

- In soda pop, $\text{CO}_2(\text{g})$ is a _____ and water is the _____.
[A] solute; solution [B] solution; solute [C] solvent; solute
[D] solvent; solution [E] solute; solvent
- A mixture of sand and water is a(n) _____.
[A] solvent [B] solution [C] solute [D] aqueous solution [E] none of these
- Approximately 38 g of NaCl can be dissolved in 100 g of water at 25°C . A solution prepared by adding 35 g of NaCl to 100 g of water at 25°C is unsaturated.
[A] True [B] False
- When a solvent has dissolved all the solute it can at a particular temperature, it is said to be
[A] unsaturated [B] supersaturated [C] diluted
[D] saturated [E] none of these
- A 1 molar solution of NaCl contains
[A] 1 mol of solute per liter of solution
[B] 1 liter of solute per mol of solution [C] 1 mol of solute per kilogram of solution
[D] 1 mol of solute per mole of solution [E] 10.0 grams of solute per liter of solution
- Which of the following aqueous solutions contains the greatest number of ions?
[A] 200.0 mL of 0.10 M KBr [B] 400.0 mL of 0.10 M NaCl
[C] 300.0 mL of 0.10 M CaCl_2 [D] 800.0 mL of 0.10 M sucrose
[E] 200.0 mL of 0.10 M FeCl_3
- What is the mass of H_2SO_4 in 1.00×10^2 mL of 0.200 M H_2SO_4 solution?
[A] 20.0 g [B] 1.00×10^2 g [C] 19.6 g [D] 1.96 g [E] none of these
- What number of moles of solute are present in 25.0 mL of 2.00 M HCl?
[A] 50.0 mol [B] 0.0800 mol [C] 0.0500 mol [D] 2.00 mol [E] none of these
- A chemist needs 225 mL of 2.4 M HCl. What volume of 12 M HCl must be dissolved in water to form this solution?
[A] 6.8 mL [B] 3.4 mL [C] 7.2 mL [D] 21 mL [E] 45 mL

10. What volume of a 10.0 *M* HNO₃ solution is needed to completely neutralize 575 mL of a 4.10 *M* KOH solution?

[A] 2.36 mL [B] 236 mL [C] 0.236 mL [D] 0.0236 mL [E] none of these

11. Adding a solute to a liquid will

[A] decrease the boiling point

[B] increase the freezing point

[C] leave the boiling point unchanged

[D] decrease the freezing point

[E] none of these

12. What is the solubility of each of these substances at 10°C? Use your graph of solubilities to determine the answers.
- Na_2SO_4
 - NaCl
 - SO_2
 - NH_3
 - KI
13. Consider a solution in which 90 g of NaNO_3 is dissolved in 100 g of water at 25 °C. Is it saturated, unsaturated, or supersaturated?
14. Consider a solution in which 90 g of NaNO_3 is dissolved in 200 g of water at 25 °C. Is it saturated, unsaturated, or supersaturated?
15. Consider a solution in which 90 g of NaNO_3 is dissolved in 50 g of water at 25 °C. Is it saturated, unsaturated, or supersaturated?
16. Balance the following chemical reaction. Identify the precipitate. Write the complete ionic equation. Identify the spectator ions. Then write the net ionic equation.
- $\text{Na}_3\text{PO}_4 \text{ (aq)} + \text{Ba(NO}_3)_2 \text{ (aq)} \rightarrow \text{Ba}_3(\text{PO}_4)_2 \text{ (s)} + \text{NaNO}_3 \text{ (aq)}$
 - The precipitate is _____.
 - Complete ionic equation:
 - Spectator ions:
 - Net ionic equation:
 - Will oil dissolve in water? Why or why not?
17. Which of the following solutions is the most concentrated?
- 6.0 M $\text{HCl} \text{ (aq)}$
 - 9.0 M $\text{HCl} \text{ (aq)}$
 - 12.0 M $\text{HCl} \text{ (aq)}$
18. Which of the solutions from above is the most dilute?
19. What is meant by the “thermal pollution” of a lake?
20. What is “the bends”? What causes it? How could it be cured?

