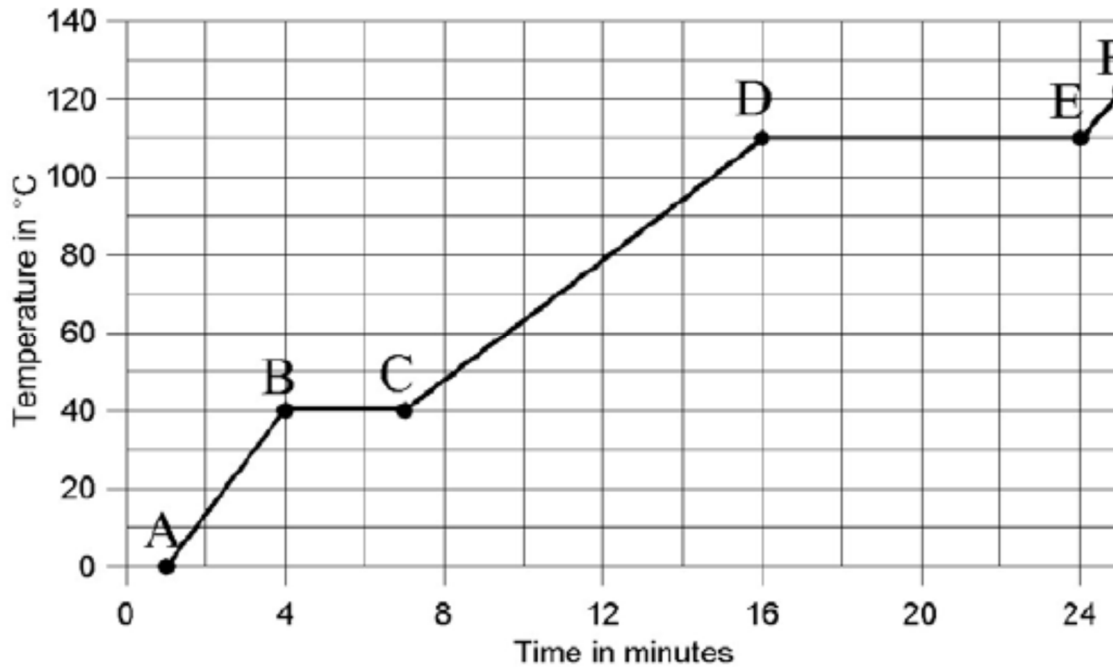


Heating Curve Do Now:



1. Label each section of the graph with the following terms:

Solid *liquid* *gas* *melting* *boiling/evaporation*

2. What is the boiling point of the substance?
3. What is the melting point of the substance?
4. Which letters represent a change in potential energy?
5. Which letters represent a change in kinetic energy?
6. Which letters represents condensation?
7. Which letters represents freezing?

Calculations:

8. Calculate the amount of heat absorbed when 10 grams of the solid is heated from point A to point B. Assume the specific heat capacity of the substance is $2.00 \text{ J/g}^\circ\text{C}$.
9. Calculate the amount of heat required to melt 10 grams of the substance. The heat of fusion of this substance is $400. \text{ J/g}^\circ\text{C}$.

Review: Solutions

a. **Solutions** are _____ mixtures that may be solid, liquid, or gaseous.

If something is **not** homogeneous (i.e. it is _____), it is **NOT** a solution!

b. Solute vs. Solvent

The _____ is what is being dissolved.

