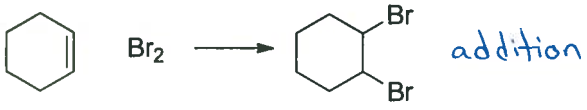
7A. Classify reactions as additions, eliminations, substitutions or rearrangements; Classify reactions as oxidations or reductions.

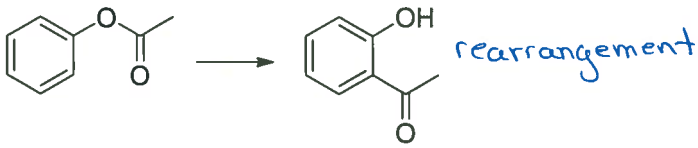
7A.1 Are the following reactions additions, eliminations, substitutions or rearrangements?

a)



addition

b)

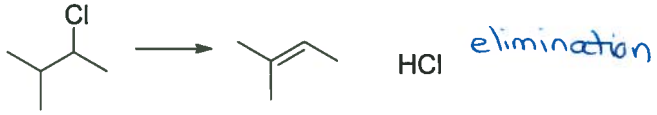


rearrangement

c)

addition

d)

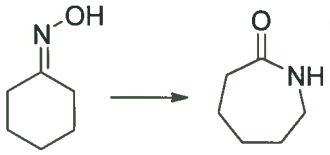


elimination

e)

substitution

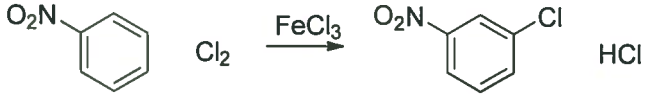
f)



rearrangement

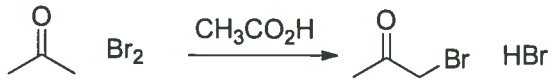
g)

substitution



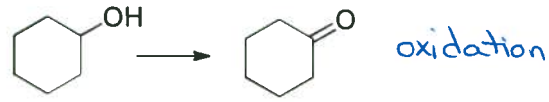
h)

substitution



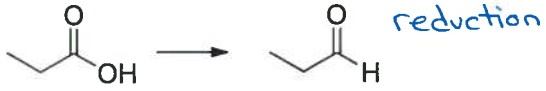
7A.2 Are the following reactions oxidations or reductions?

a)



oxidation

b)

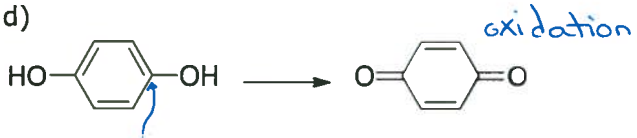


reduction

c)

oxidation

d)



oxidation

Focus on carbon

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

oxidation

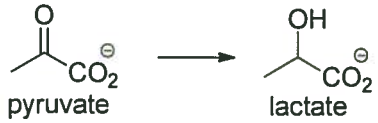
(combustion)

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

reduction

(photosynthesis)

g)



reduction

(from the Cori cycle)

h)

oxidation

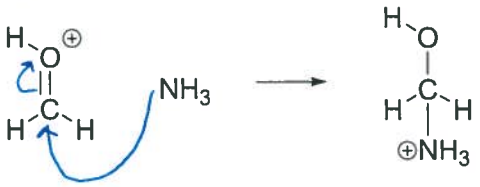
(from the Krebs cycle)

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

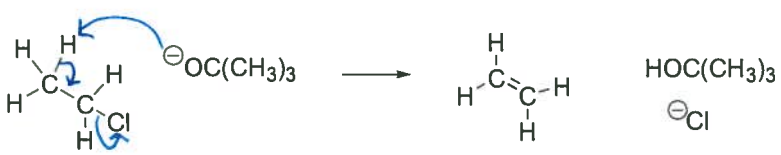
OCSL: 8.1 – 8.19

7B.1 Use curved arrows to show the flow of electrons.

a)

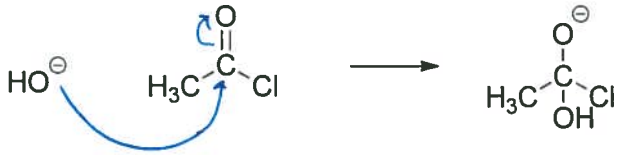


b)

