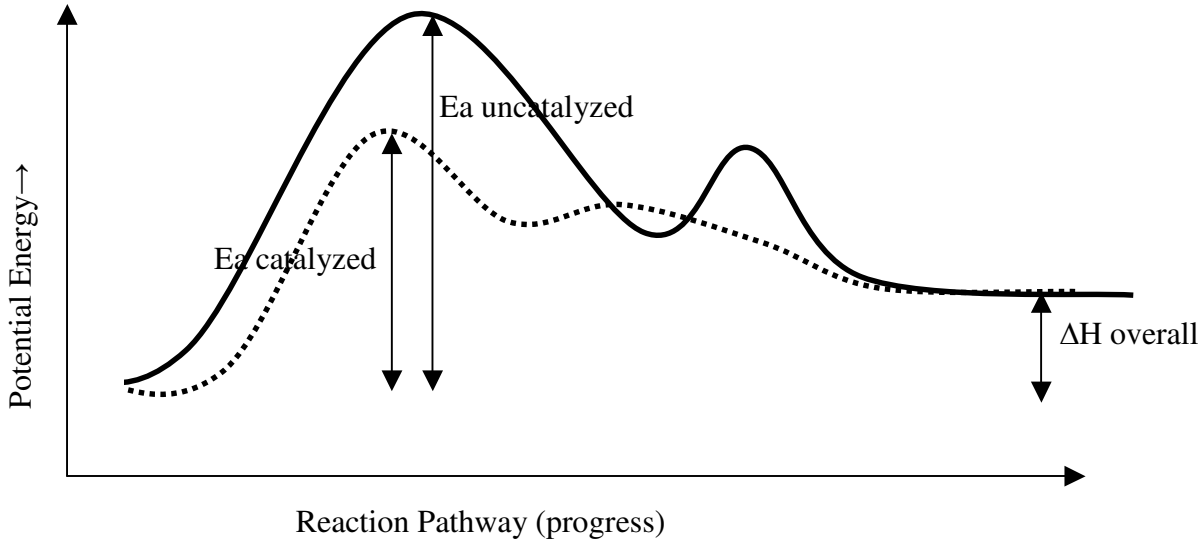
Unit 4, Lesson 07: Catalysis

A **catalyst** is a substance that changes the rate of a chemical reaction, but is not consumed (used up) during the reaction.

- the catalyst provides an alternative reaction mechanism with a different Ea
- a **homogeneous catalyst** is in the same phase as the reaction (eg. H_2SO_4 in solution)
- a **heterogeneous catalyst** is in a different phase as the reaction (eg. a platinum surface for the breakdown of liquid water into oxygen and hydrogen gas)
- a **positive catalyst** speeds the reaction up by lowering the Ea of the rate determining step
- a **negative catalyst** (an inhibitor) slows a reaction down by raising the Ea of the rate determining step
- the overall ΔH for the reaction is unchanged (ΔH is a state function)
- the catalyst can be recovered, unchanged, at the end of the reaction



Catalysts are powerful tools for chemists:

- they allow us to control the rates of a reaction
- enzymes are "biological catalysts". Enzymes are proteins that provide an alternative pathway for a chemical reaction, so the reaction can take place at body temperature
- many poisons (eg. lead) act by combining with enzymes in our bodies and "clogging" them so they can't work
- many medications act as negative catalysts by binding with enzymes so they can't work, or by reacting with a reaction intermediate and slowing down a reaction