The _____ is what is doing the dissolving

Solutes and solvents can be in any of the 3 phases of matter

c. Determine which is the solvent and which is the solute:

Salt water: Solute = _____ Solvent = _____

Aqueous calcium oxide: Solute = _____ Solvent = _____

Kool-aid : Solute = _____ Solvent = _____

Seltzer water (water with CO₂ gas) Solute = _____ Solvent = _____

Solubility=a measure of _____ will _____

in a certain amount of _____

Factors that Effect Solubility:

1) Temperature

- **Solid solutes:** IN GENERAL,

As _____, the solubility of a **SOLID** solute in a liquid solvent _____

*this means that at a higher temperature, you can dissolve _____ solute in the same amount of solvent. Ex: dissolving cocoa powder in cold vs. hot water

- **Gas solutes:** IN GENERAL,

As _____ the solubility of a **GAS** solute in a liquid solvent _____

*this means that at a higher temperature, you can dissolve _____ solute in the same amount of solvent. Ex: cold soda vs. warm soda

2) Pressure

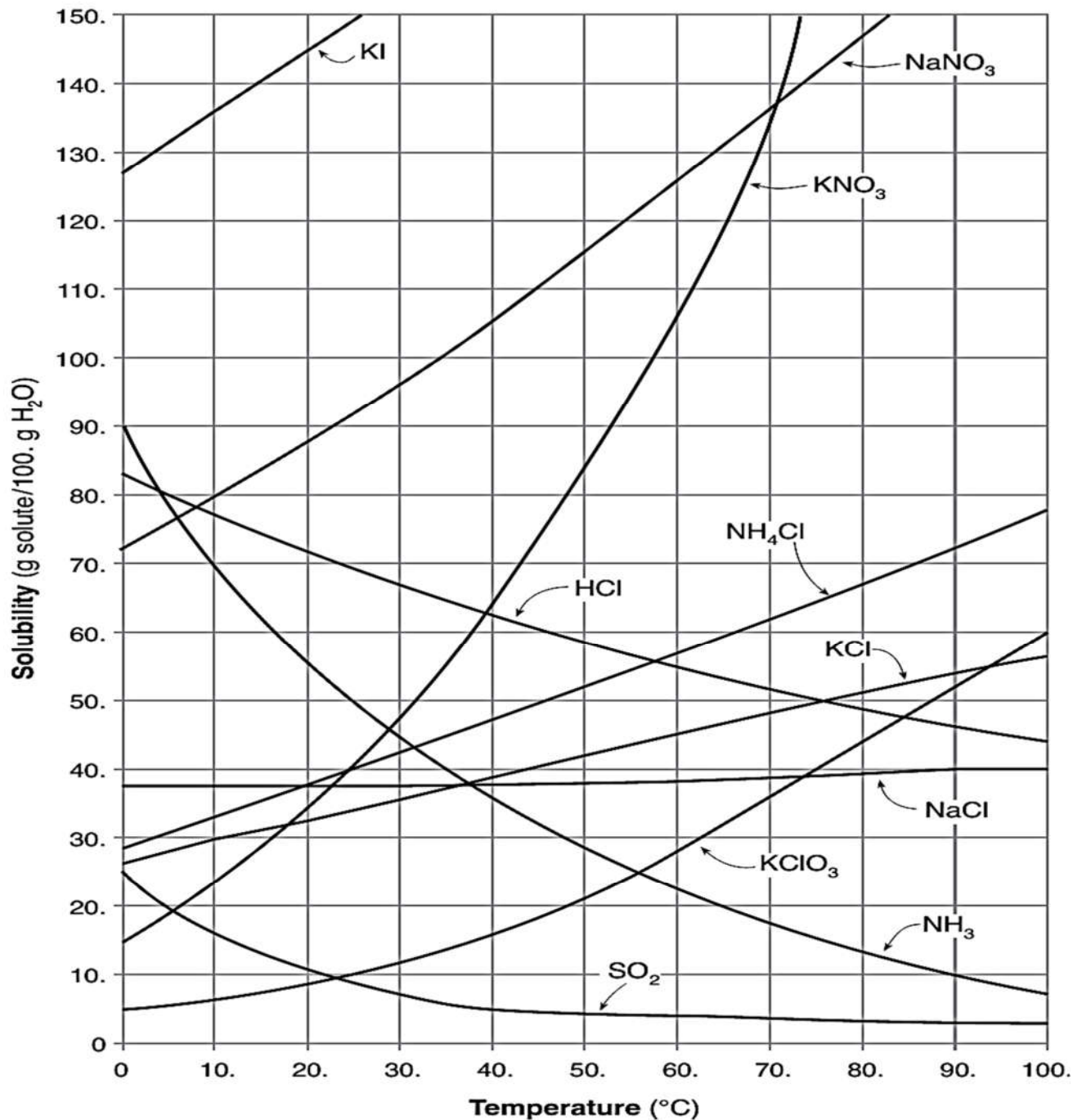
- **Solid and liquid solutes:** little to no effect on solubility

