

2.3 (a) In order to determine the number of grams in one amu of material, appropriate manipulation of the amu/atom, g/mol, and atom/mol relationships is all that is necessary, as

$$\begin{aligned}\# \text{ g/amu} &= \left(\frac{1 \text{ mol}}{6.023 \times 10^{23} \text{ atoms}} \right) \left(\frac{1 \text{ g/mol}}{1 \text{ amu/atom}} \right) \\ &= 1.66 \times 10^{-24} \text{ g/amu}\end{aligned}$$

(b) Since there are 453.6 g/lb_m,

$$\begin{aligned}1 \text{ lb - mol} &= (453.6 \text{ g/lb}_m) (6.023 \times 10^{23} \text{ atoms/g - mol}) \\ &= 2.73 \times 10^{26} \text{ atoms/lb-mol}\end{aligned}$$

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.

2.20 Below is plotted the bonding energy versus melting temperature for these four metals. From this plot, the bonding energy for molybdenum (melting temperature of 2617°C) should be approximately 7.0 eV. The experimental value is 6.8 eV.

