7A. Classify reactions as additions, eliminations, substitutions or rearrangements; Classify reactions as oxidations or reductions.

7A.1 Are the following reactions additions, eliminations, substitutions or rearrangements?



7A.2 Are the following reactions oxidations or reductions?



e) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (combustion)

f) $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ (photosynthesis)



(from the Cori cycle)

h)

CO2[⊖] [⊖]O₂C[′] [⊖]O₂C succinate fumarate

(from the Krebs cycle)

7B. Use curved arrows to show electron flow and draw the product given starting materials and curved arrows.

OCSL: 8.1 - 8.19 7B.1 Use curved arrows to show the flow of electrons. a) b) c) $\begin{array}{ccc} O^{-H} & Br - Br \\ \downarrow & & \\ C \\ C \\ CH_2 \end{array} \xrightarrow{H} \begin{array}{c} \oplus & H \\ O \\ H \\ H \end{array} \xrightarrow{H} \begin{array}{c} \oplus & H \\ O \\ H \\ H \end{array} \xrightarrow{H} \begin{array}{c} Br \\ H \\ H \\ H \end{array}$ Br d) f) $\begin{array}{cccc} & & & & & & & \\ & & & & \\ H_{3}C^{-C}C_{-}CH_{3} & & & & & \\ & & & & & \\ H_{3}C^{-C}C_{-}CH_{3} & & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & & & & \\ & & & & \\ H_{3}C^{-C}C_{-}CH_{3} & & & \\ & & & & \\ & & & & \\ & & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \xrightarrow{\oplus} \begin{array}{c} & & & \\ & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & \\ &$ g) $H-CI + \bigcup_{H_2C-CH_2}^{O} \longrightarrow CI^{\ominus} + \bigcup_{H_2C-CH_2}^{H_1} \longrightarrow H_2C^{-}$











m)



n)









r)







u)





e)



f)







7C. Have a general understanding factors affecting reactivity.

7C.1 Circle all factors that influence the rate of a reaction.

a) ΔG b) E_a c) temperature d) ΔH e) catalysts f) concentration g) ΔS

7C.2 Circle true or false for the statements below.

- True False A catalyst increases the rate of a reaction.
- True False Ring formation leads to an increase in entropy
- True False Spontaneous reactions tend to have negative ΔH and positive ΔS values.
- True False The mechanistic step with the lowest activation energy is known as the rate determining step.
- 7C.3 Based on the values below, are the products or reactants favored at equilibrium?

a) ∆G = 65 kJ/mol	d) ∆G = -2.3 kJ/mol	g) $\Delta S = 6.8 \text{ J/Kmol}$
b) K _{eq} = 0.0045	e) ∆S = -9 J/Kmol	h) K _{eq} = 4500
c) ∆H = 200 kJ/mol	f) $K_{eq} = 1$	

7C.4 Which of the following reactions have a positive ΔS value?



7D. Interpret and identify the parts of a reaction diagram.

7D.1 What is the difference between a transition state and intermediate?

7D.2 For the energy diagrams below: a) Which reaction has $K_{eq} = 1$? _____ b) Which reaction is fastest?_____



7D.3 For each set of questions, base your answers on the reaction diagrams to the left. a)



c)



The number of steps in this reaction is ______ Label any intermediates on the diagram with an I True/False – The products are lower in energy than the reactants. Label the activation energy for the rate determining step.



Is the reaction endo or exothermic?

Label ΔH_{rxn} on the diagram

How many steps are in this reaction?

7D.4 Draw an energy diagram that fits the descriptions below.

a) a three-step exothermic process where the second step is the rate determining step.

b) a two-step endothermic process where the first step is the rate determining step:

c) a 1 step reaction that absorbs energy

d) a two-step reaction where the final step is the rate determining step and the reaction releases energy

7D.5 a) Draw arrows to show electron flow in the reaction below.



b. Draw an energy diagram for the exothermic reaction above. Formation of the positive carbon is the rate determining step. Label the diagram with A, B, C, D where those species occur.

7D.6 a) Draw arrows to show electron flow in the reaction below.



b) Draw a reaction diagram for above reaction given that the 1st step is the slow step and the products are lower in energy than the reactants. Label the sections of the diagram that correspond to species A, B, C and D.