Enthalpy

$$q_p = \Delta H = \Delta E + P\Delta V$$
$$\Delta H = H_{final} - H_{initial} = H_{products} - H_{reactants}$$
$$w = -P\Delta V$$

1. What conditions will the enthalpy change of a process or reaction be equal to the heat that is transferred into or out of the system?
   If the process occurs under a constant pressure with only PV work. $\Delta H = q_p$

2. If a process is run under constant pressure and heat is released from the system, will the enthalpy of the system increase or decrease?

   It will decrease because both q and ΔH are negative.
3. Consider the following balanced equation:

   $2\ NO\ (g) + O_2\ (g) \rightarrow 2\ NO_2\ (g)$

If the reaction were carried out in a constant volume container at constant temperature, would the amount of heat (absorbed or released) correspond to ΔH or ΔE? Which quantity would be larger for this reaction?
At constant volume, ΔV is equal to zero and ΔE is equal to q_v. H = E + PV and $\Delta H = \Delta E + \Delta(PV)$. An ideal gas a constant temperature and volume has $\Delta(PV) = V\Delta P = RT\Delta n$ where n is equal to the number of moles of gas. There are 3 moles of reactant gas and 2 moles of product gas and $\Delta n = 2 - 3 = -1$. $\Delta(PV)$ is negative. The negative $\Delta(PV)$ term means ΔH will be smaller than ΔE.

4. A gas is confined to a vessel under a constant pressure. The gas undergoes a chemical reaction and absorbs 785 J of heat from the surroundings. There are 625 J of work done on the gas from the surroundings. Calculate both ΔH and ΔE for this reaction.
   $\Delta E = q + w = 785\ J + 625\ J = 1.41 \times 10^3\ J$
   At constant pressure, $q_p = \Delta H = 785\ J = 0.785\ kJ$