5.19a) In a closed system matter cannot leave or enter.
b) In an isolated system neither matter nor energy can leave or enter
c) The part of the universe that is not part of the system is the surroundings.

5.21a) According to the first law of thermodynamics energy is conserved.
b) q and w will be negative numbers when the system is losing energy to the surroundings.

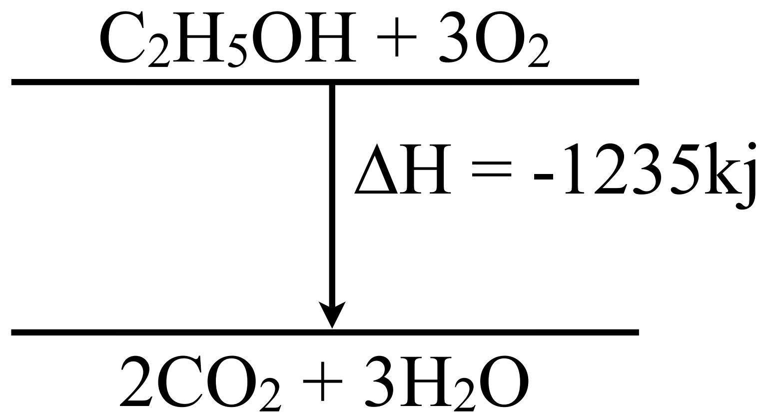
5.22a) $(q + w)_{\text{lost}} = (q + w)_{\text{gained}}$
b) Because our frame of reference is from within the system, q and w will be negative values when the system is doing work on or heat the surroundings.

5.25a) The gas will be warmer in situation 2, because the fix piston keeps the warming gas from doing work. As a result, all the energy is transferred as heat, causing the gas to be warmer.
b) In situation 1, *q* will be positive as the gas is heated; *w* will be negative as the gas expands, doing work on the surroundings. In situation 2, the value for *q* will be positive, while *w* will be zero.
c) The value for ΔE in both cases will be equal, since the wire is adding the same amount of energy in both trials.

5.34a) In order for the enthalpy change of a process to equal the amount of heat transferred into or out of the system, the system must be at constant pressure, removing the opportunity for work.
b) If a system releases heat to the surroundings at constant pressure the enthalpy of the system decreases.
c) If $\Delta H = 0$ at constant pressure, then we know ΔE, *q* and *w* are all zero as well.

5.39a) $C_2H_5OH + 3O_2 \Rightarrow 2CO_2 + 3H_2O$ $\Delta H = -1235kj$

5.39b)



5.41a) Since the reaction is written with 2 moles of O_3, the enthalpy change for each mole of O_3 will be half the ΔH for the reaction, or -142.3kj/mol O_3.

b) The negative ΔH value for this process indicated that heat is lost during the process. Therefore, the reactants (2 O_3) has a greater enthalpy

5.45a)

$$\frac{0.450 \text{ mol AgCl}}{} \Bigg| \frac{-65.5\text{kJ}}{1 \text{ mol AgCl}} = -29.5\text{kJ}$$

5.45b)

$$\frac{9.00\text{g AgCl}}{} \Bigg| \frac{1 \text{ mol AgCl}}{143.3\text{g AgCl}} \Bigg| \frac{-65.5\text{kJ}}{1 \text{ mol AgCl}} = -4.11\text{kJ}$$

5.45c)

$$\frac{9.25 \times 10^{-4} \text{ mol AgCl}}{} \Bigg| \frac{65.5\text{kJ}}{1 \text{ mol AgCl}} = 0.0606 \text{ kj} = 60.6 \text{ J}$$