- **Gas solutes:** IN GENERAL,

As _____, the solubility of a GAS solute in a liquid solvent _____

*this means that at a higher pressure, you can dissolve _____ solute in the same amount of solvent. Ex: unopened vs. opened soda

Table G
Solubility Curves at Standard Pressure



HOW TO USE TABLE G: Table G shows the number of grams of a solute that can be dissolved in **100 GRAMS OF WATER** at temperatures between 0°C and 100°C. Each curve represents the maximum amount of a substance that can be dissolved at a given temperature.

If the intersection of GRAMS OF SOLUTE vs. TEMPERATURE falls:

- **ON THE CURVE**, the solution is _____
- **UNDER THE CURVE**, the solution is _____
- **ABOVE THE CURVE**, the solution is _____

Use the solubility curve to answer the following questions:

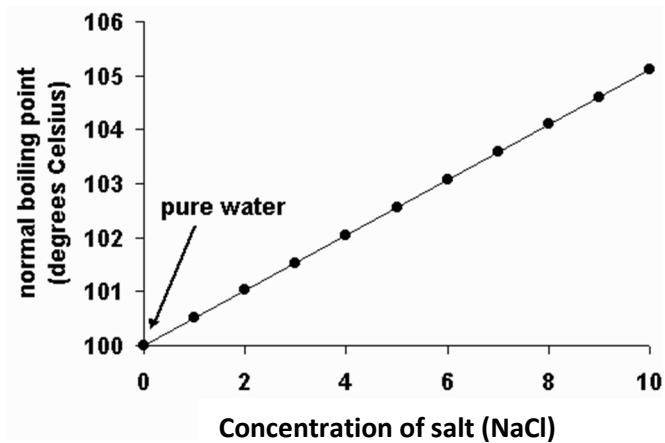
1. Indicate the type of solution you would find (unsaturated, saturated or supersaturated) if the given grams of solute were dissolved in 100 grams of water.

Solute	Temperature	Grams of Solute	Type of solution
KI	15	140	
NaNO ₃	45	50	
NaNO ₃	68	135	
NH ₄ Cl	35	53	
HCl	40	67	
NH ₃	35	20	
SO ₂	90	35	
NH ₄ Cl	55	40	
KCl	35	47	
KNO ₃	60	105	
HCl	40	55	
KNO ₃	70	35	

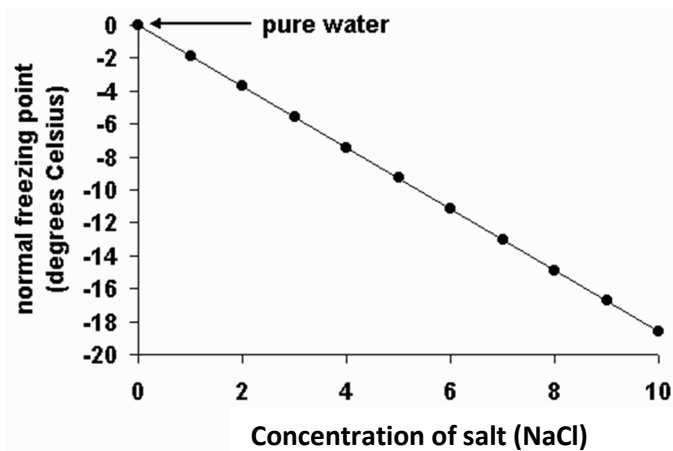
2. The compound which is the least soluble at 10°C is _____
3. The compound which is the least soluble at 80°C is _____
4. The number of grams of KNO₃ needed to saturate 100 g of water at 70°C is about _____
5. How do you make a supersaturated solution?

