

34. Sodium metal reacts violently with water to form NaOH and release hydrogen gas. Suppose that 10.0 g of Na react completely with 1.00 L of water and the final solution volume is 1.00 L.
- What is the molar mass of NaOH?
 - Write a balanced equation for the reaction.
 - What is the molarity of the NaOH solution formed by the reaction?
35. In cars, ethylene glycol, $C_2H_6O_2$, is used as a coolant and antifreeze. A mechanic fills a radiator with 6.5 kg of ethylene glycol and 1.5 kg of water.
- What is the molar mass of ethylene glycol?
 - What is the molality of the water in the solution?
36. Plot a solubility graph for $AgNO_3$ from the following data, with grams of solute (by increments of 50) per 100 g of H_2O on the vertical axis and with temperature in $^{\circ}C$ on the horizontal axis.

Grams solute per 100 g H_2O	Temperature ($^{\circ}C$)
122	0
216	30
311	40
440	60
585	80
733	100

- How does the solubility of $AgNO_3$ vary with the temperature of the water?
 - Estimate the solubility of $AgNO_3$ at $35^{\circ}C$, $55^{\circ}C$, and $75^{\circ}C$.
 - At what temperature would the solubility of $AgNO_3$ be 275 g per 100 g of H_2O ?
 - If 100 g of $AgNO_3$ were added to 100 g of H_2O at $10^{\circ}C$, would the resulting solution be saturated or unsaturated? What would occur if 325 g of $AgNO_3$ were added to 100 g of H_2O at $35^{\circ}C$?
37. If a saturated solution of KNO_3 in 100. g of H_2O at $60^{\circ}C$ is cooled to $20^{\circ}C$, approximately how many grams of the solute will precipitate out of the solution? (Use **Table 4.**)

38. a. Suppose you wanted to dissolve 294.3 g of H_2SO_4 in 1.000 kg of H_2O .
- What is the solute?
 - What is the solvent?
 - What is the molality of this solution?
- b. What is the molality of a solution of 63.0 g HNO_3 in 0.250 kg H_2O ?

CRITICAL THINKING

39. **Predicting Outcomes** You have been investigating the nature of suspensions, colloids, and solutions and have collected the following observational data on four unknown samples. From the data, infer whether each sample is a solution, suspension, or colloid.

DATA TABLE 1 *Samples*

Sample	Color	Clarity (clear or cloudy)	Settle out	Tyndall effect
1	green	clear	no	no
2	blue	cloudy	yes	no
3	colorless	clear	no	yes
4	white	cloudy	no	yes

Based on your inferences in Data Table 1, you decide to conduct one more test of the particles. You filter the samples and then reexamine the filtrate. You obtain the data found in Data Table 2. Infer the classifications of the filtrate based on the data in Data Table 2.

DATA TABLE 2 *Filtrate of Samples*

Sample	Color	Clarity (clear or cloudy)	On filter paper	Tyndall effect
1	green	clear	nothing	no
2	blue	cloudy	gray solid	yes
3	colorless	clear	none	yes
4	colorless	clear	white solid	no