

Chemistry Fundamentals Review Problem Set

SCC283

Introduction

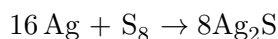
This problem set is designed to review the fundamental concepts needed to be successful in the course. You should find much of the material to be familiar from your first year course in chemistry. However, due to teaching preferences and styles, some topics may have been covered quickly or not at all. As you work through this problem set, take note of how comfortable you feel with each topic. We will discuss everything at some point during the first few weeks of the course, but we usually will not have extensive time for remediation.

This paper is not intended to be finished in a single sitting. Take your time working through the questions. It takes time for a student to process, practice, and subsequently thoroughly learn a subject. These questions and problems represent key ideas and skills that will be used throughout the course.

Questions and Exercises

- How many significant figures are in each of the following measurements?
 - 0.0012
 - 437,000
 - 900.0
 - 106
- Using dimensional analysis, complete the following conversions:
 - 1 km to pm
 - 1 g to ng
- A person has a temperature of 102.5 °F. What is this temperature in °C and K?
- Diamonds are measured in carats, and 1 carat = 0.200 g. The density of diamond is 3.51 g/cm³. What is the volume of a 5.0 carat diamond?
- What are the symbols of the following nonmetals: fluorine, chlorine, bromine, sulfur, oxygen, phosphorus?
- Give the names of the metals that correspond to the following symbols: Sn, Pt, Co, Ni, Mg, Ba, K.
- Give the number of protons and neutrons in the following atoms:
 - Plutonium-238
 - Copper-65
 - Chromium-52
 - Helium-4
 - Cobalt-60

- (f) Chromium-54
8. Would you expect each of the following atoms to gain or lose electrons when forming ions? What ion is the most likely in each case?
- (a) Na
 - (b) Sr
 - (c) Ba
 - (d) I
 - (e) Al
 - (f) S
9. Name each of the following compounds:
- (a) CrO_2
 - (b) Cr_2O_3
 - (c) Al_2O_3
 - (d) SeO_2
10. Write the formula for each of the following compounds:
- (a) cesium bromide
 - (b) barium sulfate
 - (c) ammonium chloride
11. Calculate the molar mass of Al_2O_3 and Na_3AlF_6
12. Determine the mass in grams of the following:
- (a) 3.00×10^3 nitrogen molecules
 - (b) 3.00×10^{-3} moles of N_2 molecules
 - (c) a single N_2 molecule
13. When a mixture of silver metal and sulfur is heated, silver sulfide is formed according to the following balanced chemical equation.



- (a) What is the mass of Ag_2S formed from a mixture of 2.0 g Ag and 2.0 g S_8 ?
- (b) What mass of which reagent is left unreacted?

Answers

- 1. (a) 2
- (b) 3
- (c) 4
- (d) 3

2. (a) 10^{15} pm
(b) 10^9 ng
3. 39.2 C, 312.4 K
4. 0.28 cm^3
5. fluorine, F chlorine, Cl bromine, Br sulfur, S oxygen, O phosphorus, P
6. Sn, tin Pt, platinum Co, cobalt Ni, nickel Mg, magnesium Ba, barium K, potassium
7. (a) 94p, 144n
(b) 29p, 36n
(c) 24p, 28n
(d) 2p, 2n
(e) 27p, 33n
(f) 24p, 30n
8. (a) lose, Na^+
(b) lose, Sr^{2+}
(c) lose, Ba^{2+}
(d) gain, I^-
(e) lose, Al^{3+}
(f) gain, S^{2-}
9. (a) chromium (IV) oxide
(b) chromium (III) oxide
(c) aluminum oxide
(d) selenium dioxide
10. (a) CsBr
(b) BaSO_4
(c) NH_4Cl
11. (a) Al_2O_3 101.96 g/mol
(b) Na_3AlF_6 209.95 g/mol
12. (a) 1.39×10^{-19} g
(b) 8.4×10^{-2} g
(c) 4.653×10^{-23} g
13. (a) 2.3 g
(b) 1.7 g