Unit 11 Review - Water and Its Solutions

1. Determine whether the following compounds are electrolytes or nonelectrolytes:
   a. SO₂
   b. MgSO₄
   c. C₂H₆
   d. Ag₂CO₃
   e. Ca₃(PO₄)₂
   f. LiNO₃
   g. PbO
   h. AlBr₃

2. What factors affect the rate at which solute particles can be dissolved?

3. Brass, a metal commonly used in the productions of musical instruments, is a mixture of about 65% Copper (by mass) and about 35% Zinc (by mass). Which substance is the solute and which is the solvent? What type of solution is brass?

4. In the following table, identify which compounds are electrolytes and which are nonelectrolytes.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Conductivity (µS)</th>
<th>Electrolyte</th>
<th>Non-Electrolyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaCl₂</td>
<td>5321 µS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AlCl₃</td>
<td>8725 µS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NaCl</td>
<td>4124 µS</td>
<td></td>
<td></td>
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<tr>
<td>H₃C₂H₂O₄</td>
<td>895 µS</td>
<td></td>
<td></td>
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<tr>
<td>H₂O deionized</td>
<td>137 µS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH₃OH</td>
<td>145 µS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C₂H₆O₂</td>
<td>122 µS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For #5-6, determine the concentration of the following solution (both % by mass and Molarity):

5. A solution containing 4.95 g of sodium chloride in 0.0500 L of solution. (Assume that the solute does not appreciably affect the volume of the solution.)

6. How would you prepare the following solution: 1200 ml of a 3.71 M sodium acetate solution?
7. Use the following solubility curve to determine whether each of the following is unsaturated, saturated or supersaturated.

![Solubility Curve](image)

a. A solution of 76 g of Ammonium Chloride dissolved into 100 g of water at 80 °C.

b. A solution of 40 g of Potassium Nitrate dissolved into 100 g of water at 50 °C.

c. A solution of 100 g of HCl dissolved in 200 g of water at 75°C.

For #8-9, how would you prepare the dilution?

8. How would you prepare 500 ml of 1.00 M H$_2$SO$_4$ from a stock solution of 10.0 M H$_2$SO$_4$?

9. How would you prepare 1.50 L of 2.5 M HCl from a stock solution of 6.00 M HCl?

10. If I add 45 grams of sodium chloride to 500 grams of water, what will the melting and boiling points be of the resulting solution? $K_u$(H$_2$O) = 0.512 °C/m and $K_i$(H$_2$O) = -1.86 °C/m.