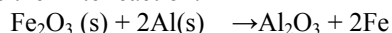


Chemistry 140
Exam II Practice

1. (20) The ingredients of an over the counter Alka-Seltzer tablet show that it contains 1.92 g of sodium bicarbonate (NaHCO_3)
- How many moles of sodium bicarbonate are present in one tablet?
 - How many grams of oxygen are present in one tablet?
 - How many bicarbonate ions are present in one tablet?
 - What is the percent by mass of carbon in this compound?
 - How many moles of hydrogen are present in one tablet?
2. (8) The hydrated salt sodium acetate ($\text{NaC}_2\text{H}_3\text{O}_2$) is analyzed and is determined to contain 39.7% water. What is the complete chemical formula of the salt?
3. (8) The salt $\text{Al}_2(\text{SO}_4)_3$ is soluble in water.
- Write the dissociation reaction for this salt.
 - What is the Molarity of Al^{3+} ions in a solution when 4.9 g of $\text{Al}_2(\text{SO}_4)_3$ is dissolved in enough water to make 250 mL of solution?
4. (8) To make an automobile requires one frame and four wheels, as represented by the equation below:
- $$1 \text{ frame} + 4 \text{ wheels} \rightarrow 1 \text{ car}$$
- A manufacturing plant has 175 frames and 600 wheels available. How many cars can be made? What is the "limiting reactant"? Clearly show your work and/or explain your reasoning.

- b. Each frame weighs 450 kg and each wheel weighs 11 kg. If 2.7×10^4 kg of frames, and 3.3×10^3 kg of wheels are available, how many cars can be made? What limits? Clearly show your work and/or explain your reasoning.

5. (10) Iron metal can be made using the thermite reaction:



- a. If 37.5 moles of Fe_2O_3 and 48.2 moles Al of are available, how many moles of Fe can be made? What is the limiting reactant? Clearly show your work and/or explain your reasoning.

- b. If 985 g of Fe_2O_3 and 1250 g Al of are available, how many moles of Fe can be made? What is the limiting reactant? Clearly show your work and/or explain your reasoning.

6. (10) Which of the following compounds would be soluble in water? Circle all which apply.

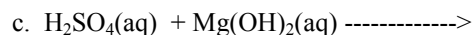
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|--------------------|---------------------------------|
| a. PbI_2 | c. $(\text{NH}_4)_3\text{PO}_4$ |
| b. CaSO_4 | d. $\text{Cu}(\text{OH})_2$ |

7. (8) A laboratory technician needs to prepare 500. mL of 0.250 M NaOH.

- a. How can this solution be prepared using a solution of 1.0 M NaOH? Give directions, including volume of concentrated solution to use.
- b. Once the solution of 0.25 M NaOH is prepared, it is diluted by taking 100. mL of the solution and adding 200. mL of water. What is the concentration of the diluted solution?

8. (20) Complete and balance the following double replacement reactions. Give the net ionic equation. Refer to the solubility rules to determine if a precipitate forms.





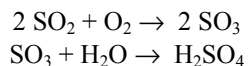
9. (8) Refer to reaction *d* in the question above. If 75 mL of 0.15 M sodium carbonate is combined with 55 mL of 0.25 M aluminum chloride, what is the limiting reactant?

What is left in the solution after the reaction? List all species and their physical state. You do not have to give masses or volumes.

10. (6) Complete the following sentence: (there is more than one right answer)

In a redox reaction, the substance which _____ (gains/loses) electrons is _____ (oxidized/reduced). This substance is the _____ (oxidizing/reducing) agent.

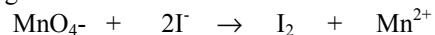
11. Of the two reactions below, which is an oxidation-reduction reaction? How can you tell? What is the oxidizing agent? What is the reducing agent?



12. (8) Give the oxidation number of *each element* in the compounds or ions below:



13. (8) The reaction between permanganate ion and iodide ion is a redox reaction:



- a. What is the oxidizing agent and what is the reducing agent?
- b. How many electrons are gained by the oxidizing agent? How many electrons are lost by the reducing agent?
- c. Based on your answer to part b, place appropriate coefficients in the reaction above so that the reaction is balanced for electron transfer. Note - do NOT try to balance oxygens!

