

**Chem Semester 1 Review 06****Completion**

Complete each sentence or statement.

Use each of the terms below just once to complete the passage.

anion	-ate	cation	electrons	zero
lower right	monatomic	one	oxidation number	-ite
oxyanion	polyatomic	subscript		

A one-atom ion is called a(n) (1) \_\_\_\_\_ ion. The charge of such an ion is equal to the atom's (2) \_\_\_\_\_, which is the number of (3) \_\_\_\_\_ transferred to or from the atom to form the ion. In ionic compounds, the sum of the charges of all the ions equals (4) \_\_\_\_\_. Ions made up of more than one atom are called (5) \_\_\_\_\_ ions. If such an ion is negatively charged and includes one or more oxygen atoms, it is called a(n) (6) \_\_\_\_\_. If two such ions can be formed that contain different numbers of oxygen atoms, the name for the ion with more oxygen atoms ends with the suffix (7) \_\_\_\_\_. The name for the ion with fewer oxygen atoms ends with (8) \_\_\_\_\_.

In the chemical formula for any ionic compound, the chemical symbol for the (9) \_\_\_\_\_ is written first, followed by the chemical symbol for the (10) \_\_\_\_\_. A(n) (11) \_\_\_\_\_ is a small number used to represent the number of ions of a given element in a chemical formula. Such numbers are written to the (12) \_\_\_\_\_ of the symbol for the element. If no number appears, the assumption is that the number equals (13) \_\_\_\_\_.

- Use the words above to fill in the paragraph.

**Matching**

Match the terms below with their correct definitions.

- |                                |                                |
|--------------------------------|--------------------------------|
| a. aqueous solution            | j. precipitate                 |
| b. chemical equation           | k. product                     |
| c. chemical reaction           | l. reactant                    |
| d. coefficient                 | m. single-replacement reaction |
| e. combustion reaction         | n. spectator ion               |
| f. complete ionic equation     | o. synthesis reaction          |
| g. decomposition reaction      | p. solute                      |
| h. double-replacement reaction | q. solvent                     |
| i. net ionic equation          |                                |

- \_\_\_\_\_ 2. A reaction in which a compound breaks down into two or more elements or new compounds
- \_\_\_\_\_ 3. A number written in front of a chemical formula
- \_\_\_\_\_ 4. A solid produced during a chemical reaction in a solution
- \_\_\_\_\_ 5. A solution in which the solvent is water
- \_\_\_\_\_ 6. A statement that uses chemical formulas to show the identities and relative amounts of the substances involved in a chemical reaction
- \_\_\_\_\_ 7. An equation that shows all of the particles in solution as they actually exist

- \_\_\_ 8. Substance dissolved in a solution.
- \_\_\_ 9. An equation that includes only the particles that participate in the reaction
- \_\_\_ 10. An ion that is present but does not participate in a reaction
- \_\_\_ 11. A reaction in which oxygen combines with a substance and releases heat and light energy
- \_\_\_ 12. A reaction in which the atoms of one element replace the atoms of another element in a compound
- \_\_\_ 13. A reaction involving the exchange of positive ions between two compounds dissolved in water
- \_\_\_ 14. The process by which the atoms of one or more substances are rearranged to form different substances
- \_\_\_ 15. A starting substance in a chemical reaction
- \_\_\_ 16. A substance formed during a chemical reaction
- \_\_\_ 17. A reaction in which two or more substances react to produce a single product
- \_\_\_ 18. The most plentiful substance in a solution.

**Short Answer**

19. Balance the following equation for the reaction.  
\_\_\_ Cr(s) + \_\_\_ H<sub>3</sub>PO<sub>4</sub>(aq) → \_\_\_ H<sub>2</sub>(g) + \_\_\_ CrPO<sub>4</sub>(s)
20. Balance the following equation for the reaction.  
\_\_\_ SiO<sub>2</sub>(s) + \_\_\_ C(s) → \_\_\_ SiC(s) + \_\_\_ CO(g)

Write a balanced equation for each of the following reactions, substituting symbols and formulas for names. Include the state of each reactant and product. Then identify the reaction type for each. If more than one reaction type applies, list all that apply.