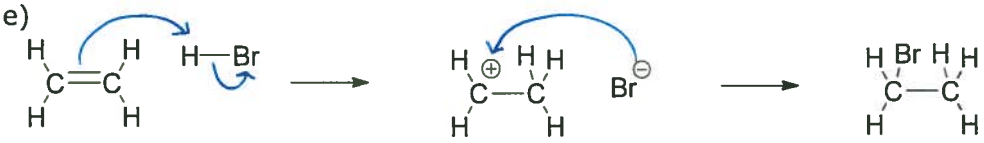


c)

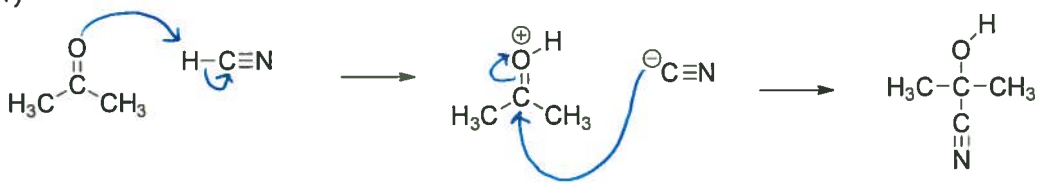
d)



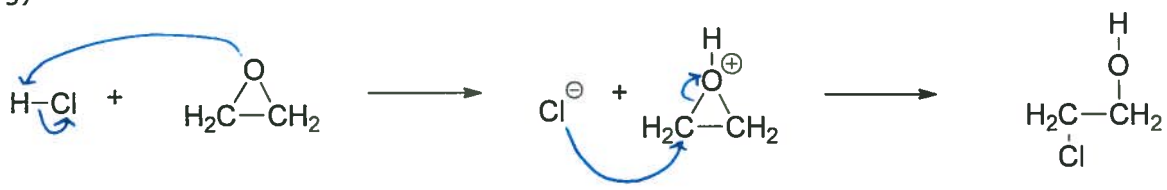
e)



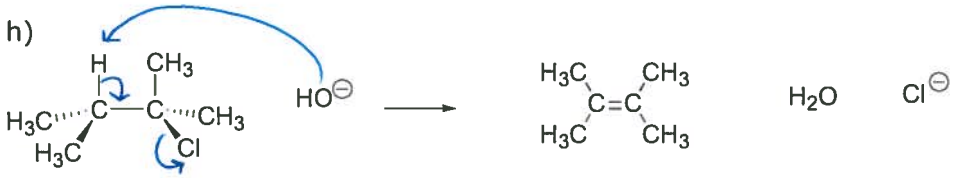
f)



g)

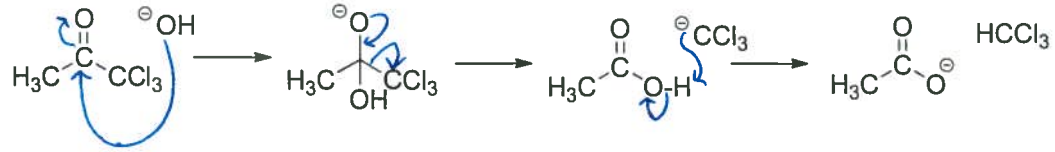


h)



i)

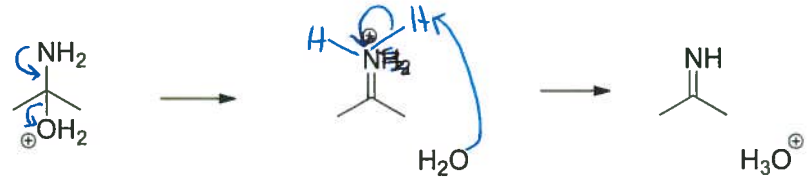
j)



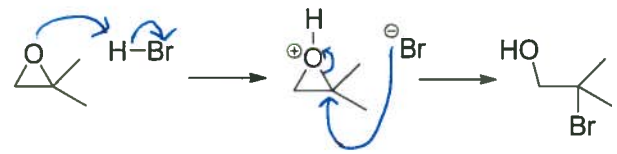
k)

l)

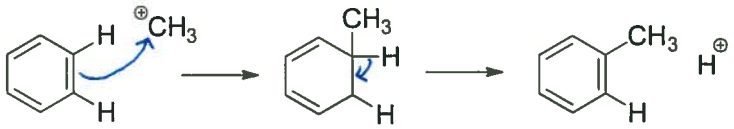
m)



