

First Letter of Last Name

Key

Write your name above this line

2283g Midterm  
 Dr. Brian Pagenkopf  
 Saturday, February 27, 2010  
 2:00 pm – 5:00

You may not leave the exam room within the first 30 minutes or the last 30 minutes. During the last 30 minutes when you finish do not bring your exam up to the front of the room until the exam time is over. No notes, books, calculators, cell phones, iPods, computers or electronics of any sort allowed. Please turn off the ringer on your phone now.

Be sure you have all of the exam pages.

6 — Atomic number  
 C — Symbol  
 12.011 — Atomic mass

**PERIODIC TABLE OF THE ELEMENTS**

Atomic masses are based on <sup>12</sup>C. Atomic masses in parentheses are for the most stable isotope.

																VIII A																	
																2	10																
																He	Ne																
																4.00260	20.179																
																5	6	7	8	9	10												
																B	C	N	O	F	Ne												
																10.81	12.011	14.0067	15.9994	18.998403	20.179												
																13	14	15	16	17	18												
																Al	Si	P	S	Cl	Ar												
																26.98154	28.0855	30.97376	32.06	35.453	39.948												
																19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
																K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
																39.0963	40.08	44.9559	47.90	50.9415	51.996	54.9380	55.847	58.9332	58.70	63.546	65.38	69.72	72.59	74.9216	78.96	79.904	83.80
																37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
																Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
																85.4678	87.62	88.9059	91.22	92.9064	95.94	(98)	101.07	102.9055	106.4	107.868	112.41	114.82	118.69	121.75	127.60	126.9045	131.30
																55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
																Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
																132.9054	137.33	138.9055	178.49	180.9479	183.85	186.207	190.2	192.22	195.09	196.9665	200.59	204.37	207.2	208.9804	(209)	(210)	(222)
																87	88	89	104	105	106												
																Fr	Ra	Ac	Unq	Unp	Unh												
																(223)	226.0254	227.0278	(261)	(262)	(263)												

\*Lanthanide series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.12	140.9077	144.24	(145)	150.4	151.96	157.25	158.9254	162.50	164.9304	167.26	168.9342	173.04	174.967

† Actinide series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
232.0381	231.0359	238.029	237.0482	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)

page	points	
3	38	
4	12	
5	12	
6	12	
7	12	
8	7	
9	7	
	100	

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ID number

Draw a specific structure (no generic R groups) that has a pKa close to the number given.

-5 mineral acids

20 aldehydes & ketones

5 carboxylic acids

25 alkynes  
esters

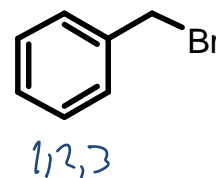
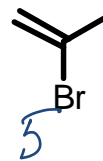
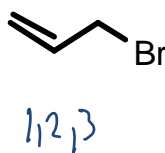
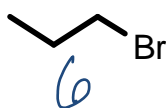
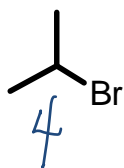
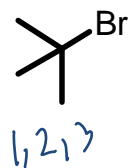
10 cyanide  
thiols  
 $\beta$ -keto esters

