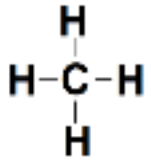
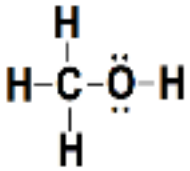
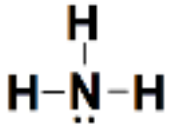
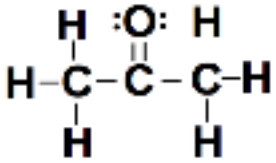
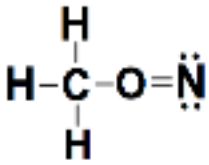
Reference Sheet -- Packet #7











Is *hydrogen bonding* possible for these molecules? Yes or No??

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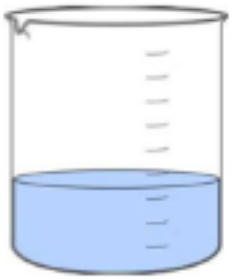
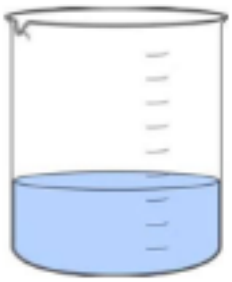
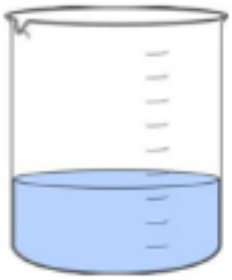
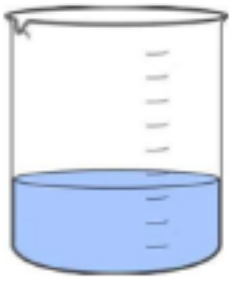
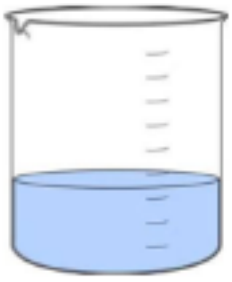
36 g of salt will dissolve in 100 g water at 25°C

