

Exam 3 Review: Chapters 7 & 8

Chapter 7

1. What is a chemical reaction? List some examples.
2. What are the main indications of a chemical reaction occurring? List all proof.
3. What is a chemical equation? Identify all important parts.
4. Define all types of chemical equations and provide a simplified (skeletal) version of each.
5. What does each abbreviation, often used in chemical equations, represent?

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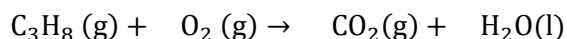
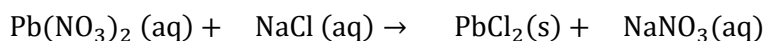
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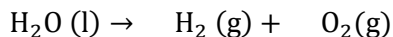
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6. Which observation is consistent with a chemical reaction occurring? Why?
- a) Solid copper deposits on a piece of aluminum foil when the foil is blacked in a blue copper nitrate solution. The blue color of the solution fades.
 - b) Liquid ethyl alcohol turns into a solid when placed in a low temperature freeze.
 - c) A white precipitate forms when solutions of barium nitrate and sodium sulfate are mixed.
 - d) A mixture of sugar and water bubbles when yeast is added. After several days, the sugar is gone and ethyl alcohol is found in the water.

7. Balance the following equations:

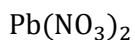


8. Consider the unbalanced chemical equation.



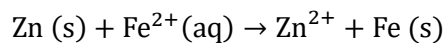
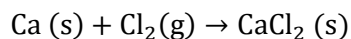
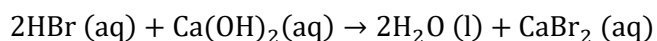
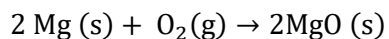
A chemistry student tries to balance the equation by placing the subscript 2 after the oxygen atom in H_2O . Explain why this is not correct. What is the correct balanced equation?

9. Is each compound soluble or insoluble? Use abbreviations.



10. Write a molecular equation for the reaction between aqueous HNO_3 and aqueous $\text{Ca}(\text{OH})_2$

11. Which of these are redox reactions?

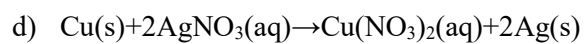
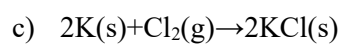
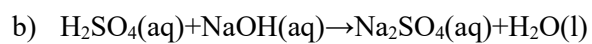
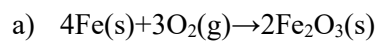


12. Write a balanced chemical equation for the combustion of liquid methyl alcohol (CH_3OH).

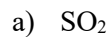
13. Write a balanced chemical equation for each chemical reaction.

- Solid magnesium reaction with aqueous copper (I) nitrate to form aqueous magnesium nitrate and solid copper.
- Gaseous dinitrogen pentoxide decomposes to form nitrogen dioxide and oxygen gas.
- Solid calcium reacts with aqueous nitric acid to form aqueous calcium nitrate and hydrogen gas.
- Liquid methanol (CH_3OH) reacts with oxygen gas to form aqueous carbon dioxide gas and gaseous water.

14. Determine whether the following reactions are redox. If so, identify what is oxidized and what is reduced.

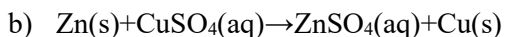
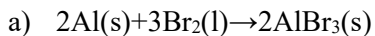


15. Determine the oxidation numbers of each element in the following compounds:

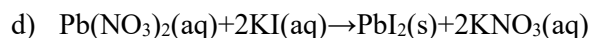
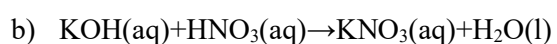
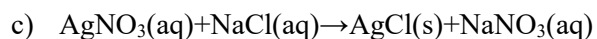
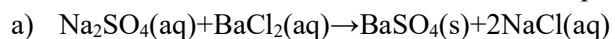


16. For each of the following redox reactions, determine:

- The oxidation number of each element
- The element that is oxidized
- The element that is reduced



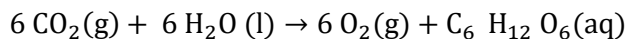
17. For each reaction below, determine the spectator ions.



Chapter Eight

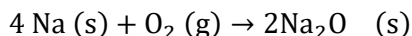
1. Why is stoichiometry important?

2. In photosynthesis, plants convert carbon dioxide and water into glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) according to the reaction:

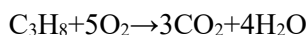


How many grams of glucose can be synthesized from 58.5 grams of CO_2 ? Assume that there is more than enough water present to react with all of the CO_2 .

3. How many mol of sodium oxide can be synthesized from 4.8 mol of sodium? Assume that more than enough oxygen is present:

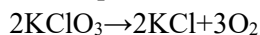


4. Propane (C_3H_8) burns in oxygen to form carbon dioxide and water:



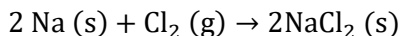
If you start with 44.1 g of propane, how many grams of water (H_2O) will be produced?

5. Potassium chlorate (KClO_3) decomposes into potassium chloride and oxygen gas:



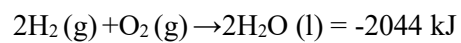
If you decompose 75.0 g of KClO_3 , how many grams of oxygen gas (O_2) are produced?

6. Consider the following synthesis reaction:

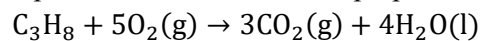


If we have 53.2 g of Na, what is the theoretical yield?

7. A student performs a reaction to produce water and calculates the theoretical yield to be 75.0 g. However, when they collect and measure the actual yield, they find they only produced 52.5 g of water. What is the percent yield of the reaction? Show your work.



8. An LP gas tank in a home barbecue contains 1.18×10^4 g of propane (C_3H_8). Calculate the heat (in kJ) associated with the complete combustion of all the propane in the tank.



9. What is a limiting reactant?