[1] [E]

[2] [E]

[3] [A]

[4] [D]

[5] [A]

[6] [C]

[7] [D]

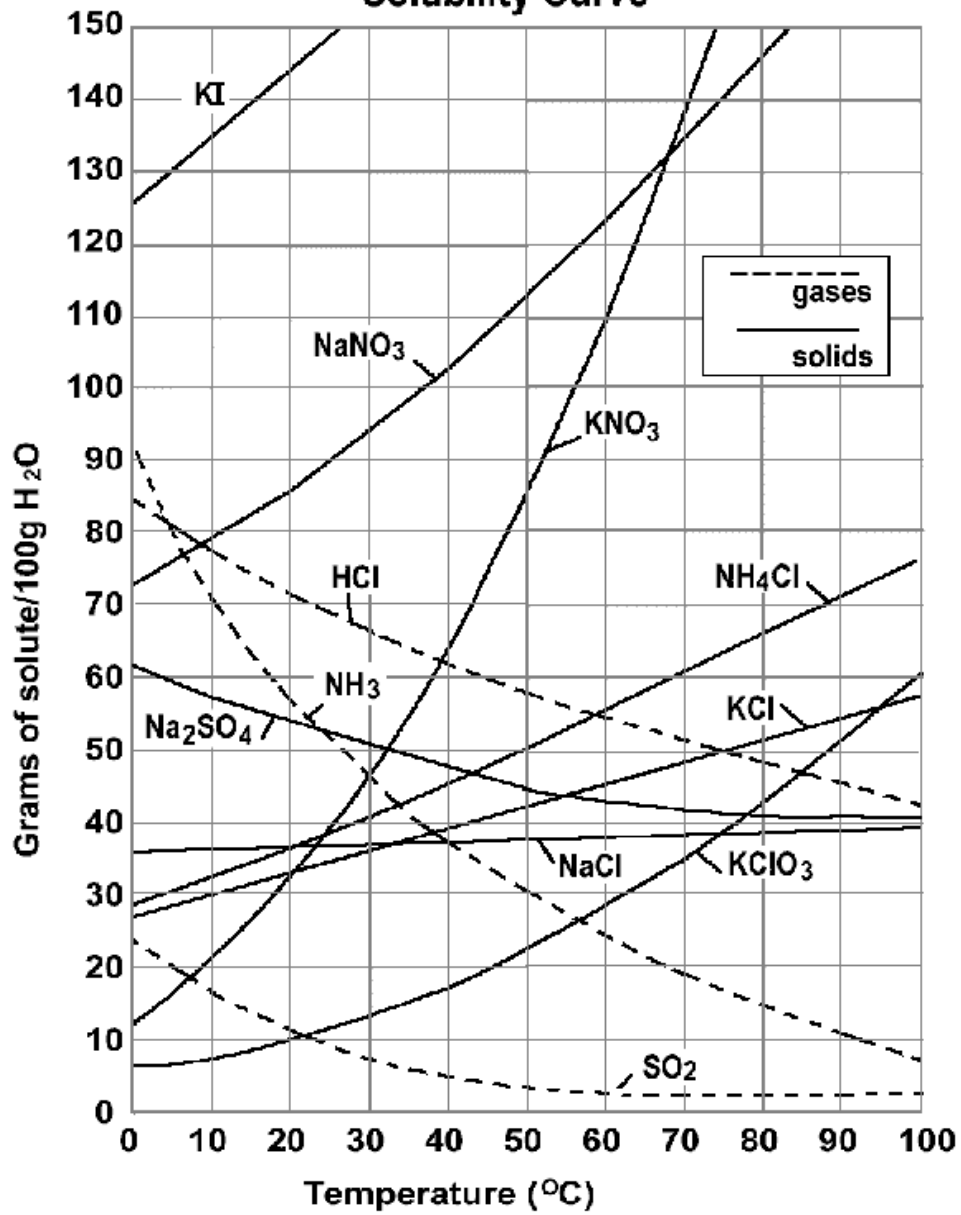
[8] [C]

[9] [E]

[10] [C]

[11] [D]

Solubility Curve



6) d) $.800 \text{ L} \times \frac{.1 \text{ mol}}{\text{L}} = .08 \text{ mol sucrose}$

c) $.300 \text{ L} \times \frac{.10 \text{ mol}}{\text{L}} = .03 \text{ mol CaCl}_2$

e) $.200 \text{ L} \times \frac{.10 \text{ mol}}{\text{L}} = .02 \text{ mol KBr}$

e) $.200 \text{ L} \times \frac{.10 \text{ mol}}{\text{L}} = .02 \text{ mol FeCl}_3$

b) $.400 \text{ L} \times \frac{.10 \text{ mol}}{\text{L}} = .04 \text{ mol NaCl}$

