d) Calculate the temperature change when 10 mol of benzene is mixed with 40 mol of heptane adiabatically, 1 bar., if the initial temperature of the pure components is 20 °C. The heat capacity of the pure liquids are $C_{P1} = 134$ J/mol, $C_{P2} = 222$ J/mol K.

J/mol/K

x_1	H (J/mol)	x_1	H (J/mol)
0	635.00	0.50	1229.51
0.14	956.91	0.58	1185.85
0.20	1035.06	0.65	1110.76
0.22	1066.37	0.71	1005.74
0.30	1174.31	0.83	688.42
0.33	1184.04	0.88	537.71
0.37	1203.61	1	−50.00
0.44	1237.33		

Problem 12.3: The table below gives the excess enthalpy for the system acetone(1)-water(2) at 25 °C, 1 bar.
a) Calculate the partial molar enthalpy of each component at $x_1 = 0.5$, 25 °C, 1 bar. The reference state for each component is the pure liquid at 25 °C, 1 bar.
b) Repeat the previous part with the reference state for water changed to the pure liquid at 2 bar,
c) A solution that contains 50% by mole acetone is mixed with ~~an equal volume~~ of a solution that contains 80% by mole acetone. The mixing takes place in a heat bath at 25 °C. Determine whether any amount of heat is exchanged between the system and the surroundings. If so, calculate that heat and report whether the mixing is endo- or exothermic.

equal moles

x_{acetone}	H^{E} (J/mol)	x_{acetone}	H^{E} (J/mol)
0.0000	0.00	0.5000	−167.57
0.0424	−388.11	0.6271	70.27
0.1186	−630.27	0.7246	200.00
0.1314	−638.92	0.7542	234.60
0.2458	−612.97	0.8771	277.84
0.2542	−591.35	0.9534	234.60
0.3729	−414.05	1.0000	0.00

Problem 12.4: a) Based on Figure 12-5, is the mixing of hydrazine and water an endothermic or exothermic process?
b) Calculate the excess enthalpy ~~of mixing~~ for a solution that contains 60% by mol hydrazine at 20 °C.