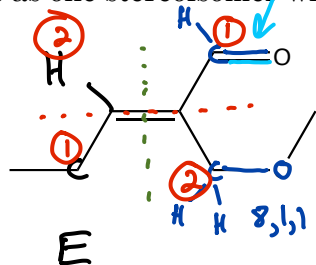
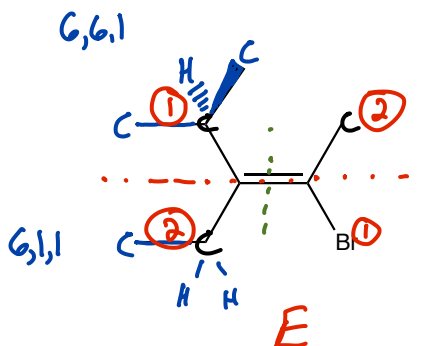


1. (18 pts.) Where appropriate, label the following alkenes as *Z* or *E*. If the molecule can only exist as one stereoisomer write "only one".

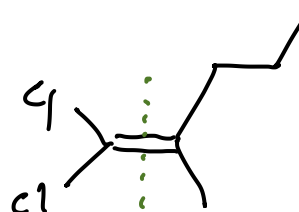
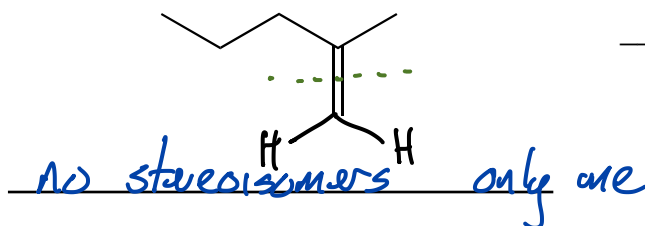
a.



b.



c.



2. A reaction coordinate diagram is drawn on the right.

a. (2 pts) Label the reactants and products.

b. (2 pts.) Put a star next to the transition state(s).

c. (2 pts.) Which is the faster step in this reaction, the first or second step?

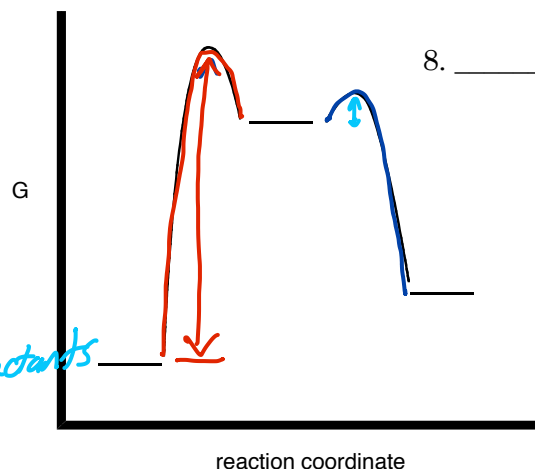
second step is faster

d. (2 pts.) Which are higher in energy, the reactants or the products?

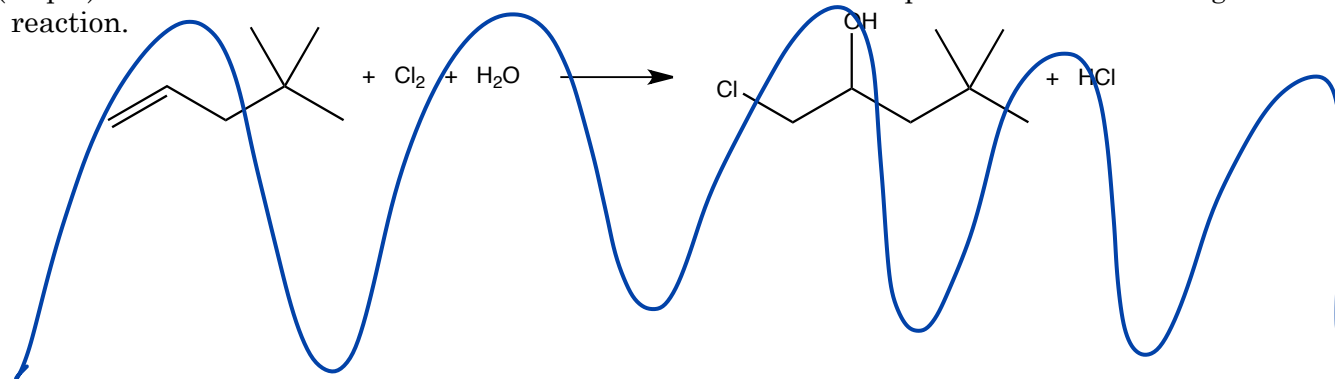
Favor Prod Favor reactants

e. (2 pts.) This reaction would have a large or a small *K*?

rxn goes up hill (unfavorable) so reactants are favored... small *K*

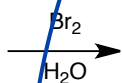
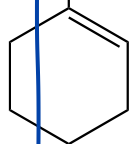


3. (10 pts) Draw a mechanism that accounts for the formation for the product in the following reaction.

