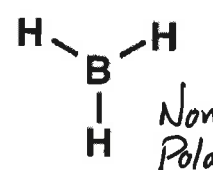
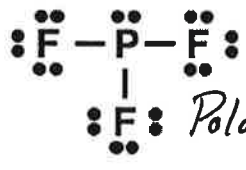


Solutions Quiz

34 pts Total

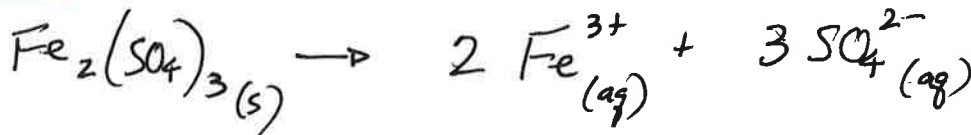
1. Water (H₂O) and hexane (C₆H₁₄) are common solvents. Based on polarity/non-polarity considerations, identify whether the following substances would dissolve in water or in hexane.

<p>Boron trihydride - BH₃</p>  <p>Non-Polar</p> <p>Dissolves in H₂O C₆H₁₄</p> <p>(circle one)</p>	<p>Phosphorus trifluoride - PF₃</p>  <p>Polar</p> <p>Dissolves in H₂O C₆H₁₄</p> <p>(circle one)</p>	<p>Calcium oxide - CaO</p> <p>Ionic</p> <p>Ca²⁺-----O²⁻</p> <p>Dissolves in ... H₂O C₆H₁₄</p> <p>(circle one)</p>
---	---	---

6
(2 pts each)

2. Write the balanced equation for the dissociation of iron(III) sulfate in water. Show ion charges and state symbols.

4



3. Determine the molarity of NaOH if an aqueous solution of NaOH is prepared with 4.25 grams of the solute are dissolved in 200.0 mL of water. PSYW

$$\text{NaOH: } 39.997 \text{ g/mol}$$

$$\# \text{ mol NaOH} = 4.25 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{39.997 \text{ g NaOH}} = 0.106257... \text{ mol NaOH}$$

4

$$[\text{NaOH}] = \frac{0.106257... \text{ mol}}{0.2000 \text{ L sol'n}} = \boxed{0.531 \text{ M}}$$

4. What mass of potassium sulfate must be added to 200.00 mL of water in order to prepare a 0.150 M aqueous solution? PSYW

$$\text{K}_2\text{SO}_4: 174.259 \text{ g/mol}$$

4

$$200.00 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.150 \text{ mol K}_2\text{SO}_4}{1 \text{ L}} \times \frac{174.259 \text{ g K}_2\text{SO}_4}{1 \text{ mol K}_2\text{SO}_4} = \boxed{5.23 \text{ g K}_2\text{SO}_4}$$

$$(5.22777 \text{ g})$$

18

5. A chemist mixes 200.0 mL of 0.2500 M potassium nitrate, 50.0 mL of 0.400 M magnesium nitrate, and 200.0 mL of 0.150 M aluminum nitrate. What is the molarity of nitrate ion in the final solution?

$$[KNO_3] = 0.2500$$

$$[Mg(NO_3)_2] = 0.400$$

$$[Al(NO_3)_3] = 0.150$$

$$KNO_3 : 0.2000 \text{ L} \times \frac{0.2500 \text{ mol}}{1 \text{ L}} = 0.0500 \text{ mol } NO_3^-$$

$$Mg(NO_3)_2 : 0.0500 \text{ L} \times \frac{0.800 \text{ mol}}{1 \text{ L}} = 0.040 \text{ mol } NO_3^-$$

$$Al(NO_3)_3 : 0.2000 \text{ L} \times \frac{0.450 \text{ mol}}{1 \text{ L}} = 0.0900 \text{ mol } NO_3^-$$

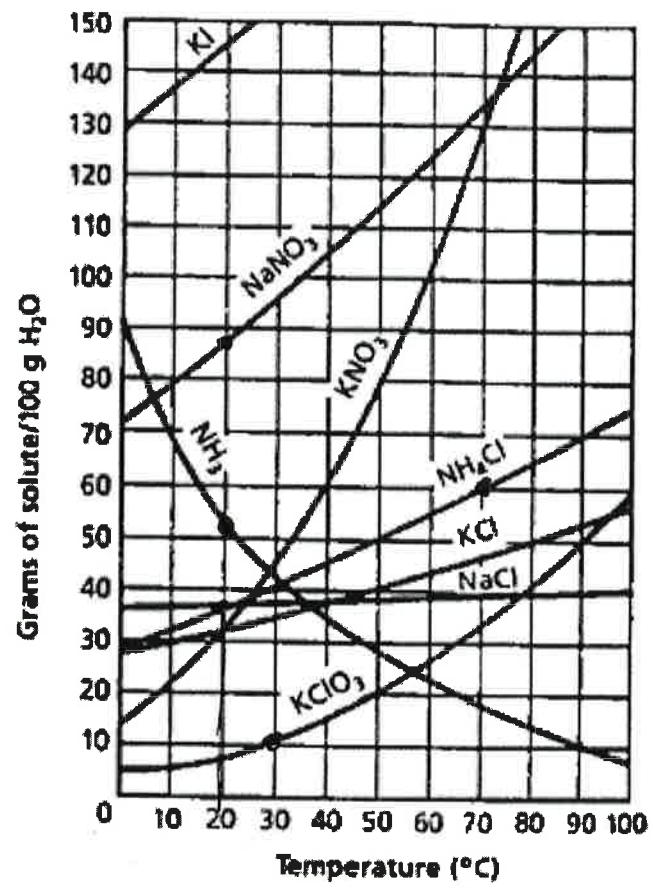
0.18 mol NO_3^-
in 450 mL
sol'n

$$[NO_3^-] = \frac{0.180 \text{ mol } NO_3^-}{0.450 \text{ L}} = 0.400 \text{ M}$$

200 mL + 50 mL + 200 mL

For Questions #6 - #8: Use the solubility curve at the right to answer the following questions.

