

1. In a 15% alcohol solution, the solute is _____, and the solvent is _____.
2. Mixtures characterized by an observable segregation of component substances are called _____ mixtures.
3. The process of crystal decomposition into hydrated ions is called _____.
4. Solutions that are able to dissolve additional solute are said to be _____; solutions that cannot dissolve any more solute at a given temperature are _____; and solutions that contain more solute than can normally be dissolved at a given temperature are _____.
5. Ions that do not participate in a chemical change but are necessary to maintain electrical neutrality in solutions are called _____ ions.
6. Properties that depend only on the number of solute particles are _____ properties.
7. Classify each of the following as a pure substance, a heterogeneous mixture or a homogeneous mixture:
 - a. Smoke
 - b. Diet sprite
 - c. Rubbing alcohol
8. A solution is a _____ mixture.
9. _____ is an example of a solution of gases.
10. Water is an excellent solvent for ionic compounds because each water molecule is _____.
11. Write a balanced dissociation reaction for $\text{Ca}(\text{OH})_2$ dissolved in water.
(remember to use the appropriate subscripts.)
12. What is the difference between a substance like ethanol ($\text{CH}_3\text{CH}_2\text{OH}$) dissolving in water and a substance like sodium chloride (NaCl) dissolving in water?
13. A 0.50 M solution of NaCl is diluted by taking 50.0 mL of it and adding 150.0 mL of water. What is the diluted concentration of the NaCl solution?
14. What mass of CaBr_2 is contained in 75.0 mL of a 0.50 M solution of CaBr_2 ?

15. What volume of water must be added to 10.0 mL of 5.0 M HCl to make a solution of 0.10 M HCl?

16. Calculate the molar concentration of each ion in the following solutions:

a. 0.20 M CaCl_2

b. 0.15 M $\text{Mg}(\text{NO}_3)_2$

c. 0.05 M $\text{Fe}_2(\text{SO}_4)_3$

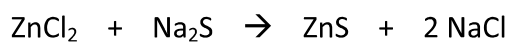
17. Calculate the molarity of each ion in the following mixed solutions in which no reaction takes place:

a. 20.0 mL of 0.50 M FeCl_3 mixed with 80.0 mL of 0.15 M NH_4Cl

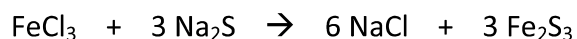
b. 140.0 mL of 0.36 M CaCl_2 mixed with 60.0 mL of 0.22 M $\text{Ca}(\text{NO}_3)_2$

18. Circle the formula of the substance that is the precipitate in each of the following reactions:

a. A white precipitate forms when solutions containing zinc chloride and sodium sulfide are mixed:



b. A black precipitate forms when solutions containing iron(III) chloride and sodium sulfide are mixed:



19. When solutions containing potassium hydroxide and nickel(II) nitrate are mixed, a green, jelly-like precipitate forms.
- Write and balance the complete chemical equation to describe the reaction.
 - Write the formula and name of the substance that is the green, gelatinous precipitate.
 - Write the net ionic equation to describe the reaction.
 - What is the maximum mass of the green precipitate that can be formed when 75 mL of a solution containing 0.0010 mole of $\text{Ni}(\text{NO}_3)_2$ is mixed with 75 mL of a solution containing 0.0010 mole of KOH?
20. At the onset of arctic winter, large regions of the sea's surface freeze. Explain what happens to the freezing point of the ocean water found beneath the ice masses as winter progresses.
21. The temperature at which a pure liquid boils remains constant until all the liquid has changed to a gas. If a solution is heated to boiling, however, the temperature required to maintain the boiling state steadily increases. Explain.
22. Would spreading crystals of barium chloride on a layer of snow affect the melting process? Explain.
23. In the process of fermentation, yeast can produce a solution that is about 15% alcohol (30 proof). At higher concentrations of alcohol, the yeast cannot survive. How, then, are the more concentrated alcoholic beverages obtained?

24. If 30.0 mL of 0.10 M NaOH solution is mixed with 40.0 mL of 0.10 M $\text{Fe}(\text{NO}_3)_2$ solution and a precipitate forms
- What is the identity of the precipitate? (Hint: it is not NaNO_3)
 - Write the net ionic equation for the reaction.
 - What is the mass of the precipitate produced?
 - What is the final concentration of each of the spectator ions in the solution?
25. 75.0 mL of 2.0 M K_2SO_4 solution is mixed with 125.0 mL of 1.0 M BaI_2 solution and a precipitate forms
- What is the identity of the precipitate?
 - Write the net ionic equation for the reaction.
 - Which ion is in excess?
 - What is the mass of the precipitate produced?
 - What is the final concentration of each of the spectator ions?
 - What is the concentration of the excess ion after the reaction?