## 5.4 Hess's Law of Additivity of Reaction Enthalpies

- Calorimetry is an accurate and useful technique for determining enthalpy changes.
- What happens if the reaction is slow and change in temperature to small to measure? Or, if the product produced in a calorimeter does not match the one you are trying to determine (e.g. CO as the product of C and O, in a calorimeter CO_2 would be produced.)
- Chemists work around this problem using the principle that net changes in some properties of a system are independent of the way the system changes form the initial state of the final state. (It doesn't matter the path you follow, as long as you start and end in the same place.)

E_p NO   +90kJ   -56kJ   NO$_2$ N$_2$ & O$_2$ *Net Energy Change +34kJ*   Reaction Progress
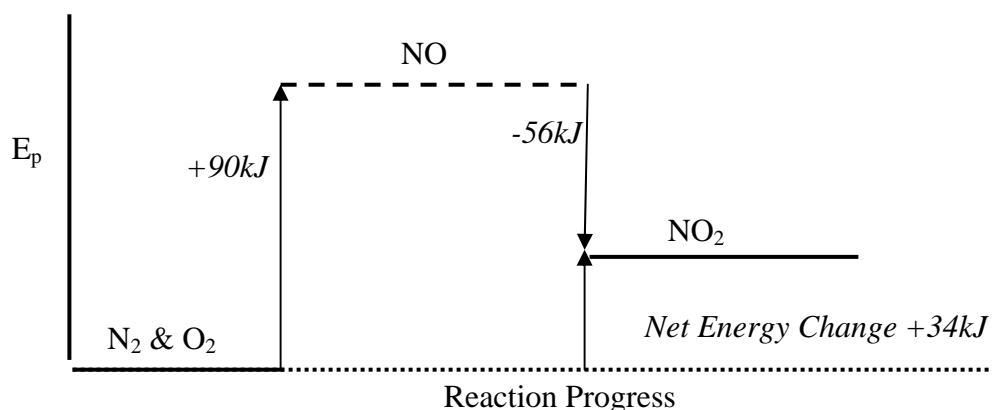
Predicting ΔH Using Hess's Law
- Hess's Law: The value of the ΔH for any reaction that can be written in steps equals the sum of the values of ΔH for each of the individual steps.
- $\Delta H_{target} = \Sigma \Delta H_{known}$
- This allows scientists to calculate enthalpy change of a reaction without direct calorimetry using 2 rules:
  - i) if a chemical equation is reversed, then the sign of ΔH changes,
  - ii) if the coefficients of a chemical equation are altered by multiplying or dividing by a constant factor, then the ΔH is altered the same way.

Homework
- Review all sample questions
- Practice 1,2,3,4,5 and Questions 1,2,3