Solutions: Colligative Properties

1. Why do you think people pour salt on the roads/sidewalks in the winter?
2. Why do you think people add salt to water when making pasta?



1. What is the boiling point of pure water?
2. What happens to the boiling point of water as you increase the concentration of salt added?



1. What is the freezing point of pure water?
2. What happens to the freezing point of water as you increase the concentration of salt added?

Summary:

The addition of a solute to a solvent causes the **boiling point** of the solvent to _____.

This phenomenon is known as _____.

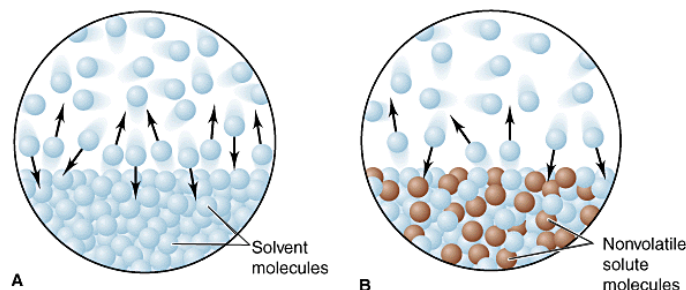
The addition of a solute to a solvent causes the **freezing point** of the solvent to _____.

This phenomenon is known as _____.

The _____ the concentration of **solute particles**, the _____ the effect.

Why does this happen?

- When a solute is dissolved in a solvent, the vapor pressure of the resulting solution will be _____ than the vapor pressure of the pure solvent.
- Recall that particles of a solvent escape the liquid phase to form a gas at the surface of the liquid. When a solvent is pure, its particles occupy the entire surface area. However, when a solute is added, a mix of _____ and _____ particles occupy the surface area. With fewer solvent particles at the surface, fewer particles enter the _____ state, and the vapor pressure is _____.



- Recall that boiling occurs when the _____ from the surface of the liquid is _____ to the _____ pushing down on the surface. If adding a solute _____ the _____, the solution must be heated to a _____ temperature in order to make _____.
- Freezing: the solute particles get in the way of the pure substances ability to form a solid structure (i.e. water forming ice crystals)

Solubility Homework:

1. What is the difference between a solute and a solvent?

2. How do the solubility of solids and gases change when temperature is changed?
When pressure is changed?

3. What happens to the freezing and boiling point of water when solute is added? Why?

4. Use table G (solubility curve) to answer the following questions:
 - a. How many grams of KCl can be dissolved in 100 g of water at 80°C? _____
 - b. At 40°C, how much KNO₃ can be dissolved in 100 g of water? _____
 - c. How many grams of NaCl can be dissolved in 100 g of water at 60°C? _____
 - d. At 30°C, 90 g of NaNO₃ is dissolved in 100 g of water. Is this solution saturated, unsaturated, or supersaturated? _____
 - e. At 80°C, 150 g of NaNO₃ has been dissolved in water. Is this solution saturated, unsaturated, or supersaturated? _____
 - f. At 20°C, 32 g of KCl has been dissolved in water. Is this solution saturated, unsaturated, or supersaturated? _____
 - g. At 50°C, 40 g of NH₃ has been dissolved in water. Is this solution saturated, unsaturated, or supersaturated? _____
 - h. Which compounds show a decrease in solubility from 0°C to 100°C? _____
 - i. Which substance is least soluble in water at 20°C? _____
 - j. Which substance shows the least change in solubility as it is heated from 0°C to 100°C?