Chemistry 211
Name: ____________________

Fall 2016
Test 2

R = 0.0821 L\cdot atm/mol\cdot K

Multiple Choice: (4 points each. Put answers in left margin as capital letters.)

1. Which of the following sets of measurements is most **precise** for 5.00 g reference weight?
   A) 4.92 g, 5.00 g, 5.02 g
   B) 4.97 g, 4.98 g, 4.99 g
   C) 4.93 g, 5.01 g, 5.07 g
   D) 5.03 g, 5.03 g, 5.04 g
   E) 4.90 g, 4.95 g, 5.00 g

2. Which of the following is **least** likely to represent a real compound?
   A) Al(C\textsubscript{2}H\textsubscript{3}O\textsubscript{2})\textsubscript{3} (Al(CH\textsubscript{3}CO\textsubscript{2})\textsubscript{3})
   B) Ga\textsubscript{3}
   C) K\textsubscript{2}SO\textsubscript{4}
   D) MgPO\textsubscript{4}
   E) SrCO\textsubscript{3}

3. Which of the following would be soluble in water?
   A) Al\textsubscript{2}S\textsubscript{3}
   B) CaSO\textsubscript{4}
   C) NiCO\textsubscript{3}
   D) Fe(OH)\textsubscript{3}
   E) Fe\textsubscript{3}(PO\textsubscript{4})\textsubscript{2}

4. Which of the following solutions conducts electricity the best?
   A) 0.30 M CaCl\textsubscript{2}
   B) 0.30 M CaSO\textsubscript{4}
   C) 0.20 M Na\textsubscript{2}SO\textsubscript{4}
   D) 0.20 M Na\textsubscript{3}PO\textsubscript{4}
   E) 0.15 M (NH\textsubscript{4})\textsubscript{3}PO\textsubscript{4}

5. What is the oxidation number of the chromium atoms in Na\textsubscript{2}Cr\textsubscript{2}O\textsubscript{7}?
   A) 0
   B) +2
   C) +4
   D) +6
   E) +8

6. Gases behave most ideally at:
   A) high temperature and high pressure
   B) high temperature and low pressure
   C) low temperature and high pressure
   D) low temperature and low pressure

7. Which of the following gases would have the **slowest** root-mean-square velocity?
   A) CH\textsubscript{4}
   B) CO\textsubscript{2}
   C) H\textsubscript{2}
   D) NH\textsubscript{3}
   E) SF\textsubscript{6}

8. A gas mixture contains 1.00 moles of hydrogen, 2.00 moles of helium, and 3.00 moles of nitrogen. If the total pressure of the container is 5.00 atm, what is partial pressure of nitrogen?
   A) 0.833 atm
   B) 1.67 atm
   C) 2.00 atm
   D) 2.50 atm
   E) 5.00 atm
Discussion Questions: (Show your work to receive credit.)

1. Define the following: (12 points)
   - stoichiometry
   - nonelectrolyte
   - miscible

2. Zinc hydroxide is used as an absorbent in surgical dressings and to attach dyes to cloth (mordant). It may be prepared by the following reaction:
   \[ \text{ZnCl}_2(\text{aq}) + 2 \text{NaOH}(\text{aq}) \rightarrow \text{Zn(OH)}_2(\text{s}) + 2 \text{NaCl(}\text{aq}) \]
   What is the limiting reagent when 125 mL of a 0.15 M ZnCl\(_2\) is mixed with 125 mL of a 0.15 M NaOH solution? What mass of zinc hydroxide is produced? (10 points)

3. Write out the balanced molecular equation between aqueous nitric acid and aqueous ammonia. What is the net ionic equation? (8 points)

4. A solution of SnCl\(_2\) is needed to have [Cl\(^-\)] = 0.244 M. What mass of SnCl\(_2\) must be dissolved in 125 mL of water to achieve this concentration of chloride ion? (5 points)
5. Why would two liquids that do not mix to a significant extent be miscible as vapors/gases? (4 points)

6. For the reaction: $2 \text{FeCl}_2(\text{aq}) + \text{AuCl}_3(\text{aq}) \rightarrow 2 \text{FeCl}_3(\text{aq}) + \text{AuCl}_3(\text{aq})$, (8 points)
   i) identify the reducing agent, and
   ii) indicate the beginning and ending charges on that species.

7. Calculate the molar mass of a vapor that has a density of 7.135 g/L at 12 °C and 0.9776 atm (5 points)

8. Explain Charles’ law ($V \propto T$) in terms of the kinetic molecular theory. (6 points)

9. What are the five assumptions of the kinetic molecular theory of gases? (10 points)