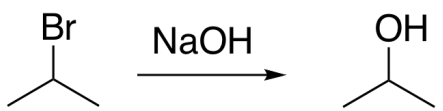
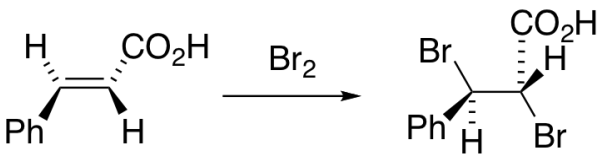
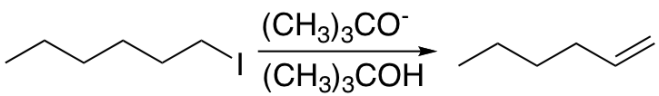
Identify the type of reaction.



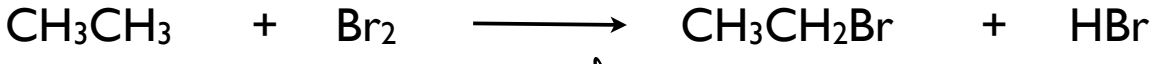
completed in class





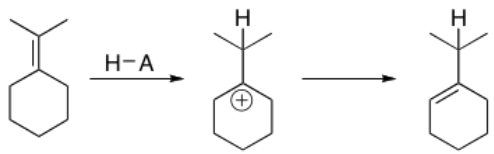
Enthalpy Change

Calculate ΔH for the reaction.



completed in class

A multi-step problem



At equilibrium, the product mixture contains about 30% reactant and 70% product.

A. What type of intermediate is present? Is this a polar or radical reaction?

B. Draw curved arrows to indicate electron movement in each step.

C. Calculate K_{eq} for the reaction.

D. Calculate $\Delta G°$ for the reaction.

completed in class

True or false?

completed in class

A. True
B. False
C. No Idea

1. The enthalpy of a reaction is the sole determinant of whether it will occur or not.
2. Kinetics is the study of chemical reaction rates.
3. An exergonic reaction will always occur during the lifespan of the standard human being.
4. Thermodynamics is the study of the energies of structures that are represented by the wells on reaction coordinate diagrams.
5. A reaction coordinate diagram is used to visualize the change in the internal energy of chemical structures that occurs during chemical reactions.

Explain!

The acid-base chemistry reaction barium hydroxide with ammonium thiocyanate (NH_4SCN) in water creates barium thiocyanate, ammonia, and water. The reaction is highly favorable, but also so endothermic that the solution cools to such an extent that a layer of frost forms on the reaction vessel. Explain how an endothermic reaction can be favorable.

$$Ba(OH)_2 + 2\,NH_4SCN \longrightarrow 2NH_3 + 2H_2O + Ba(SCN)_2$$

$\Delta H = +$, but $\Delta S = -$

ΔG must be $-$ if rxn is spontaneous

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

Predict the sign of ΔG.

Completed in class

ΔG	ΔH	T	ΔS
	-(large)	small	-(small)
	-(large)	small	+(small)
	-(small)	large	-(large)
	-(small)	large	+(large)

General BDE Trends

- Describe general trends for bond dissociation energies.

- Stronger bonds = greater BDE

→ shorter bond length = stronger bond

* C-F > C-Cl > C-Br > C-I

* C–C < C=C < C≡C

(when breaking all bonds)

Calculate K_{eq}. Are products or reactants favored?

If the ΔG° for a reaction is -4.5 kcal/mol at 298 K, what is K_{eq} for this reaction?

$$\Delta G = -RT \ln K_{eq}$$

$$-4.5 = -(8.314\ kJ/mol\,K)(298\ K) \ln K_{eq}$$

$$e^{\left(\frac{-4.5}{-8.314 \cdot 298}\right)} = K_{eq}$$

$$1.0 = K_{eq}$$