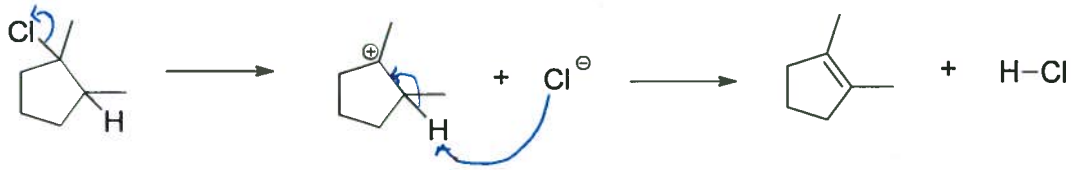
n)



o)

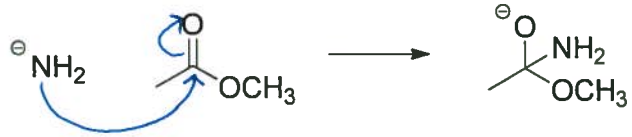


p)



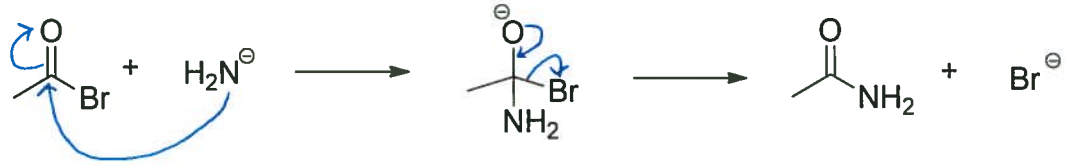
q)

r)

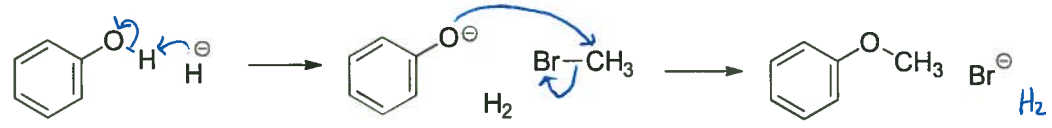


s)

t)

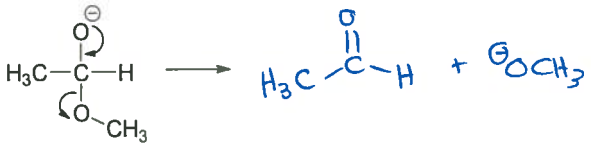


u)

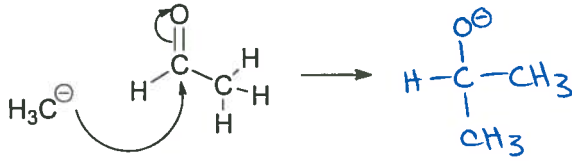


7B.2 Draw the product(s) of the following :

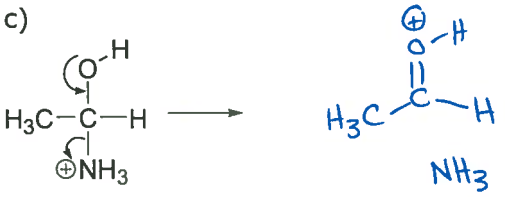
a)



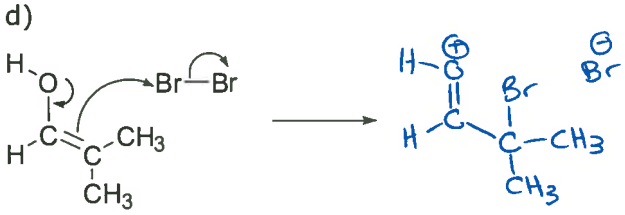
b)



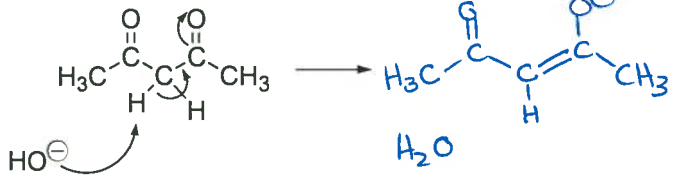
c)



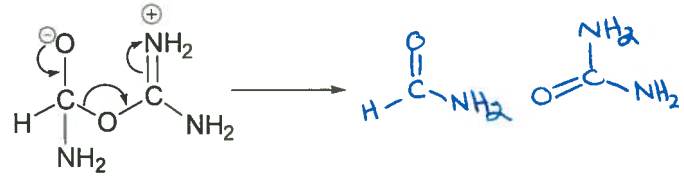
d)