35 amines

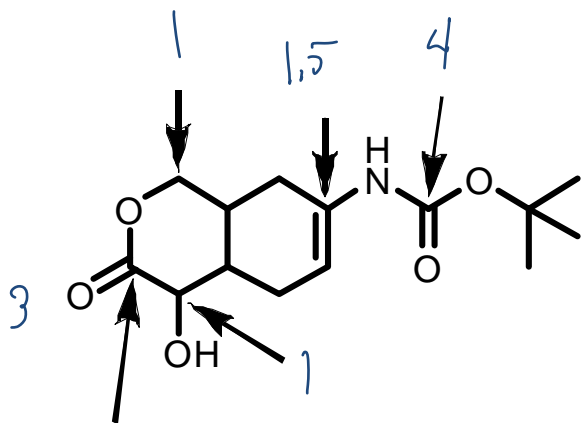
15 water  
alcohol

45 hydrocarbon

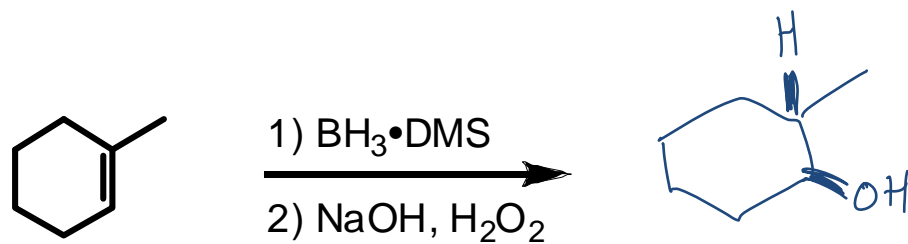
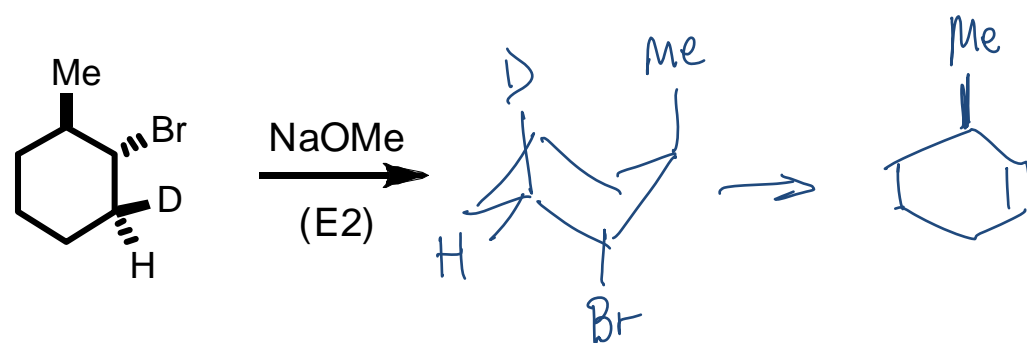
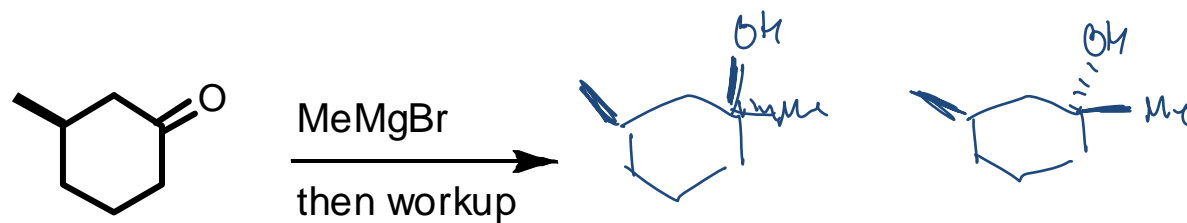
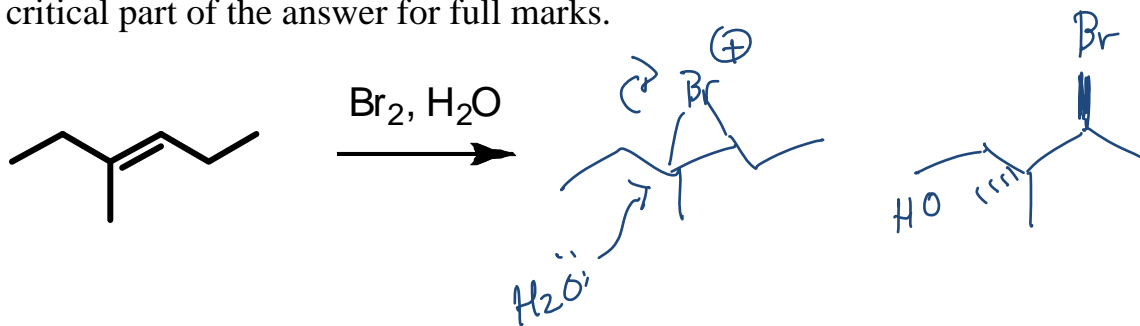
Rank the following from most reactive toward substitution under usual SN1 conditions with a #1, to the least reactive with a 6.

