6. a. The rule of thumb for predicting solubility is "like dissolves like."  
b. In general, the rule means that polar substances dissolve in polar solvents, and nonpolar substances dissolve in nonpolar solvents.
7. a. The solubility of a gas in a liquid is directly proportional to its pressure above the liquid.  
b. This is a statement of Henry's law.  
c. If the pressure above the gas increases, the amount of gas that can dissolve will increase.  
d. The cold soda will effervesce more than the partially frozen soda. The gas is less soluble in the warmer solvent.
8. a. about 84 g per 100 g solvent  
b. about 105 g per 100 g solvent  
c. about 36 g per 100 g solvent
9. a. 25°C  
b. 40°C  
c. 32°C
10. a. AgNO₃(s) → AgNO₃(aq) + 22.8 kJ/mol solution  
b. The dissolution process is endothermic; crystallization is exothermic.  
c. The temperature drops as silver nitrate dissolves.  
d. At equilibrium, the rates of dissolution and crystallization are equal.  
e. The rate of dissolution will initially increase at a faster pace than the rate of crystallization because the dissolution process is endothermic and will serve to reduce the stress placed on the system.  
f. The amount will increase if additional solute is available.  
g. The rate of crystallization will increase to relieve the stress, and the solubility of the solute will then decrease.
11. a. Molality would be used when it is important to know the molar mass of solute in a given volume of solution.  
b. Molality is preferred when it is important to know the relative numbers of solute and solvent particles.
12. dissolution and recrystallization
13. Graphs should accurately match data shown. A good range for the y-axis is 0 to 800 g. The x-axis range should be 0 to 100°C.  
a. Solubility increases with increasing temperature.  
b. at 35°C, 250 g per 100 g solvent; at 55°C, 380 g per 100 g solvent; at 75°C, 540 g per 100 g solvent  
c. This solubility would be observed at about 35°C.  
d. The solution would be unsaturated; the solution would be saturated.
14. 68.4 g
15. a. (1) Determine the molar mass of NaOH.  
   (2) 40 g (3) 0.167 M  
   (3) 0.953 M NH₄Br ð 9.5 M
16. a. (1) H₂SO₄ b. 1140 g  
   (2) H₂O  
   (3) 343 g
17. 0.143 mol NaOH
18. a. 132 g ð 7.2.17 g/mol  
   b. NH₄OH + H₂SO₄  
   c. 3.998 M
19. a. Determine the molar mass of AgNO₃.  
   b. 168.88 g ð 69.89 g/mol  
   c. 1000 mL ð 1.0 x 10⁻⁳ L
20. a. 2H₃PO₄ + 3Ca(OH)₂ → Ca₃(PO₄)₂ + 6H₂O  
   b. 698 g calcium phosphate; 243 g water ð 7.0 x 10⁻³ g
21. 52.1 mL
22. 0.0309 M
23. a. (1) H₂SO₄ b. 4.00 m  
   (2) H₂O  
   (3) 3.000 m
24. a. 441 g  
   b. 126 g
25. a. 342 g  
   b. 0.182 m
26. 0.920 kg
27. 20.2 g
28. a. 142 g  
   b. 0.11 mol
29. a. 192 g  
   b. H₂O and CO₂  
   c. no  
   d. 3.9 × 10⁻⁴ M
30. a. 74.6 g  
   b. not at all  
   c. 160 g
31. a. 40 g  
   b. 2Na + 2H₂O → 2NaOH + H₂↑  
   c. 0.435 M
32. a. 62 g  
   b. 13 m
33.

<table>
<thead>
<tr>
<th>DATA TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>sample 1 = solution</td>
</tr>
<tr>
<td>sample 2 = suspension</td>
</tr>
<tr>
<td>sample 3 = colloid</td>
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<tr>
<td>sample 4 = colloid</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>sample 1 = solution</td>
</tr>
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</tr>
<tr>
<td>sample 3 = colloid</td>
</tr>
<tr>
<td>sample 4 = suspension</td>
</tr>
</tbody>
</table>

34. a. 20°C  
   b. 65°C  
   c. 66.8 g/100 g SatdSoln
35. a. It is lightweight and strong, resists corrosion, and has good conductivity properties.  
   b. copper and tin  
   c. copper and zinc  
   d. any alloy of iron with less than 2.5% carbon  
   e. pure iron, carbon, and cementite—an iron ore
36. a. 500 ppm  
   b. 2.5 times the limit

37. Students will discover that emulsifying agents contain a polar center and a nonpolar center to the molecule.

38. Usually the information regarding sugar will be given in units of grams per amount of drink. Have students convert the mass of sugar to moles of sugar, which will result in the units of mole per liter, or molarity.

39. At some point, students will need to convert from mass of solute to moles of solute. The number of grams in one mole of copper sulfate pentahydrate is 90 g more than the molar mass of copper sulfate anhydrous.