Practice Problems **31-1** A gaseous mixture contains 60% nitrogen, 22% carbon dioxide, 11% carbon monoxide, and  
 7% oxygen on a gravimetric basis. What are the mole fractions of the components in the  
 mixture?

**31-2** A mixture of ideal gases at a total pressure of 40 psia and 70 F contains .6 lbm of hydrogen  
 and 4.8 lbm of oxygen. Under these conditions, determine the following:  
 (a) mole fraction of hydrogen in the mixture  
 (b) equivalent molecular mass of the mixture  
 (c) the total volume occupied by the mixture

## Preparatory Reading Questions

1. What measurements are taken with a sling psychrometer? Explain how these are used to obtain the humidity ratio and relative humidity. (page 421)
2. What are the coordinates on a psychrometric chart? Show the characteristic shape of lines of constant humidity ratio and constant relative humidity. (pages 421-424)
3. Sketch a pure heating process on a psychrometric chart. What HVAC equipment is used to realize such a process? (pages 424-428)
4. Sketch a humidification and cooling process on a psychrometric chart. What HVAC equipment is used to realize such a process? (pages 424-428)
5. Sketch a cooling and condensation process on a psychrometric chart. What HVAC equipment is used to realize such a process? (pages 424-428)

Answers **31-1** Mole Fraction Ratios are: 0.66 for N2, 0.15 for CO2, 0.12 for CO, and 0.07 for O­2

**31-2**   
a) Mole Fraction of H2 = 0.667

b) Mmix = 12 lbm/lbmol

c) Volmix = 64 ft3