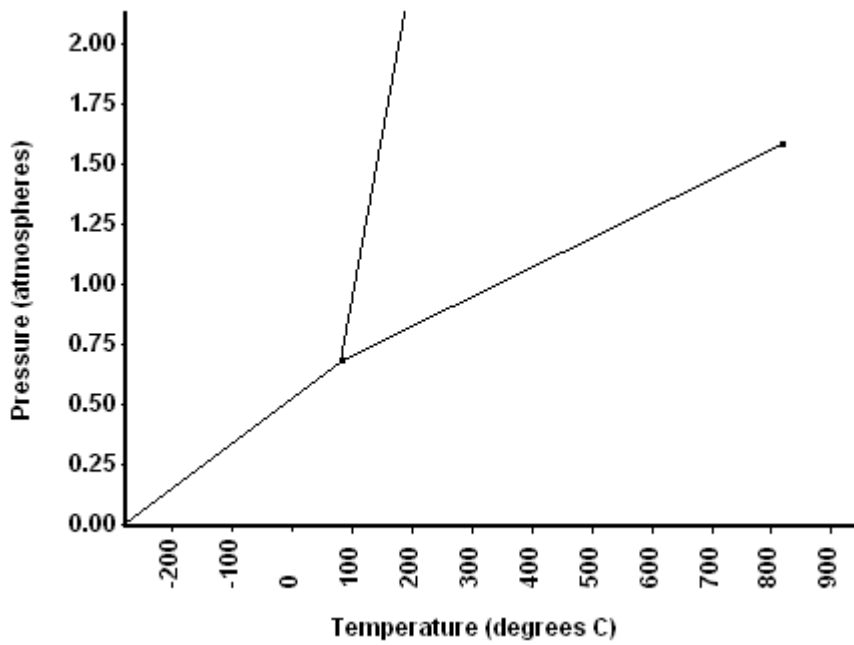
Solvent	Boiling Point ($^{\circ}\text{C}$)	k_b ($^{\circ}\text{C}/\text{m}$)
water	100	0.512
ethanol	78.5	1.22
benzene	80.1	2.53

Solvent	Freezing Point ($^{\circ}\text{C}$)	k_f ($^{\circ}\text{C}/\text{m}$)
water	0	1.86
ethanol	-114.1	1.99
benzene	5.5	5.12

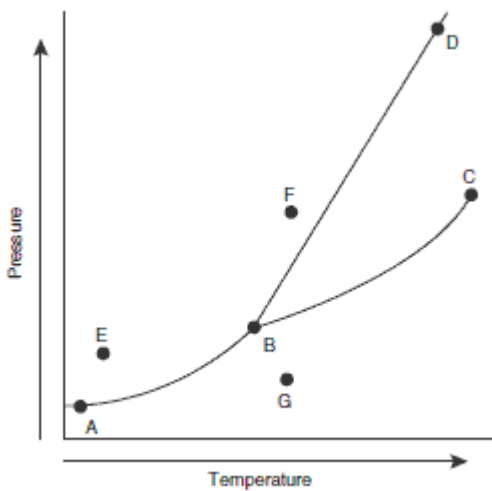
For the following problems use Table 5 on page 500 for the K_b values and Table 6 on page 502 for the K_f values.

4. What are the boiling and freezing point of a 0.625m aqueous solution of any nonvolatile, nonelectrolyte solute?
5. What are the boiling point and freezing point of a 0.40m solution of sucrose in ethanol? ($k_b = 1.22^{\circ}\text{C}/\text{m}$, boiling point = 78.5°C ; $k_f = 1.99^{\circ}\text{C}/\text{m}$, freezing point = -114.1°C)
6. A lab technician determines the boiling point elevation of an aqueous solution of a nonvolatile, nonelectrolyte to be 1.12°C . What is the solution's molality?
7. A student dissolves 0.500 mol of a nonvolatile, nonelectrolyte solute in one kilogram of benzene (C_6H_6). What is the boiling point elevation of the resulting solution? ($k_b = 2.53^{\circ}\text{C}/\text{m}$, boiling point = 80.1°C)
8. Calculate the freezing point and boiling point of each of the following solutions:
 - a. 2.75m NaOH in water
 - b. 0.58m of water in ethanol
 - c. 1.26m of naphthalene (C_{10}H_8) in benzene

Use the phase diagrams to answer the following questions:



11. What is the normal freezing point of the substance? _____
12. What is the normal melting point of the substance? _____
13. What is the normal boiling point of the substance? _____
14. What phase will the substance be in at STP? _____



15. What letter represents the triple point? _____
16. What phase change is happening between letter E and letter G?

17. What phase is letter F in? _____
18. What is happening to the substance at letter D? _____