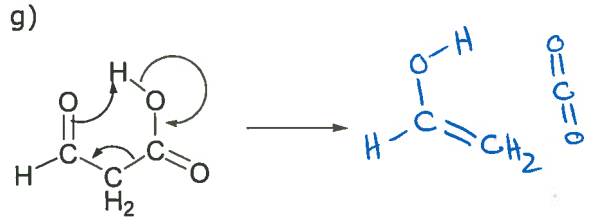
e)



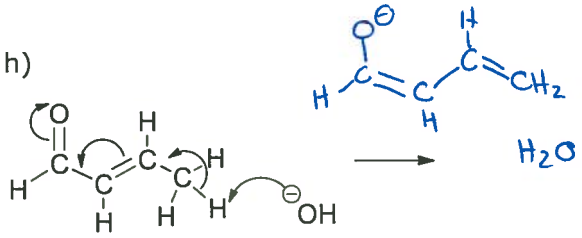
f)



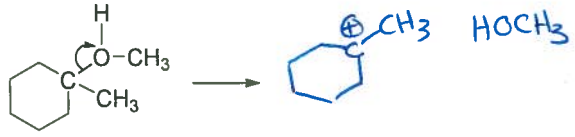
g)



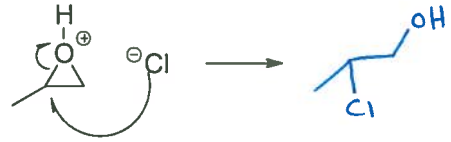
h)



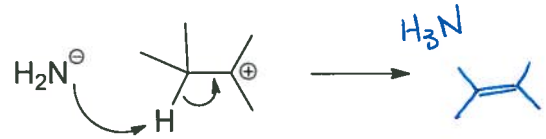
i)



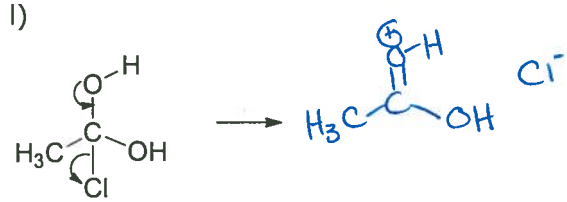
j)



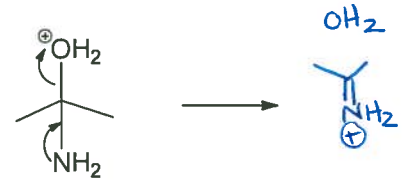
k)



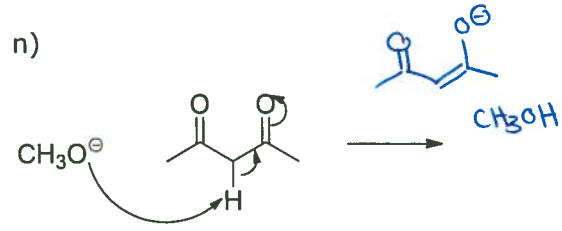
l)



m)



n)



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) ΔG = 65 kJ/mol reactants

b) K_{eq} = 0.0045 reactants

c) ΔH = 200 kJ/mol reactants

d) ΔG = -2.3 kJ/mol products

e) ΔS = -9 J/Kmol reactants

f) K_{eq} = 1 neither

g) ΔS = 6.8 J/Kmol products

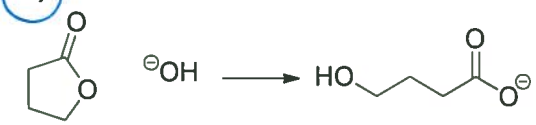
h) K_{eq} = 4500 products

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

a)

b)

(c)



(d)

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

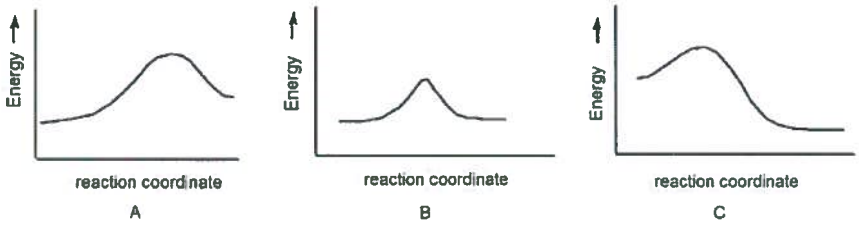
Transition state: unstable energy maximum with partially formed/broken bonds

Intermediate: relatively unstable species formed between reactants and products. local energy minimum with fully formed bonds