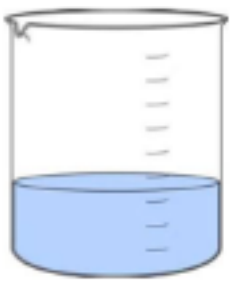




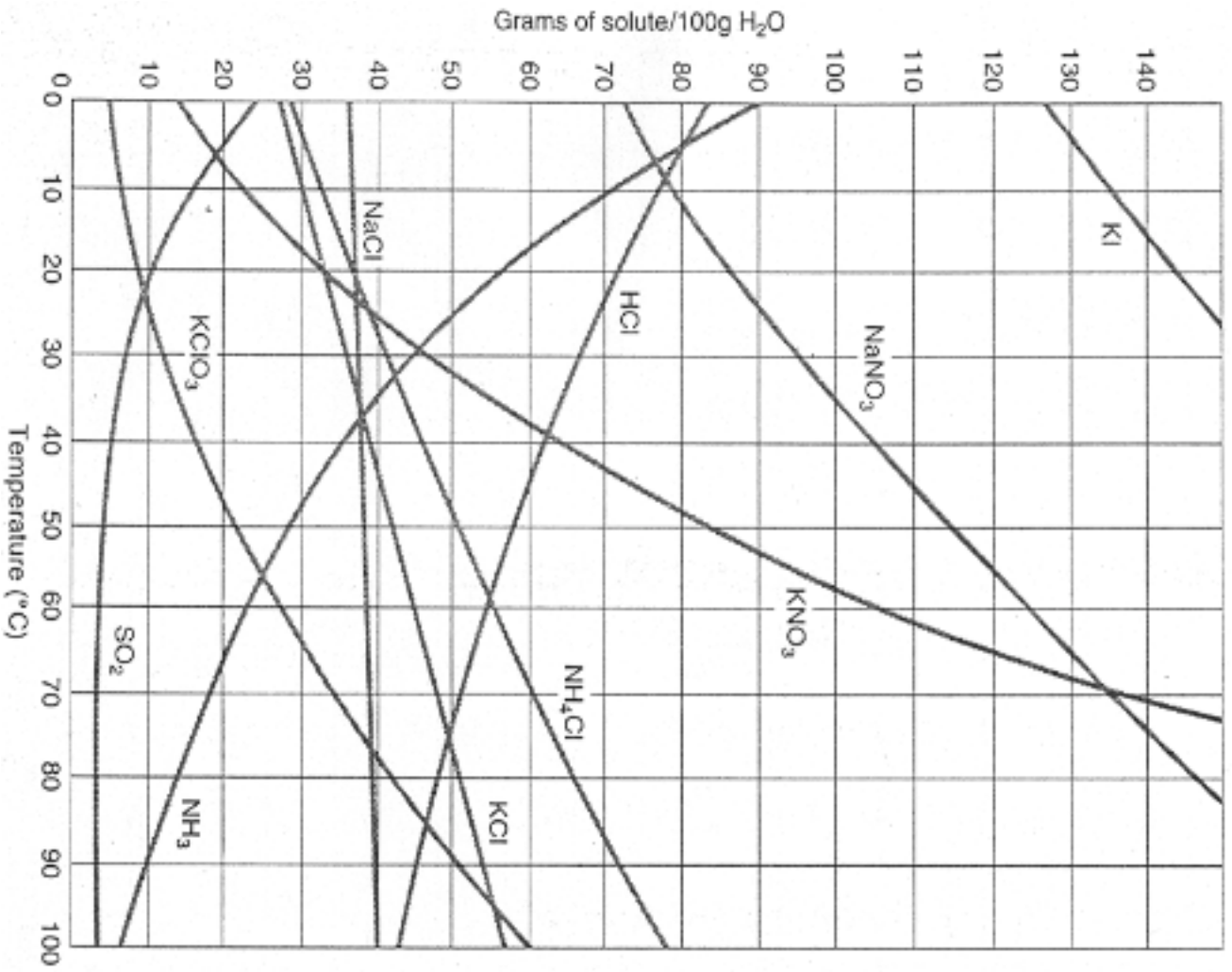








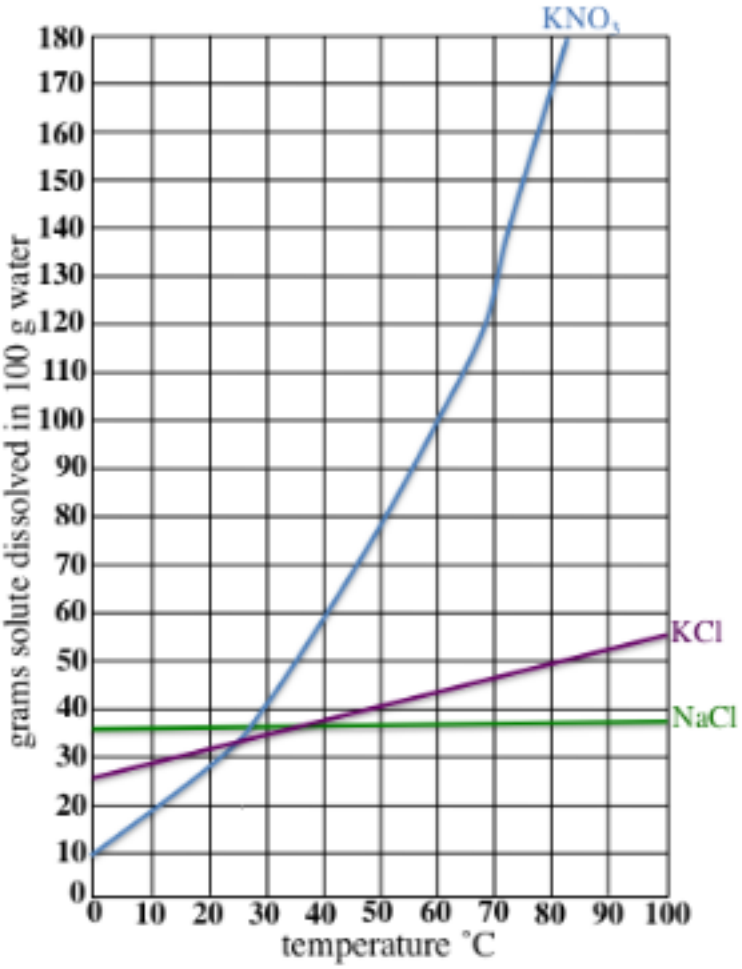
Reference Sheet -- Packet #7



unsaturated: a solution which contains less solute than what could be dissolved for a given temperature. Unsaturated solutions still have "room" to hold more solute. They often appear clear. If one more grain of solute is added, it dissolves upon mixing.

saturated: a solution which contains the maximum amount of solute dissolved for a given temperature. Saturated solutions cannot dissolve any extra solute, and often has excess solute sitting undissolved at the bottom.

supersaturated: this type of solution contains more solute than what is supposed to be dissolved for a given temperature. It was "tricked" by adding extra solute, heating it so it all dissolves, then cooling it carefully without re-crystallization. Supersaturated solutions appear unsaturated, but adding one extra crystal of solute will return this solution to being saturated.



- How much KCl can dissolve in 215 g of water @ 80˚C?

- What temp is req'd to dissolve 65 g KNO_3 in 45 g water?

packet #7 Objectives

- how to use a volumetric flask
- know about hydrogen bonding; identify whether or not a molecule can do hydrogen bonding
- how to read and do calculations from a solubility graph for solids & gases. Know bottom of WS 7.3
- how to calculate the concentration of a solution in %, ppm, M
- how to perform calculations relating to solution dilutions
- identify differences between solutions that are unsaturated, saturated, & supersaturated
- identify substances as being polar or non-polar, including how soap works
- identify a mixture as a solution, colloid, and suspension
- how to calculate molality, and use it for boiling point elevation & freezing point depression problems