Answer is **c**, because $.03 \text{ mol CaCl}_2$ makes $.09 \text{ mol}$ ions in solution
 $\text{CaCl}_2 \xrightarrow{\text{H}_2\text{O}} \text{Ca}^{2+} + 2\text{Cl}^-$
 3 ions per mol of dissolved CaCl_2

7) $1.00 \times 10^2 \text{ ml} \times \frac{\text{L}}{10^3 \text{ ml}} = .100 \text{ L}$

$.100 \text{ L} \times \frac{0.200 \text{ mol}}{1 \text{ L}} = .0200 \text{ mol}$

$0.0200 \text{ mol} \times \frac{98.1 \text{ g}}{1 \text{ mol}} = \boxed{1.96 \text{ g}}$

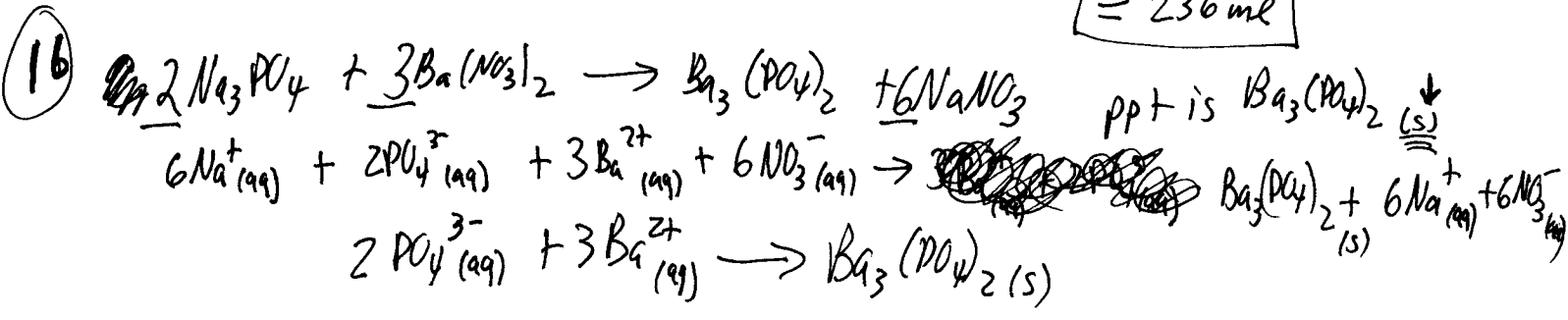
$\text{H} + \text{H} + \text{S} + \text{O} + \text{O} + \text{O}$
 $2.02 \quad 32.1 \quad 64$

8) $25.0 \text{ ml} \times \frac{1 \text{ L}}{1000 \text{ ml}} \times \frac{2.00 \text{ mol}}{1 \text{ L}} = \boxed{0.0500 \text{ mol}}$

9) $M_1 = 12 \text{ M}$ $M_2 = 2.4 \text{ M}$ $M_1 V_1 = M_2 V_2$
 $V_1 = ?$ $V_2 = 225 \text{ ml}$ $V_1 = \frac{M_2 V_2}{M_1} = \frac{(2.4 \text{ M})(225 \text{ ml})}{12 \text{ M}}$
 $V_1 = \boxed{45 \text{ ml}}$

10) $\text{HNO}_3 + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KNO}_3$

$\boxed{?} \text{ ml}$	$\boxed{575} \text{ ml}$	$0.575 \text{ L} \times \frac{4.10 \text{ mol}}{1 \text{ L}} = 2.358 \text{ mol KOH}$	or use $M = \frac{n}{V}$
$\boxed{10.0} \text{ M}$	$\boxed{4.10} \text{ M}$	$2.358 \text{ mol KOH} \times \frac{1 \text{ mol HNO}_3}{1 \text{ mol KOH}} = 2.358 \text{ mol HNO}_3$	
$\boxed{} \text{ mol}$	$\boxed{} \text{ mol}$	$2.358 \text{ mol HNO}_3 \times \frac{1 \text{ L}}{10.0 \text{ mol}} = 0.236 \text{ L}$	or use $M = \frac{n}{V}$
		$\boxed{= 236 \text{ ml}}$	



- 12 (a) 58g (per 100g H₂O) (c) 18g (e) 135g
(b) 38g (d) 70g

13 saturated 14 unsaturated 15 supersaturated

17 c 18 A 19 Water becomes hotter, reduces solubility of gases such as O₂.

20 The bends occurs from depressurization of scuba divers over too short a period of time. As P ↓, solubility of air in bloodstream ↓. The bubbles formed in bloodstream from rapid depressurization are deadly.