- 21. When aluminum nitrate and sodium hydroxide solutions are mixed, solid aluminum hydroxide forms. The other product is sodium nitrate.
- 22. When magnesium is heated in the presence of nitrogen gas, solid magnesium nitride forms.
- 23. When solid copper(II) oxide and hydrogen react, metallic copper and water form.
- 24. Most industrial production of metallic sodium is accomplished by passing an electric current through molten sodium chloride. Chlorine gas also is produced.
- 25. Liquid pentane (C<sub>5</sub>H<sub>12</sub>) burns, producing water vapor and carbon dioxide.

Predict the products in each of the following reactions. If no reaction occurs, write NR. You may use Figure 10-10 for the relative activities of common metals and halogens.

- 26. Rb(s) + CaCl<sub>2</sub>(aq)
- 27. Pt(s) + MnBr<sub>2</sub>(aq)
- 28. F<sub>2</sub>(g) + NaI(aq)

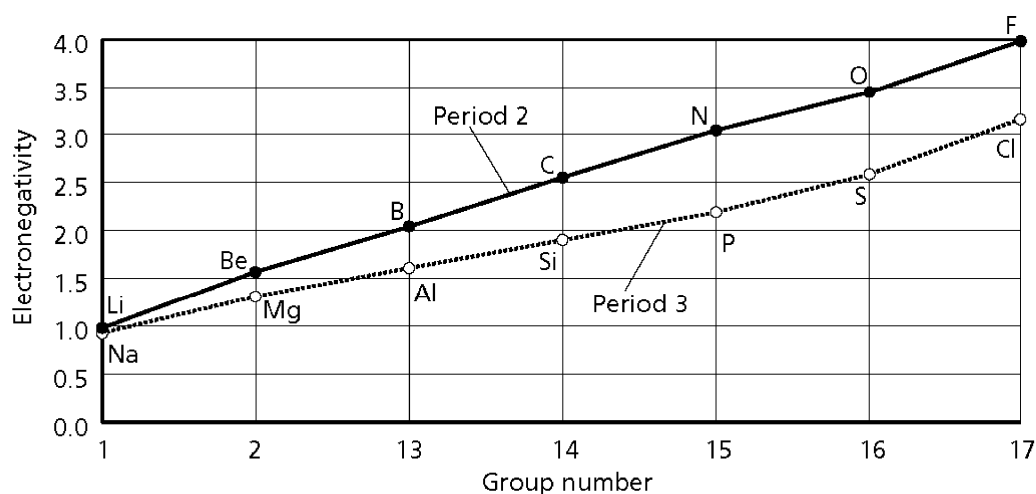
For the following questions, do not use Figure 6-12, 6-15, or 6-20. Rank the following atoms in order of decreasing radii.

- 29. Al, Na, P, S

For the following questions, do not use Figure 6-12, 6-15, or 6-20.  
Rank the following ions in order of decreasing radii.

30.  $\text{Br}^-$ ,  $\text{Cl}^-$ ,  $\text{F}^-$

The graph shows the electronegativities of the elements of periods 2 and 3 of the periodic table, except for the noble gases. Use the graph to answer the following questions.

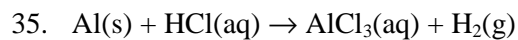
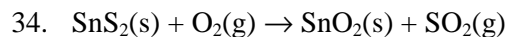


31. If two atoms of differing electronegativity are bonded covalently to each other, what is true of the electrons they share? What type of bond results in such a case?
32. How does the electronegativity of boron (B) compare with that of nitrogen (N)? In terms of the periodic table, how are these two elements related? Compare aluminum (Al) with phosphorus (P) in the same way.
33. Use the solution to the sample problem below to describe each step of the four-step procedure for solving a mass-to-mass problem.

