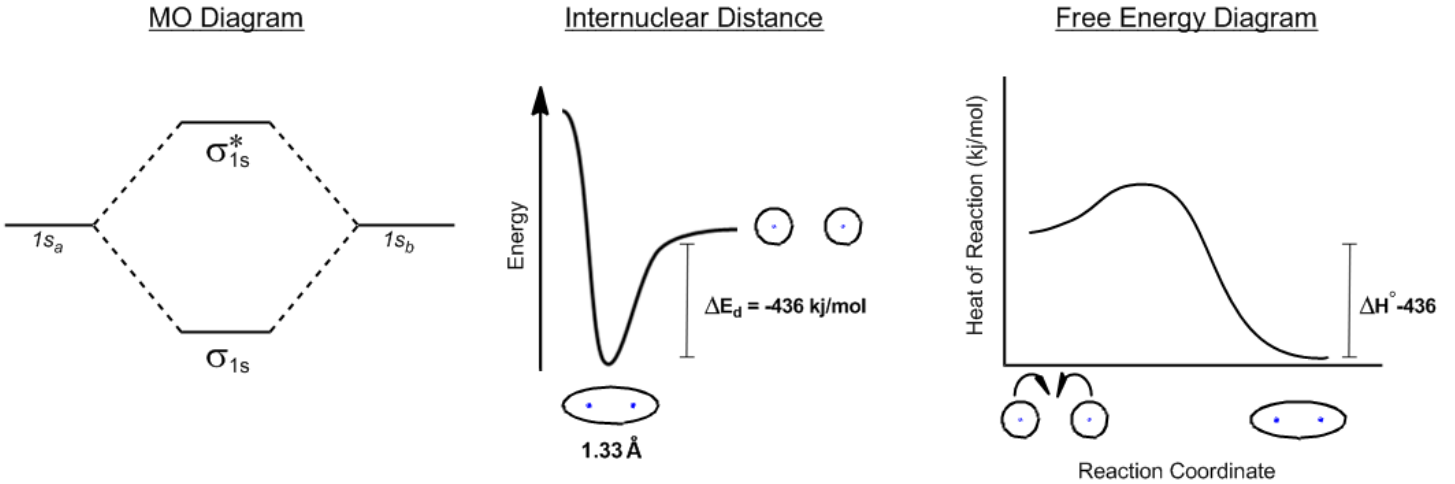


CONCEPT: ENERGY DIAGRAM

□ Atoms save energy by forming bonds. Free energy diagrams show overall changes in **potential energy** during reactions.



□ Free energy diagrams give us information on the spontaneity and rate of reactions

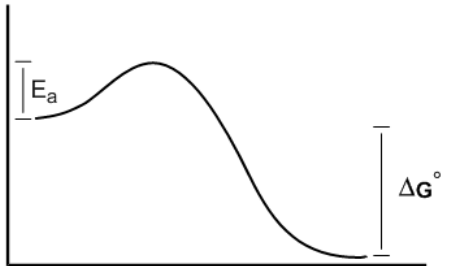
● **Thermodynamics** describes favorability. Determined by Gibbs Free Energy

$$\Delta G^\circ = \Delta H^\circ - T\Delta S$$

● **Kinetics** describes rate. Determined by the activation energy of the rate determining step.

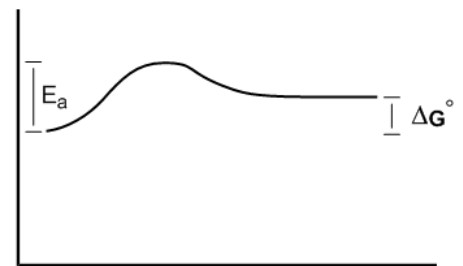
$$E_a$$

EXAMPLE: Describe the favorability and rate of the following free energy diagrams.



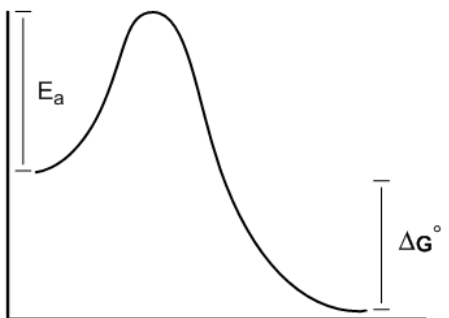
Spontaneity = ___ = _____

Rate = _____



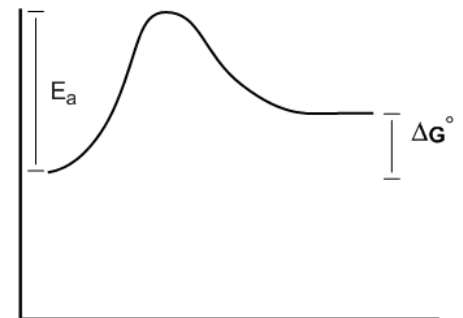
Spontaneity = ___ = _____

Rate = _____



Spontaneity = ___ = _____

Rate = _____



Spontaneity = ___ = _____

Rate = _____