Practice 2-1

Write the **name** and the **symbol** of the element that fits each of the following descriptions:

a) the alkaline earth metal in the sixth period.
b) the metalloid in the third period.
c) the nonmetal in group IVA.
d) the halogen that is liquid at room temperature.
e) the group-VIIIB transition metal with properties similar to Ru.
f) the third-period element that exists as diatomic molecule.

Answer

a) Barium, Ba
b) Silicon, Si
c) Carbon, C
d) Bromine, Br
e) Iron, Fe
f) Chlorine, Cl

Practice 2-2

The nucleus of an atom contains 27 protons and 33 neutrons. Write the symbol for the atom.

Answer

The atomic number equals the number of protons (27) and the mass number equals the sum of the protons and neutrons (27 + 33 = 60).
The element with an atomic number of 27 is cobalt (see the periodic table).
Therefore the symbol of the atom is

$$\text{mass number } {}^{60}_{27}\text{Co} \quad \text{atomic number}$$

Practice 2-3

Calculate the atomic mass of chlorine given the two naturally occurring isotopes below.

$^{35}_{17}Cl$ (atomic mass 34.969 amu, abundance 75.77%)

$^{37}_{17}Cl$ (atomic mass 36.966 amu, abundance 24.23%)

Answer

(34.969 amu x 0.7577) + (36.966 amu x 0.2423) = 35.45 amu

Practice 2-4

How many orbitals exist in the third energy level? What are they?

Answer

Total of 9 orbitals

3s (ONE orbital), 3p (THREE orbitals), and 3d (FIVE orbitals)

Practice 2-5

Give the electron configuration for each of the following: Mg, P, Cl, and Ca.

Answer

Mg: $1s^2\ 2s^2\ 2p^6\ 3s^2$

P: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

Cl: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

Ca: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$

Practice 2-6

For the element sulfur:

a) write the electron configuration,

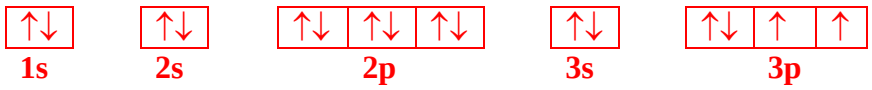
b) draw the orbital diagrams,

c) how many unpaired electrons are in the sulfur atom?

Answer

a) S: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$

b)



c) Two unpaired electrons in 3p orbitals.

Practice 2-7

Use the periodic table to write both the electron configuration and the shorthand notation for iodine.

Answer

I: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^5$

I: [Kr] $5s^2\ 4d^{10}\ 5p^5$