•• In-Class Practice Problems •• **Percent Problems** ••

1. A solution is made of 12 g NaCl and 70. g water. What is the % NaCl?

2. A 115 g of solution contains 8.50 g of KBr. What is the % KBr?

3. How much NaOH would there be in 65 g of a 12% NaOH solution?

4. Air is 18% oxygen. How much oxygen can be distilled from 87 pounds of air?

5. How much 15.0% $AgNO_3$ solution can be made from 12.2 g of $AgNO_3$?

6a. 0.0050 g of Fe^{3+} are dissolved in 750 g of solution. What is the % concentration of Fe^{3+}?

6b. Calculate this concentration in ppm.

7. Convert 14% into ppt.

•• In-Class Practice Problems •• **Molarity Problems** ••

1. What is the molarity of a solution containing 25 g of NaCN dissolved in 950 mL of solution?

2. How many moles of HCl are needed to make 3.0 L of a 1.2 M solution?

3. How many grams of NaOH are needed to make 220 mL of a 3.5 M solution?

4. What volume of 2.70 M NH_4Cl solution can be made using 5.00 moles of NH_4Cl?

Ans (IRO): 0.00067 0.54 1.85 3.6 6.7 7.39 7.8 15 16 31 81.3 140

•• In-Class Practice Problems •• **Dilution Problems** ••

1. What's the concentration of a mixture of one volume of 4.0 M HCl and one volume of water?

2. 55 L of 2.2 M NaCl & 21 L of water are mixed. What's the final molarity?
(_____)

3. 18 L of 3.0 M NaCl are diluted to a total volume of 44 L. What's the final molarity?
(_____)

4. To what total volume must 100.0 mL of 2.30 M HCl be diluted to reduce its concentration to 0.500 M?
(_____)

5. What volume of 2.0 M HCl should be added to 195 mL of water to make the final concentration 0.45 M?
(_____)

6. What volume of 1.0 M KI should be added to 65 mL of 3.5 M KI to make the total concentration 1.5 M?
(_____)

Ans: (IRO) 1.2 1.6 2 57 260 460. **Units**: M M M M mL mL mL