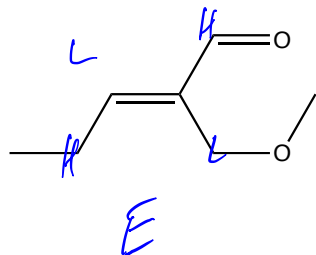
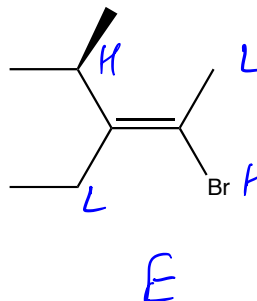


1. (18 pts.) Where appropriate, label the following alkenes as *Z* or *E*. If the molecule can only exist as one stereoisomer write "only one".

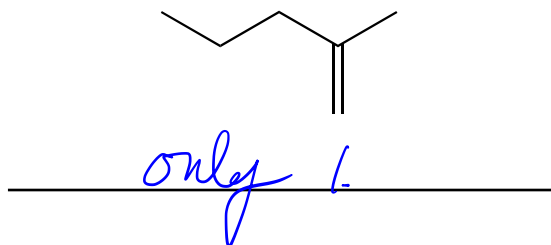
a.



b.



c.



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

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

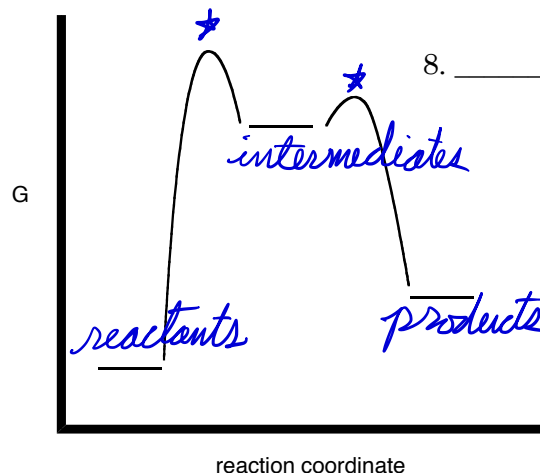
a. (2 pts) Label the reactants and products.

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?

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

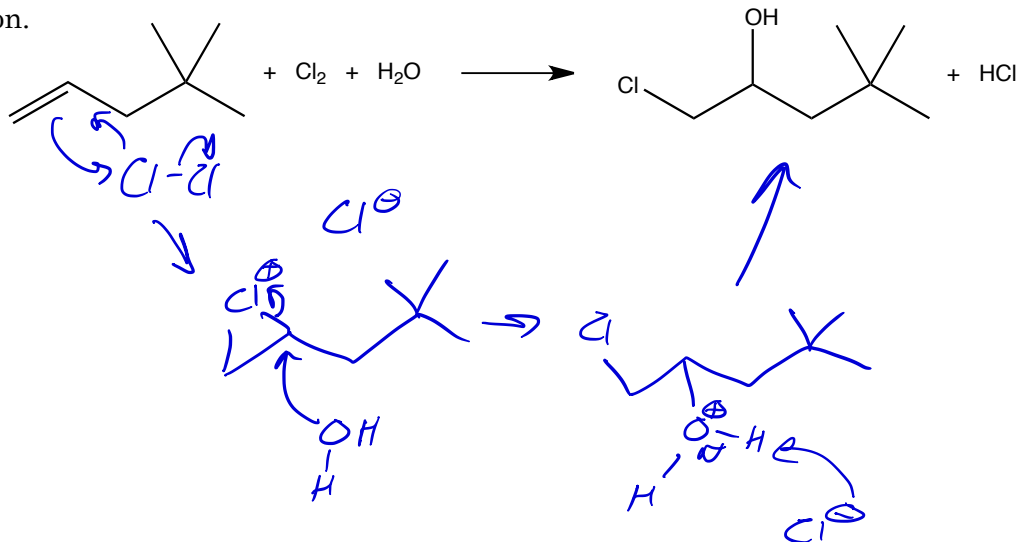
e. (2 pts.) This reaction would have a large or a small *K*?



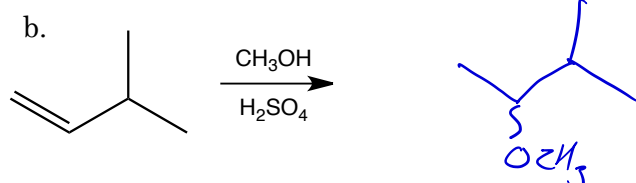
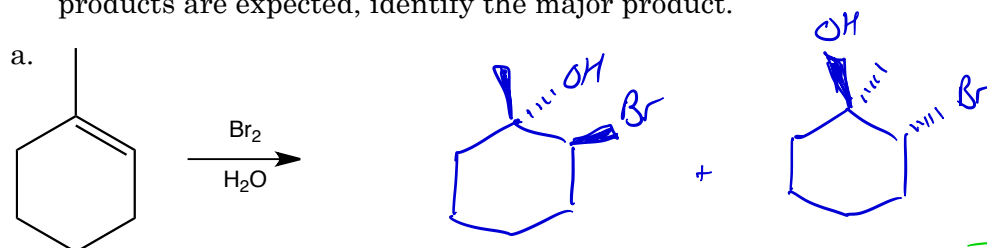
8. _____