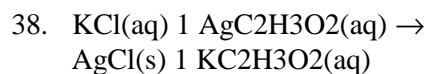
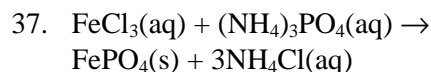
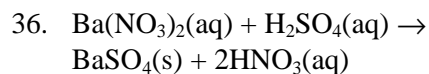
Example problem: The burning of 20.0 g of acetylene ( $\text{C}_2\text{H}_2$ ) produces what mass of carbon dioxide?

Step	Explanation	Solution
1		$2\text{C}_2\text{H}_2(\text{g}) + 5\text{O}_2(\text{g})$ $\rightarrow 4\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
2		$20.0 \text{ g } \cancel{\text{C}_2\text{H}_2} \times \frac{1 \text{ mol } \text{C}_2\text{H}_2}{26.04 \text{ g } \cancel{\text{C}_2\text{H}_2}}$ $= 0.768 \text{ mol } \text{C}_2\text{H}_2$
3		$0.768 \text{ mol } \cancel{\text{C}_2\text{H}_2} \times \frac{4 \text{ mol } \text{CO}_2}{2 \text{ mol } \cancel{\text{C}_2\text{H}_2}}$ $= 1.54 \text{ mol } \text{CO}_2$
4		$1.54 \text{ mol } \cancel{\text{CO}_2} \times \frac{44.01 \text{ g } \text{CO}_2}{1 \text{ mol } \cancel{\text{CO}_2}}$ $= 67.6 \text{ g } \text{CO}_2$

Balance the following chemical equations.



Write a complete ionic equation and a net ionic equation for each of the following double-displacement reactions.



39. Define a chemical reaction.

40. Define reactants in a chemical reaction.

41. Define products in a chemical reaction.

42. What are spectator ions?

43. Define a skeleton equation.

44. What are net ionic equations?

45. Define a decomposition reaction.

### Problem

Identify and calculate the number of representative particles in each of the following quantities.

46. 2.15 moles of gold

47. 11.5 moles of potassium bromide

Calculate the number of moles of the substance that contains the following number of representative particles.

48.  $8.92 \times 10^{23}$  atoms of barium49.  $5.50 \times 10^{25}$  molecules of carbon monoxide

Determine the mass in grams of each of the following quantities.

50. 1.24 moles of beryllium

Calculate the number of moles in each of the following samples.

51. 6.35 g lithium
52. 3.75 g calcium carbide ( $\text{CaC}_2$ )

How many atoms are in the following samples?

53. 1.24 g cobalt

Which quantity has the greatest mass?

54.  $1.33 \times 10^{24}$  atoms of argon

Calculate the number of moles in each of the following quantities.

55. atoms of each element in 3.35 moles of aspirin ( $\text{C}_9\text{H}_8\text{O}_4$ )
56. Solve the following problem. Show your work in the space provided. A sample of a compound contains 7.89 g potassium, 2.42 g carbon, and 9.69 g oxygen. Determine the empirical and molecular formulas of this compound, which has a molar mass of 198.22 g/mol.
57. Solve the following problem. Show your work. A 2.00-g sample of a hydrate of iron(II) chloride produces 1.27 g of anhydrous iron(II) chloride ( $\text{FeCl}_2$ ) after heating. Determine the empirical formula and the name of the hydrate.

Determine the percent composition of each of the following compounds.

58. manganese oxide ( $\text{MnO}$ )

Determine the empirical formula for a 100.00-g sample of a compound having the following percent composition.

59. 80.68% mercury, 12.87% oxygen, and 6.45% sulfur

### Essay

60. Go back and review rules for solubility. There are a couple of solubility problems on the test. See section 10-3 and table C-10 in the back of the book.