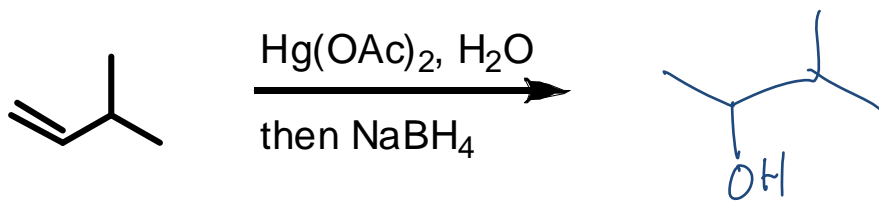
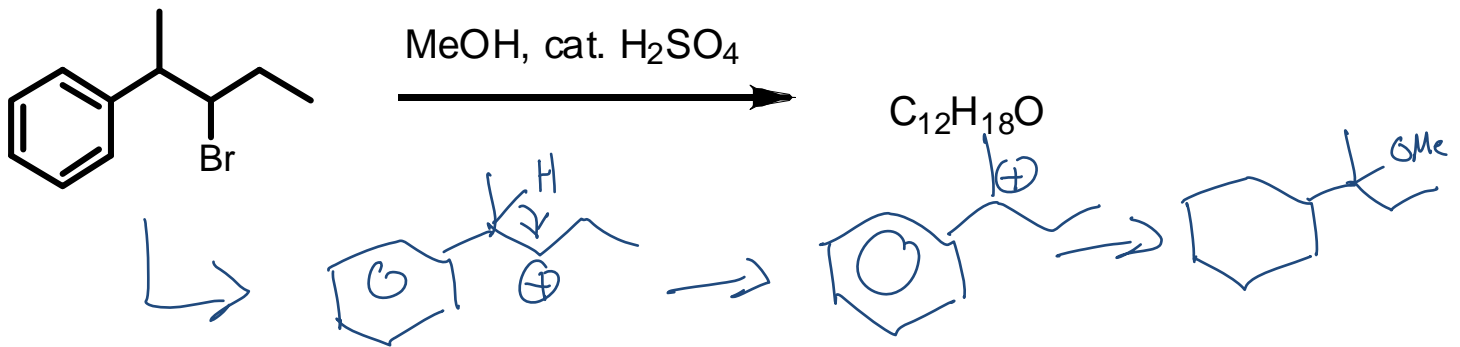
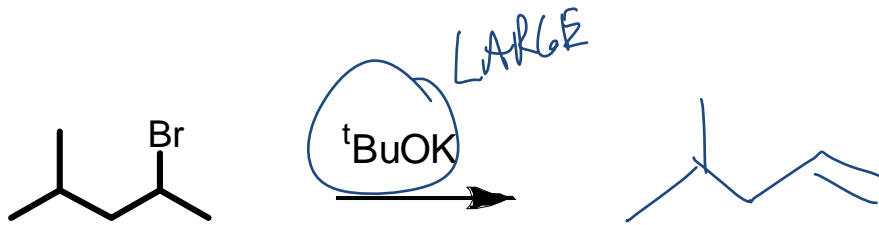
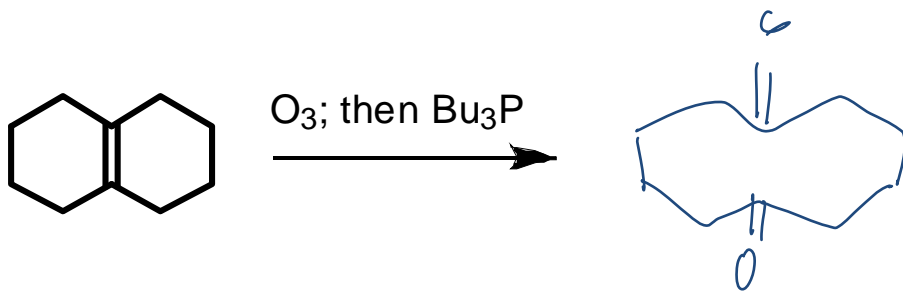


