CONCEPT: BOILING POINT ELEVATION

- The phenomenon when adding a solute to a pure solvent results in ____ of the boiling point of the solvent.
  - □ **Normal Boiling Point** (_____): The boiling point of the pure solvent _____ the addition of the solute.
  - □ **Boiling Point of Solution** (_____): The boiling point of the solvent _____ the addition of the solute.

Boiling Point Elevation

A Boiling Point Elevation Formula

ΔT_b = ____ • ____ • ____

B Boiling Point of Solution

BP_____ = BP_____ + _____

C Variables

□ ΔT_b = Change in Boiling Point

□ ____ = van't Hoff Factor

□ ____ = Boiling Point Constant of Solvent in _____.

□ ____ = molality of solution in _____.

D Constants

Solvent	Normal BP (°C)	k_b (°C/m)
Water	100.0	0.51
Benzene, C_6H_6	80.1	2.53
Chloroform, $CHCl_3$	61.2	3.60
Ethanol, C_2H_5OH	78.4	1.20

□ Recall, if a compound is covalent, nonvolatile or non-ionic then its van't Hoff factor is equal to ____.

EXAMPLE: Calculate the boiling point of a 3.71 m aqueous $CaBr_2$ solution.

PRACTICE: An ethylene glycol solution contains 25.2 g of ethylene glycol ($C_2H_6O_2$) in 99.5 mL of water. Determine the change in boiling point. Assume a density of 1.00 g/mL for water.

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PRACTICE: Pure water boils at 100ºC. What is the new boiling point of water after the addition of 13.12 g aluminum chloride, $AlCl_3$, to 615 g water?

PRACTICE: What is the molality of glucose in an aqueous solution if the boiling point of the solution is 103.15ºC?

PRACTICE: Carbon dioxide is dissolved in 722 mL of benzene with a density of 1.59 g/mL. What mass of carbon dioxide would you add to make the boiling point of the solution 104.7ºC?