second
products
small K. Reaction favors reactants

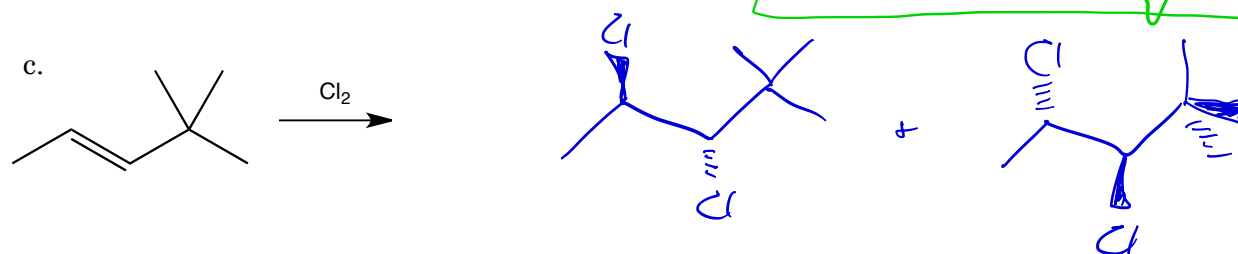
3. (10 pts) Draw a mechanism that accounts for the formation for the product in the following reaction.



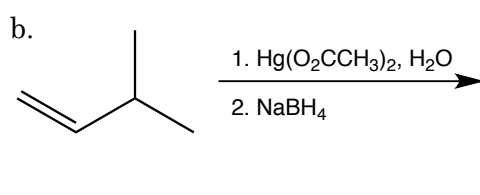
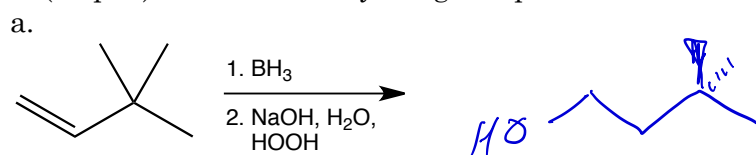
3. (18 pts.) Predict the organic products for the following reactions. If a mixture of major and minor products are expected, identify the major product.



major product due to C^+ rearrangement



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



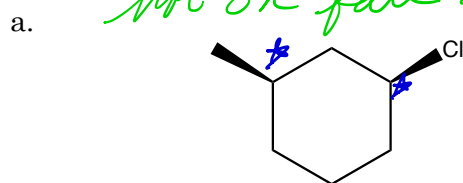
not on fall 2018 test

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.

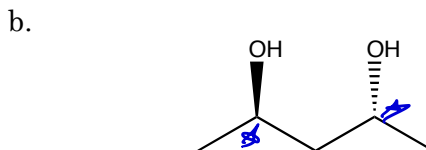
Instead of only pulling e^- 's out of the C to C π bond, the Cl , Br , and Hg^{2+} donate lone pair e^- 's back to the C atom, thus, forming a 3-membered ring and preventing C^+ formation; e.g.,

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. *not on fall 2018 test 3* b. *not on fall 2018 test 3*

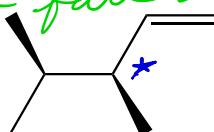


chiral



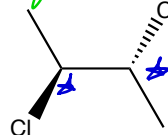
chiral

c. *not on fall 2018 test 3*



chiral

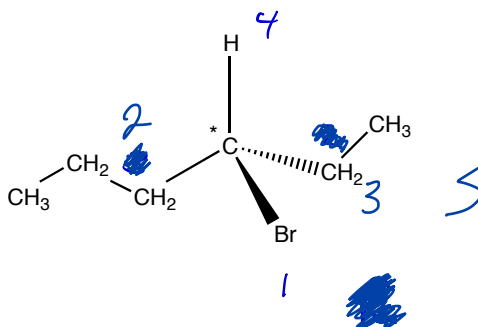
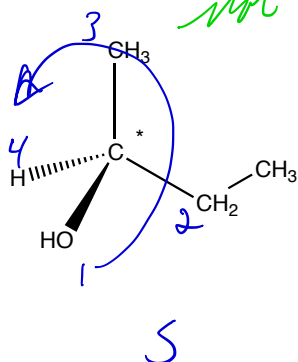
d. *not on fall 2018 test 3*