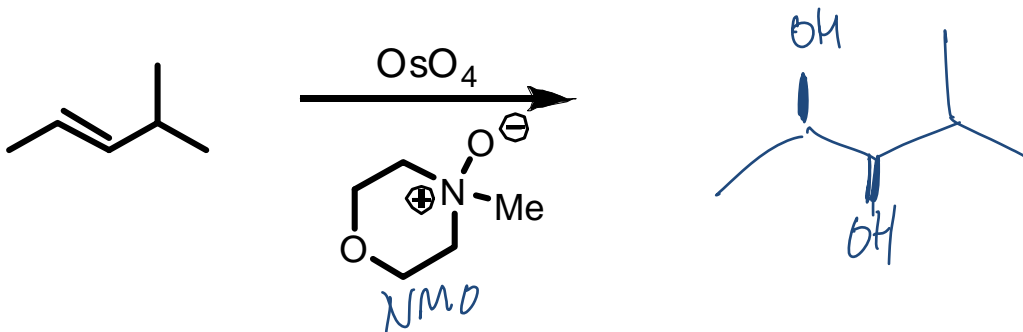
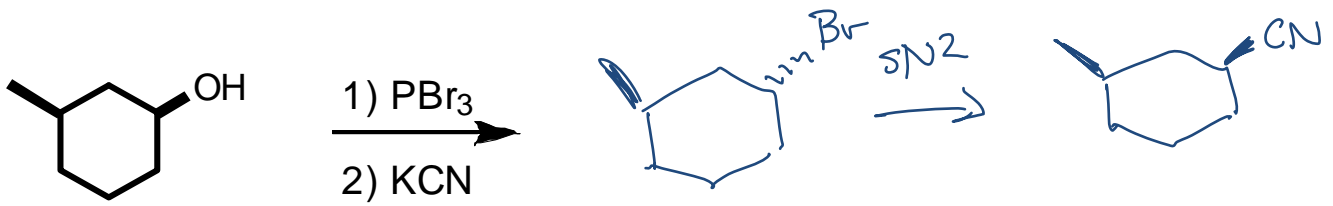
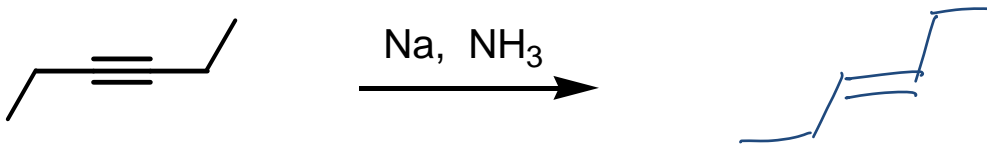
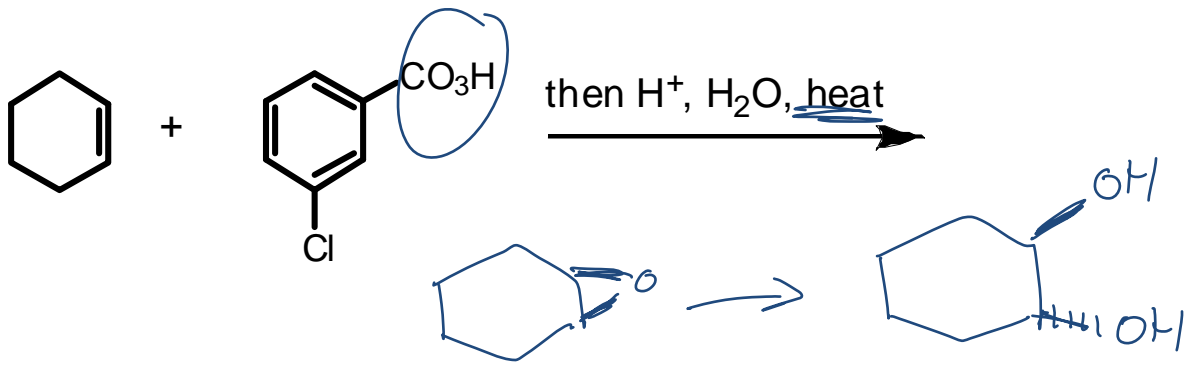
Identify the oxidation states of the indicated carbons.



