2.7 The electron configurations for the ions are determined using Table 2.2 (and Figure 2.6).

$P^{5+}$: $1s^2 2s^2 2p^6$

$P^{3-}$: $1s^2 2s^2 2p^6 3s^2 3p^6$

$Sn^{4+}$: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10}$

$Se^{2-}$: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$

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

$Ni^{2+}$: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$

## The Periodic Table

2.9 Each of the elements in Group IIA has two *s* electrons.

## Primary Interatomic Bonds

2.18 (a) The main differences between the various forms of primary bonding are:

*Ionic*--there is electrostatic attraction between oppositely charged ions.

*Covalent*--there is electron sharing between two adjacent atoms such that each atom assumes a stable electron configuration.

*Metallic*--the positively charged ion cores are shielded from one another, and also "glued" together by the sea of valence electrons.

(b) The Pauli exclusion principle states that each electron state can hold no more than two electrons, which must have opposite spins.

2.21 For silicon, having the valence electron structure $3s^2 3p^2$, $N' = 4$; thus, there are $8 - N' = 4$ covalent bonds per atom.

For bromine, having the valence electron structure $4s^2 4p^5$, $N' = 7$; thus, there is $8 - N' = 1$ covalent bond per atom.

For nitrogen, having the valence electron structure $2s^2 2p^3$, $N' = 5$; thus, there are $8 - N' = 3$ covalent bonds per atom.

For sulfur, having the valence electron structure $3s^2 3p^4$, $N' = 6$; thus, there are $8 - N' = 2$ covalent bonds per atom.

For neon, having the valence electron structure $2s^2 2p^6$, $N' = 8$; thus, there are $8 - N' = 0$ covalent bonds per atom, which is what we would expect since neon is an inert gas.

2.22 For solid xenon, the bonding is van der Waals since xenon is an inert gas.

For $CaF_2$, the bonding is predominantly ionic (but with some slight covalent character) on the basis of the relative positions of Ca and F in the periodic table.

For bronze, the bonding is metallic since it is a metal alloy (composed of copper and tin).

For CdTe, the bonding is predominantly covalent (with some slight ionic character) on the basis of the relative positions of Cd and Te in the periodic table.

For rubber, the bonding is covalent with some van der Waals. (Rubber is composed primarily of carbon and hydrogen atoms.)

For tungsten, the bonding is metallic since it is a metallic element from the periodic table.