Chapter 2 Practice Problem Key

**2.35** An *element* is a pure substance that cannot be broken down into simpler substances by a chemical reaction. A *compound* is a pure substance formed by combining two or more elements together.

|  |  |  |
| --- | --- | --- |
| a. H2 **=** element | c. S8 **=** element | e. C60 **=** element |
| b. H2O2 **=** compound | d. Na2CO3 **=** compound |  |

**2.39**

a. sodium: metal, alkali metal, main group element

b. silver: metal, transition metal

c. xenon: nonmetal, noble gas, main group element

d. platinum: metal, transition metal

e. uranium: metal, inner transition metal

f. tellurium: metalloid, main group element

**2.46**

a. palladium, Pd, group number = 10, period = 5, transition metal

b. carbon, C, group number = 14, period = 2, main group element

c. protactinium, Pa, group number = 5, period = 7, inner transition metal

d. argon, Ar, group number = 18, period = 3, main group element

e. arsenic, As, group number = 15, period = 4, main group element

**2.53** The atomic number = the number of protons = the number of electrons.

The mass number = the number of protons + the number of neutrons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Mass | Protons | Neutrons | Electrons | Group | Symbol |
| 16 | 8 | 8 | 8 | 6A |   |
| 17 | 8 | 9 | 8 | 6A |   |
| 18 | 8 | 10 | 8 | 6A |   |

**2.57**



**2.60** Multiply the isotopic abundance by the mass of each isotope, and add up the products to give the atomic weight for the element.

|  |  |  |
| --- | --- | --- |
| Antimony |  |  |
| Mass due to Sb-121: | 0.5721 × 120.90 amu | = 69.1669 amu |
| Mass due to Sb-123: | 0.4279 × 122.90 amu | = 52.5889 amu |
|  | Atomic weight | = 121.7558 amu rounded to 121.8 amu **Answer** |

**2.71**

|  |  |
| --- | --- |
| a. 1*s*22*s*22*p*63*s*23*p*64*s*23*d*104*p*65*s*2 = 38 electrons, 2 valence electrons in the 5*s* orbital, strontium | c. 1*s*22*s*22*p*63*s*1= 11 electrons, 1 valence electron in the 3*s* orbital, sodium |
| b. 1*s*22*s*22*p*63*s*23*p*4= 16 electrons, 6 valence electrons in the 3*s* and the 3*p* orbitals, sulfur | d. [Ne]3*s*23*p*5= 17 electrons, 7 valence electrons in the 3*s* and 3*p* orbitals, chlorine |

**2.79** The group number of a main group element = the number of valence electrons.

a. 2A = 2 valence electrons b. 4A = 4 valence electrons c. 7A = 7 valence electrons

**2.85** Use the size rules from Answer 2.29.

a. iodine b. carbon c. potassium d. selenium

**2.96**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | a. Type | b. Block | c,d: Radius | e,f: Ionization  Energy | g. Valence Electrons |
| Calcium | Metal | *s* | Largest |  Lowest | 2 |
| Magnesium | Metal | *s* |  |  | 2 |
| Sulfur | Nonmetal | *p* | Smallest | Highest | 6 |