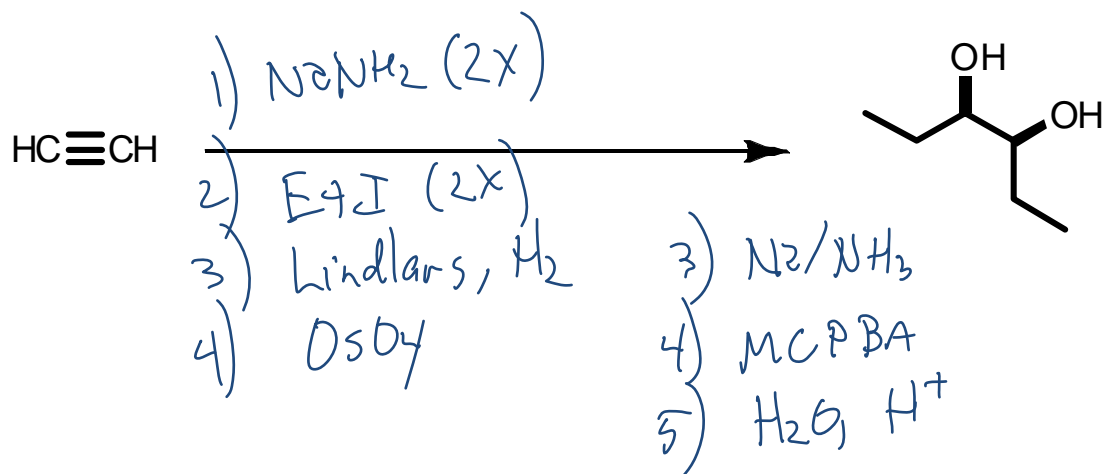
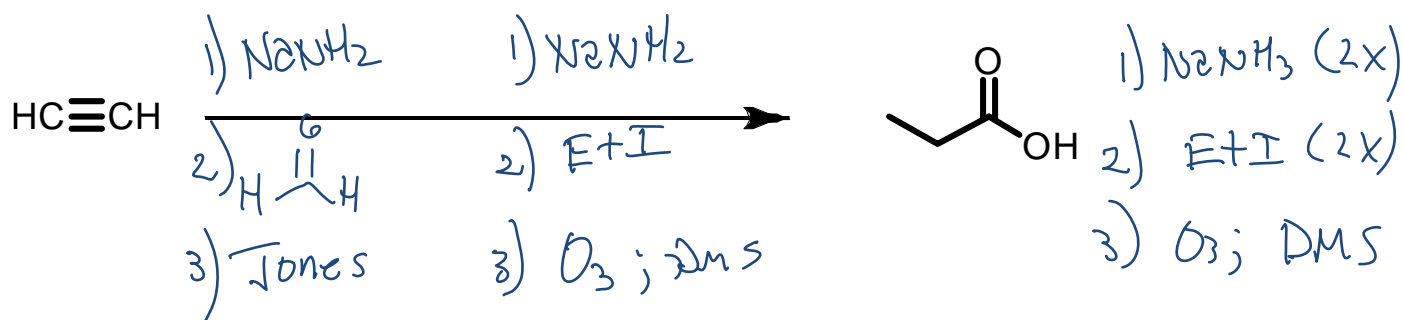
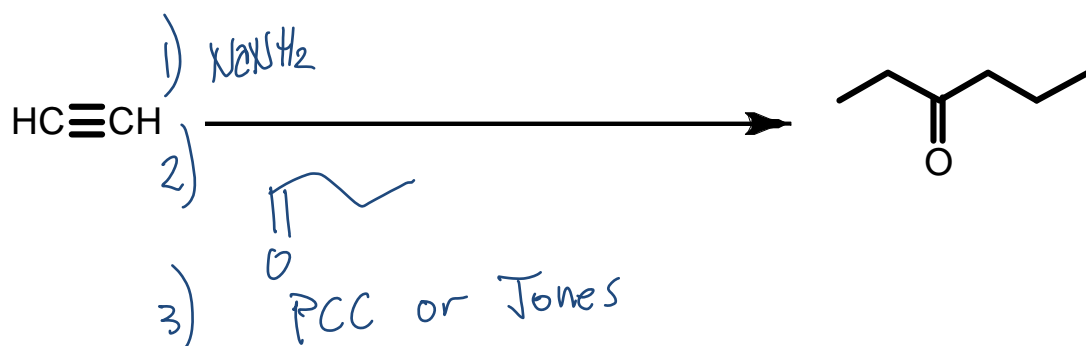
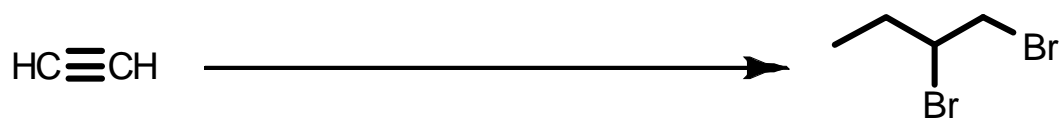
Show products for the following reactions. For some questions stereochemistry is a critical part of the answer for full marks.



