**Section 3.3 Study Guide: Counting Atoms**

**Completion**

*Complete each statement.*

1. Isotopes are atoms of the same element that have different numbers of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The atomic number of neon is 10. The atomic number of calcium is 20. Compared with a mole of neon, a mole of calcium contains a(n) number of atoms.

3. The atomic number of oxygen, 8, indicates that there are eight in the nucleus of an oxygen atom.

4. The total number of protons and neutrons in the nucleus of an atom is its number.

5. The number of atoms in 1 mol of carbon is .

6. All isotopes of contain one proton.

7. The carbon-12 atom is assigned a relative mass of exactly amu.

8. The average atomic mass of an element is the average of the masses of it naturally occurring .

9. The number of atoms in a mole of any pure substance is called number.

10. An aluminium isotope consists of 13 protons, 13 electrons, and 14 neutrons. Its mass number is .

11. Atoms of the same element that have different masses are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. All atoms of the same element have the same number.

13. Chlorine has atomic number 17 and mass number 35. It has protons, 17 electrons, and neutrons.

14. To determine the molar mass of an element, one must know the element’s atomic mass.

15. The mass of 1 mol of chromium (atomic mass 51.996 amu) is g.

**Short Answer**

16. What is the atomic number of an atom?

17. What is the mass number of an atom?

18. What is the relationship between isotopes, mass number, and neutrons?

**Problem**

19. How many atoms are present in 8.00 mol of chlorine atoms?

20. How many moles of iron are equivalent to 1.11  1025 atoms?

21. Determine the mass in grams of 10.0 mol of bromine. The molar mass of bromine is 79.90 g/mol.

22. Determine the number of moles in 100. g of potassium. The molar mass of potassium is 39.10 g/mol.

23. Calculate the number of atoms in 10.0 g of sulfur (molar mass 32.07 g/mol).