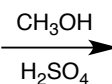
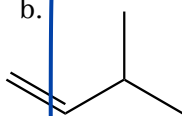


3. (18 pts.) Predict the organic products for the following reactions. If a mixture of major and minor products are expected, identify the major product.

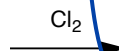
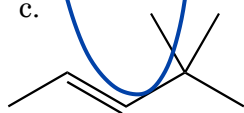
a.



b.

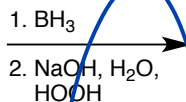
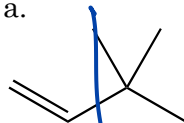


c.

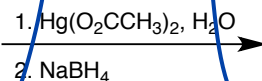
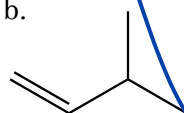


4. (12 pts.) Predict the major organic products for the following two step reactions.

a.



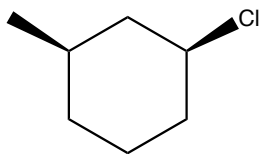
b.



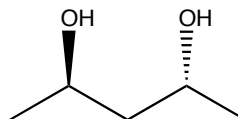
5. (10 pts.) When Cl_2 , Br_2 , and Hg^{2+} are used as electrophiles, carbocation rearrangements do not occur. Explain how these electrophiles prevent carbocation rearrangements.

6. (i. 8 pts.) Place a star next to the chiral carbons and (ii. 8 pts.) determine which of the following molecules are chiral or achiral.

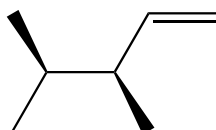
a.



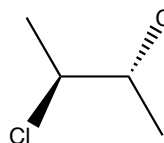
b.



c.

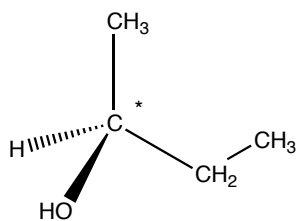


d.

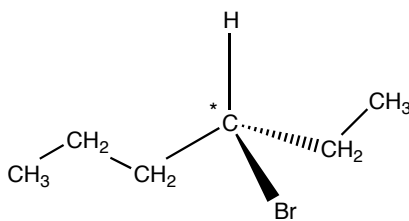


7. (12 pts.) Determine the configuration (*R* or *S*) for the starred chiral carbon atoms.

a.

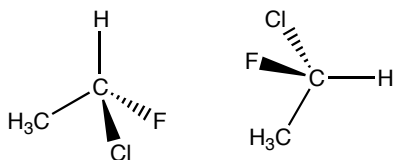


b.

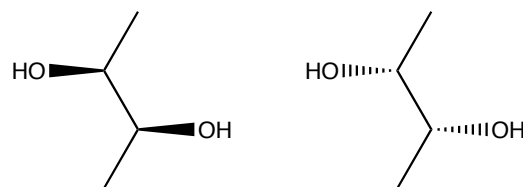


8. (12 pts.) Determine whether the pairs of molecules below are enantiomers, diastereomers, or the same molecule.

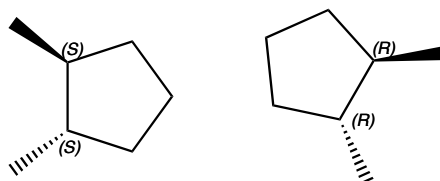
a.



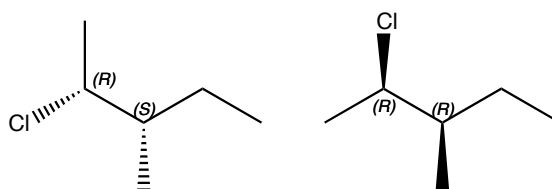
b.



c.



d.



1	H	1.0079	2	He	4.0026
3	Li	6.941	4	Be	9.012
11	Na	22.989	12	Mg	24.305
19	K	39	20	Ca	40
37	Cs	55	38	Sr	56
55	Rb	72	56	Ba	73
87	Fr	88	89	Ra	89
21	Sc	22	23	Ti	24
39	Y	40	41	Zr	42
57	La	58	59	Ce	60
72	Hf	73	74	Ta	75
89	Ac	90	91	Th	92
104	Rf	105	106	Sg	107
110	Bh	111	112	Hs	113
116	Mt	117	118	U	119
122	Os	123	124	Np	125
128	Ir	129	130	Pu	131
134	Pt	135	136	Am	137
140	Au	141	142	Cm	143
146	Hg	147	148	Bk	149
152	Tl	153	154	Cf	155
158	Pb	159	160	Es	161
164	Bi	165	166	Fm	167
170	Po	171	172	No	173
176	At	177	178	Lr	179
182	Rn	183	184		185
188		189	190		191
194		195	196		197
200		201	202		203
206		207	208		209
212		213	214		215
218		219	220		221
224		225	226		227
230		231	232		233
236		237	238		239
242		243	244		245
248		249	250		251
254		255	256		257
260		261	262		263
266		267	268		269
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308		309	310		311
314		315	316		317
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