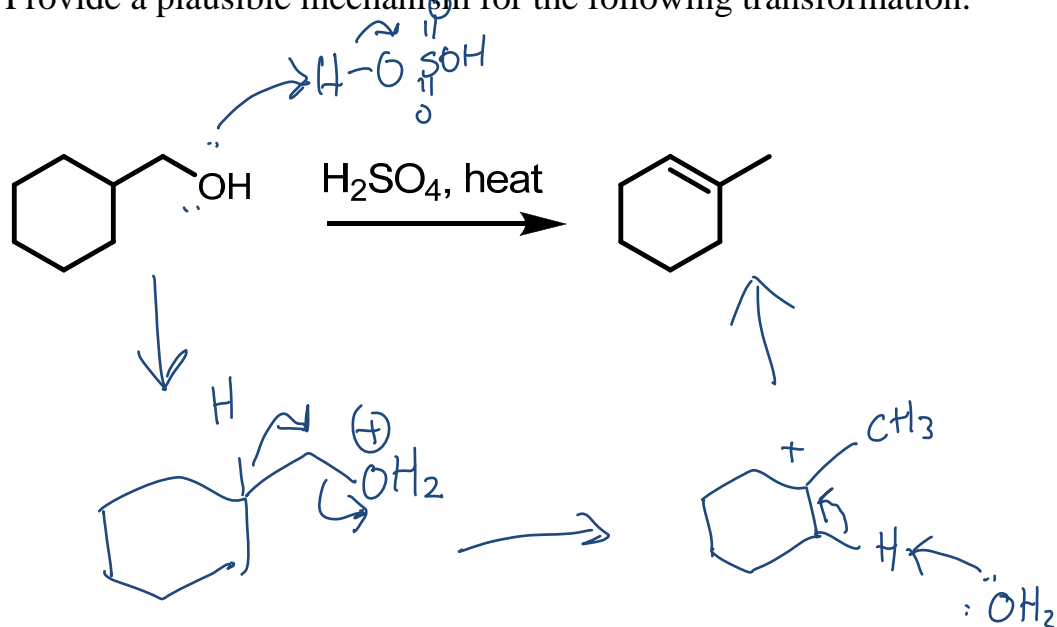




Provide reagents to effect the following transformations. More than one step may be required.

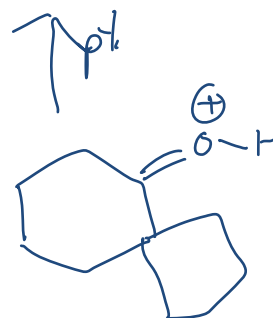
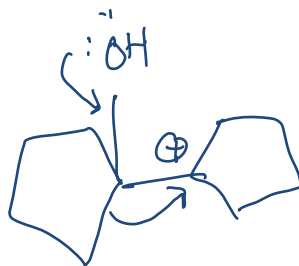
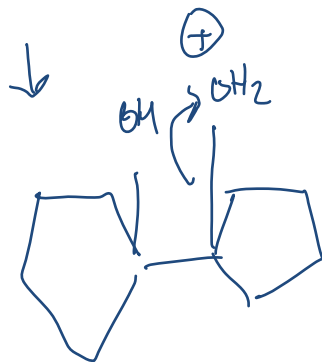
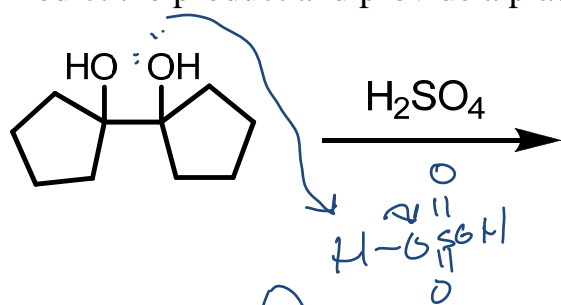


Provide a plausible mechanism for the following transformation.





Predict the product and provide a plausible mechanism.



Pinacol rearrangement