1) True / False $\overline{M}_i = \left(\frac{\partial(nM)}{\partial n_i}\right)_{T,P,n_{j\neq i}}$ can also be written $\overline{M}_i = \left(\frac{\partial M}{\partial x_i}\right)_{T,P,x_{j\neq i}}$

2) True / False For ideal gases: $H = \Sigma y_i H_i$ where H_i is the enthalpy of pure species at some fixed reference temperature.

3) True / False Ideal gases always form ideal mixtures.

4) True / False In an ideal mixture, $\overline{M}_i = M_i$ where M is any molar property.

5) A and B are ideal gases. n_A moles of A and n_B moles of B are mixed adiabatically at some constant T and constant P. Let's call the fraction of A in the final mixture x_A. Find the expression for the change of entropy of the process in terms of n_A, n_B, x_A, T, P, and R. Is this process reversible?

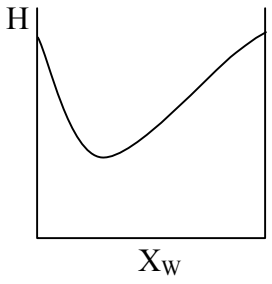
6) When we mix two unknown liquids X and Y in the amount of 100 mL of X and 50 mL of Y, we get 148 mL of solution. What can we say about the relative magnitudes of $\overline{V}_X$, $\overline{V}_Y$, V_X, and V_Y ?

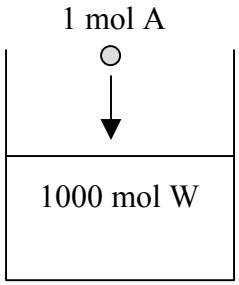
7) For a binary system of ideal gases 1 and 2, we are given $H = y_1H_1 + y_2H_2 + k^2y_1y_2$, where k is a constant. We mix some amount of gas 1 and some amount of gas 2 in a flow process, all at constant T = 298 K and P = 1 atm. Consider the case where no shaft work is done. To keep the mixture at 298 K and 1 atm, does heat need to be added or removed to the system? What if the final pressure is not 1 atm but 10 atm?

8) True / False The Gibbs-Duhem equation in the form of $\sum x_i d\overline{M}_i$ only applies at constant T and P.

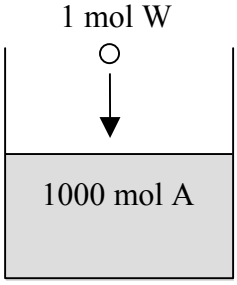
9) True / False For an ideal gas mixture, $\sum x_i \frac{d\overline{H}_i}{dx_1} - Cp\frac{dT}{dx_1} = 0$

10) The enthalpy diagram for a mixture of A and W is given below. Consider two processes depicted next to the diagram. In each process, 1 mol of one substance is added to 1,000 mol of the other substance. Which process, I or II, will generate more heat?





Process I



Process II