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

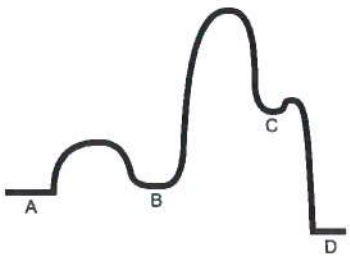
7D.2For the energy diagrams below: a) Which reaction has K_{eq} = 1? B

b) Which reaction is fastest? C



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

a)

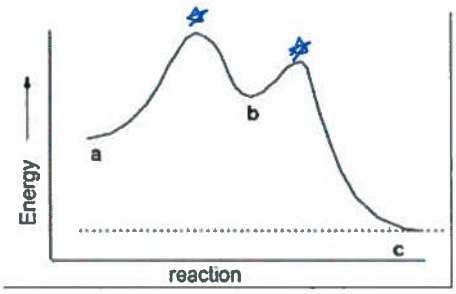


How many steps are there? 3

How many transition states are there? 3

Which step is the rate determining step? step 2 (b→c)

b)

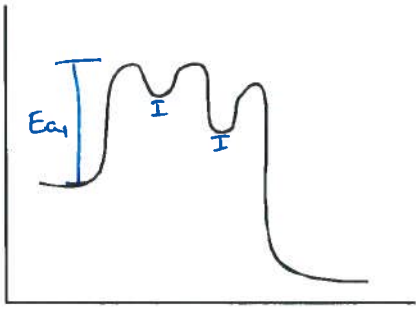


Is the reaction endothermic or exothermic? exothermic

Label transition states on the diagram with a *

Which is the slow step? step 1 (a→b)

c)



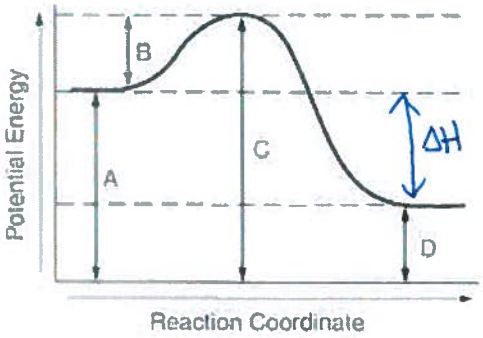
The number of steps in this reaction is 3

Label any intermediates on the diagram with an I

True/False – The products have lower energy than the reactants.

Label the activation energy for the rate determining step.

d)



Is the reaction endo or exothermic? exothermic

Which letter represents ΔH_{rxn}?

How many steps are in this reaction? 1

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

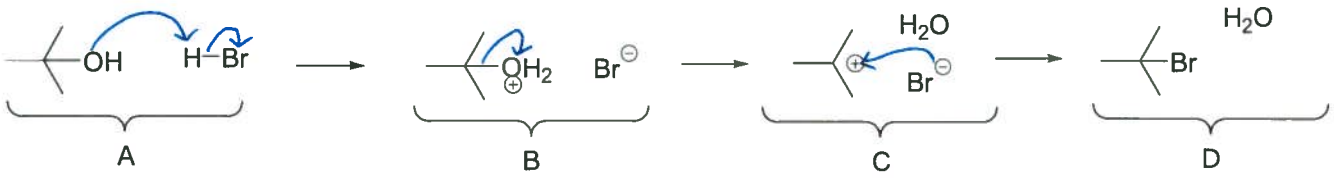
a) a three-step exothermic process where the second step is the rate determining step.

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

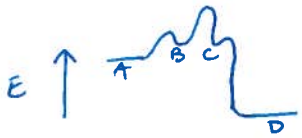
c) a 1 step reaction that absorbs energy

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

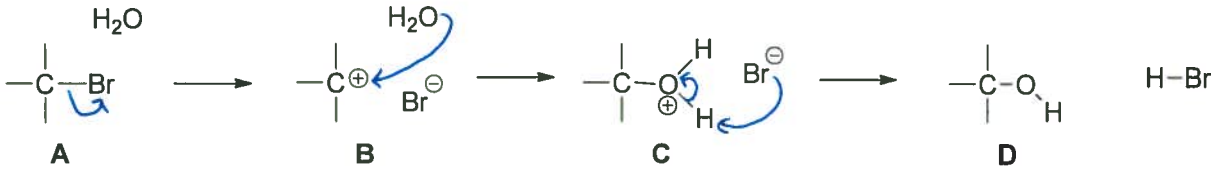
7D.5 a) Draw arrows to show electron flow in the reaction below.



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.