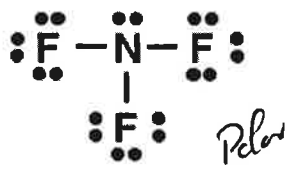
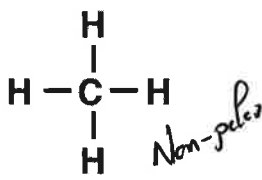
6. Which one of the following has the greatest solubility at 20°C?
 a. NH_3 b. KNO_3
 c. $NaNO_3$ d. NH_4Cl
7. How many grams of ammonium chloride (NH_4Cl) can dissolve in 100 g of water at 70°C?
 a. 29 b. 60
 c. 75 d. 90
8. A beaker contains 50 grams of water. How much $KClO_3$ can be dissolved in this water at 30°C?
 a. 5.5 b. 11
 c. 15 d. 30
 e. 60



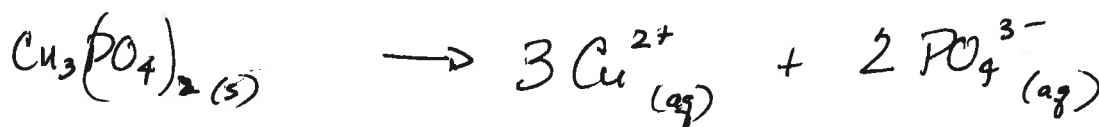
Solutions Quiz

34 pts Total

1. Water (H₂O) and hexane (C₆H₁₄) are common solvents. Based on polarity/non-polarity considerations, identify whether the following substances would dissolve in water or in hexane.

<p>Nitrogen trifluoride - NF₃</p>  <p>Dissolves in ...</p> <p><u>H₂O</u> C₆H₁₄</p> <p>(circle one)</p>	<p>Methane - CH₄</p>  <p>Dissolves in</p> <p>H₂O <u>C₆H₁₄</u></p> <p>(circle one)</p>	<p>Barium sulfide- BaS</p> <p>Ba²⁺-----S²⁻</p> <p>Ionic</p> <p>Dissolves in ...</p> <p><u>H₂O</u> C₆H₁₄</p> <p>(circle one)</p>
--	--	---

2. Write the balanced equation for the dissociation of copper(II) phosphate in water. Show ion charges and state symbols.



3. Determine the molarity of NaOH if an aqueous solution of NaOH is prepared with 8.60 grams of the solute are dissolved in 250.0 mL of water. PSYW NaOH: 39.997 g/mol

$$\# \text{ mol NaOH} = 8.60 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{39.997 \text{ g NaOH}} = 0.2150161 \dots \text{ mol NaOH}$$

$$[\text{NaOH}] = \frac{0.2150161 \dots \text{ mol}}{0.2500 \text{ L}} = \boxed{0.860 \text{ M}}$$

4. What mass of sodium sulfate must be added to 100.00 mL of water in order to prepare a 0.320 M aqueous solution? PSYW

$$\text{Na}_2\text{SO}_4: 142.04 \text{ g/mol}$$

$$100.00 \text{ mL} \times \frac{1 \text{ L}}{10^3 \text{ mL}} \times \frac{0.320 \text{ mol Na}_2\text{SO}_4}{1 \text{ L}} \times \frac{142.04 \text{ g Na}_2\text{SO}_4}{1 \text{ mol Na}_2\text{SO}_4}$$

$$= \boxed{4.55 \text{ g Na}_2\text{SO}_4}$$

$$(4.54528 \text{ g})$$

5. A chemist mixes 350.0 mL of 0.200 M potassium nitrate, 150.0 mL of 0.200 M magnesium nitrate, and 100.0 mL of 0.250 M aluminum nitrate. What is the molarity of nitrate ion in the final solution?

$$[\text{NO}_3^-] = 0.200 \text{ M}$$

$$[\text{NO}_3^-] = 0.400 \text{ M}$$

$$[\text{NO}_3^-] = 0.750 \text{ M}$$

$$\text{KNO}_3: 0.3500 \text{ L} \times \frac{0.200 \text{ mol NO}_3^-}{1 \text{ L}} = 0.0700 \text{ mol NO}_3^-$$

$$\text{Mg}(\text{NO}_3)_2: 0.150 \text{ L} \times \frac{0.400 \text{ mol NO}_3^-}{1 \text{ L}} = 0.0600 \text{ mol NO}_3^-$$

$$\text{Al}(\text{NO}_3)_3: 0.1000 \text{ L} \times \frac{0.750 \text{ mol NO}_3^-}{1 \text{ L}} = 0.0750 \text{ mol NO}_3^-$$

0.205 mol NO_3^-
in 600 mL
of sol'n

$$[\text{NO}_3^-] = \frac{0.205 \text{ mol NO}_3^-}{0.600 \text{ L}} = \boxed{0.342 \text{ M}} \quad (0.34166\dots)$$

For Questions #6 - #8: Use the solubility curve at the right to answer the following questions.

6. How many grams of ammonium chloride (NH_4Cl) can dissolve in 100 g of water at 70°C ?
- a. 29 b. 60
c. 75 d. 90
7. Which one of the following has the greatest solubility at 20°C ?
- a. NH_3 b. KNO_3
c. NaNO_3 d. NH_4Cl
8. A beaker contains 50 grams of water. How much KClO_3 can be dissolved in this water at 30°C ?
- a. 5.5 b. 11
c. 15 d. 30
e. 60