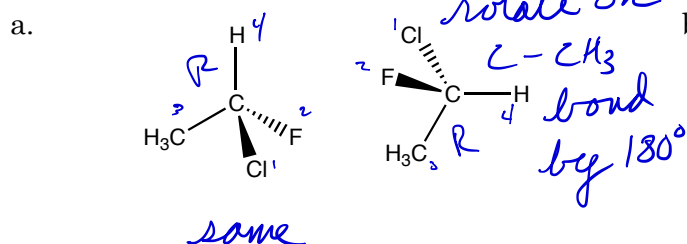
achiral

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

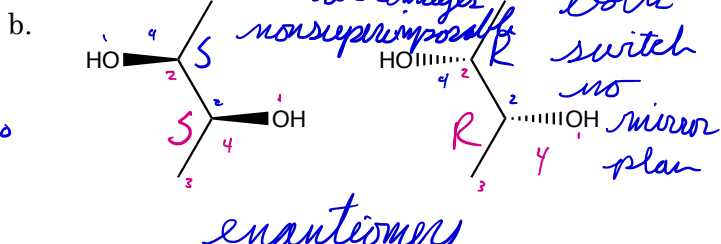
a. *not on fall 2018 test 3*



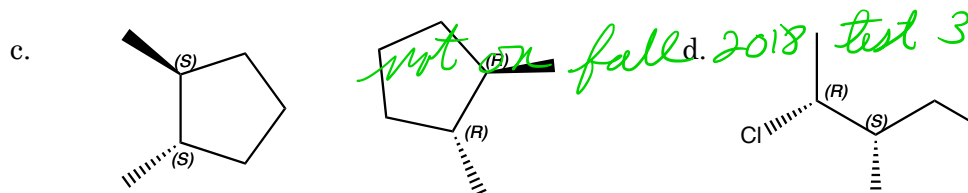
8. (12 pts.) Determine whether the pairs of molecules below are enantiomers, diastereomers, or the same molecule.



same

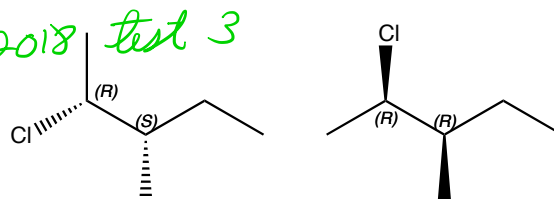


enantiomers



enantiomers

same reasons a b



diastereomers

at least one chiral center but not all switched

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
29	Ni	30	31	Ga	32
37	Zn	38	39	Y	40
45	Cd	46	47	Ag	48
53	I	54	55	Xe	55
61	Eu	62	63	Gd	64
69	Tm	70	71	Lu	71
77	Ir	78	79	Au	80
85	At	86	87	Rn	87
93	Am	94	95	Pu	94
101	Md	102	103	Lr	103
109	Mt	110	111		112
117		118	119		120
125		126	127		128
133		134	135		136
141		142	143		144
149		150	151		152
157		158	159		160
165		166	167		168
173		174	175		176
181		182	183		184
189		190	191		192
197		198	199		200
205		206	207		208
213		214	215		216
221		222	223		224
229		230	231		232
237		238	239		240
245		246	247		248
253		254	255		256
261		262	263		264
269		270	271		272
277		278	279		280
285		286	287		288
293		294	295		296
301		302	303		304
309		310	311		312
317		318	319		320
325		326	327		328
333		334	335		336
341		342	343		344
349		350	351		352
357		358	359		360
365		366	367		368
373		374	375		376
381		382	383		384
389		390	391		392
397		398	399		400
405		406	407		408
413		414	415		416
421		422	423		424
429		430	431		432
437		438	439		440
445		446	447		448
453		454	455		456
461		462	463		464
469		470	471		472
477		478	479		480
485		486	487		488
493		494	495		496
501		502	503		504
509		510	511		512
517		518	519		520
525		526	527		528
533		534	535		536
541		542	543		544
549		550	551		552
557		558	559		560
565		566	567		568
573		574	575		576
581		582	583		584
589		590	591		592
597		598	599		600
605		606	607		608
613		614	615		616
621		622	623		624
629		630	631		632
637		638	639		640
645		646	647		648
653		654	655		656
661		662	663		664
669		670	671		672
677		678	679		680
685		686	687		688
693		694	695		696
701		702	703		704
709		710	711		712
717		718	719		720
725		726	727		728
733		734	735		736
741		742	743		744
749		750	751		752
757		758	759		760
765		766	767		768
773		774	775		776
781		782	783		784
789		790	791		792
797		798	799		800
805		806	807		808
813		814	815		816
821		822	823		824
829		830	831		832
837		838	839		840
845		846	847		848
853		854	855		856
861		862	863		864
869		870	871		872
877		878	879		880
885		886	887		888
893		894	895		896
901		902	903		904
909		910	911		912
917		918	919		920
925		926	927		928
933		934	935		936
941		942	943		944
949		950	951		952
957		958	959		960
965		966	967		968
973		974	975		976
981		982	983		984
989		990	991		992
997		998	999		1000

58	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr