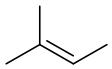
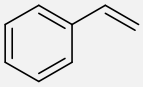
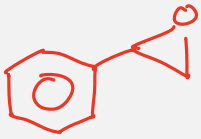
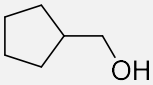
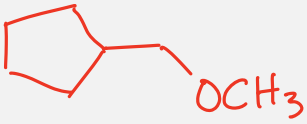
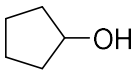
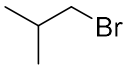
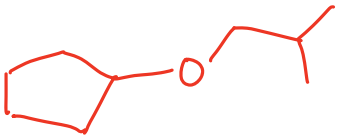
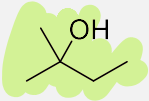
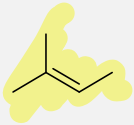
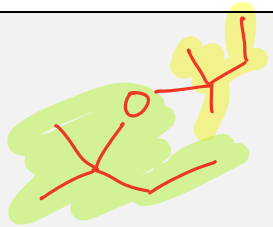
Chapter 13 Worksheet – Ethers & Epoxides

13A. Alkene Reactions - Draw the product of the reaction between each alkene (**1-3**) with reagents **(a)-(c)**.

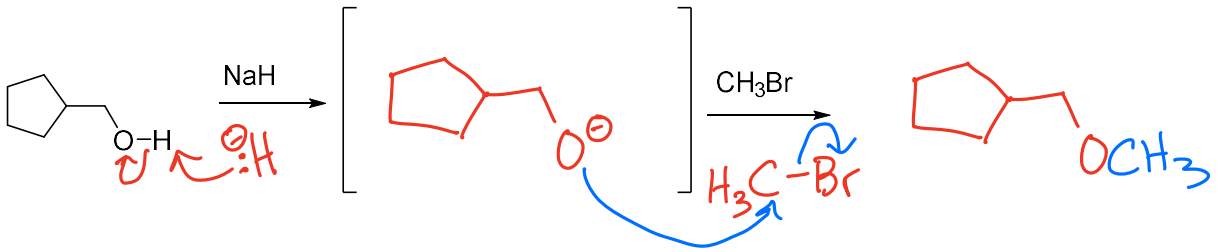
	Starting Material	Reagents *& translation*	Draw the Product
1		**(a) 1. Hg(OAc), H_2O** **2. $NaBH_4$** Oxymercuration / demercuration *Mercury (II) acetate and water, followed by sodium borohydride*	
2		**(b) 1. Hg(OAc), CH_3OH** **2. $NaBH_4$** Alkoxymercuration / demercuration *Mercury (II) acetate and alcohol, followed by sodium borohydride*	
3		**(c) *m*-CPBA** *meta-chloroperoxybenzoic acid*	

13B. Alcohol Reactions - Draw the **product** between each **alcohol (4-6)** and **reagents (d – f).**

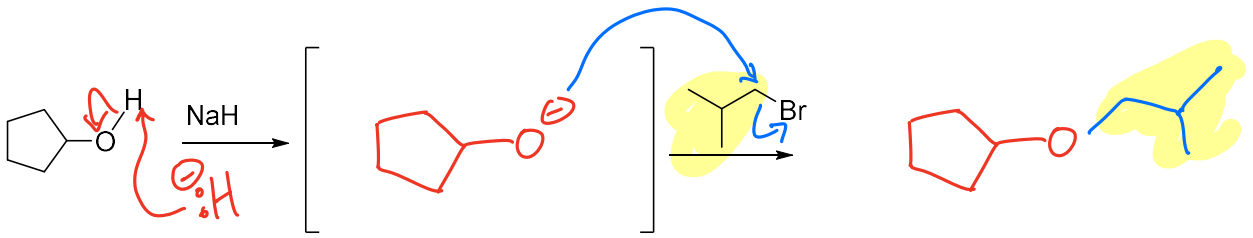
	Starting Material	Reagents *& translation* *know this mechanism	Draw the Product
4		***(d) 1. NaH** **2. CH_3Br** *Sodium hydride followed by methyl bromide*	
5		***(e)** **1. NaH** **2.**  *Sodium hydride followed by isobutyl bromide*	
6		**(f)** **1. $Hg(OAc)_2$**  **2. $NaBH_4$** Alkoxymercuration / demercuration *Mercury (II) acetate and alkene, followed by sodium borohydride*	

13B Alcohol Reaction Mechanisms – Draw the reaction mechanism and product for the reactions below.

(4d)

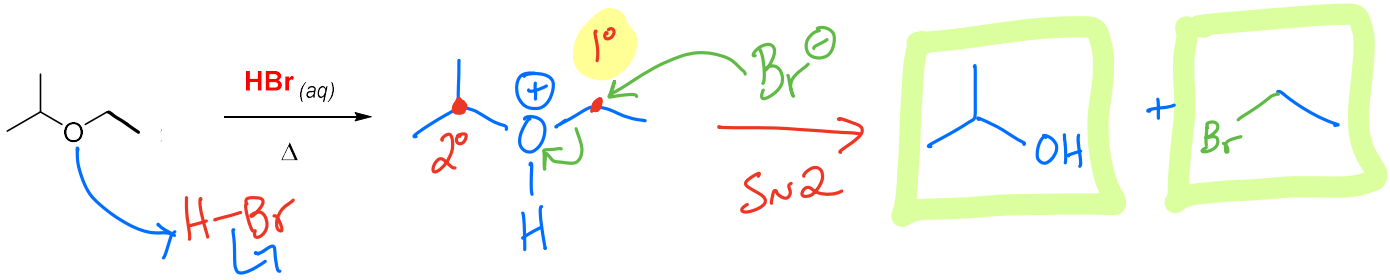


(5e)



13C Acidic Ether Cleavage. React ethers **7 & 8** with **aqueous HBr** and **heat**. Draw the mechanism for each.

7.



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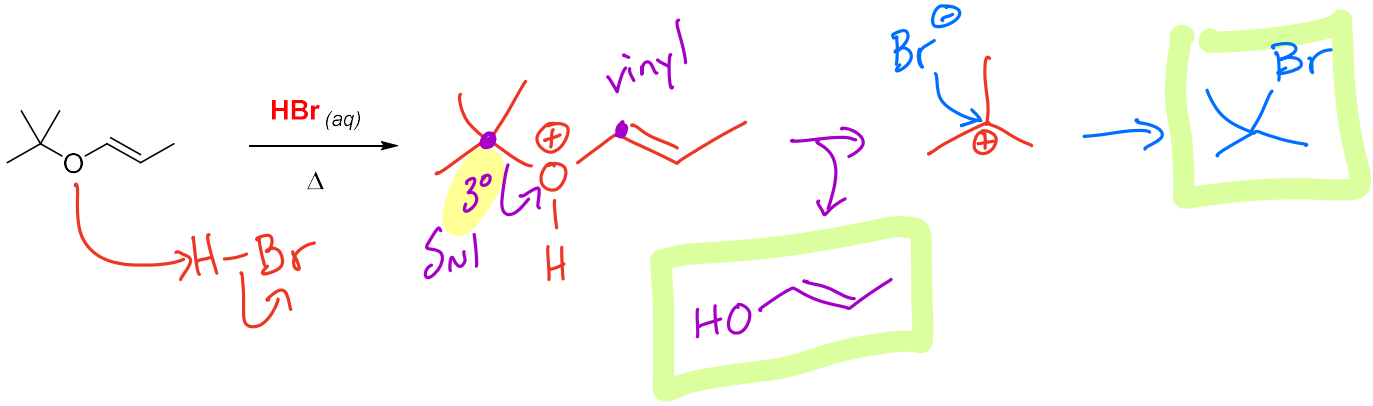
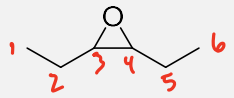
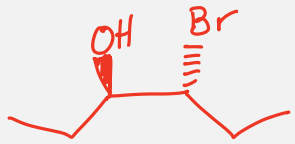
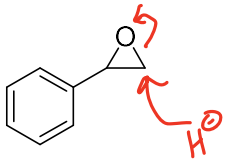
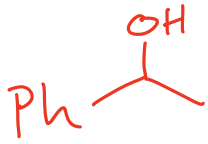
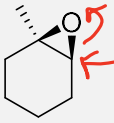
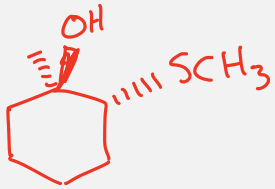
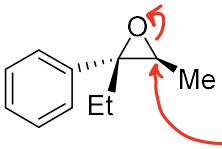
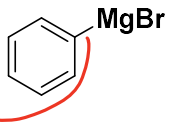
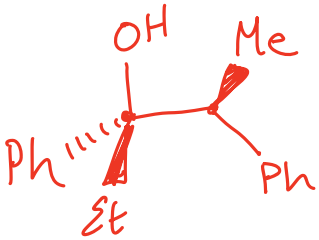
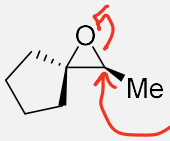
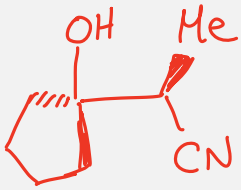
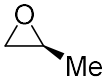
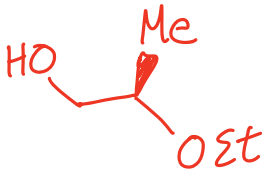


13D Epoxide-Opening Reactions. Draw the product of the reaction between epoxides **9-14** and reagents **g-l**.

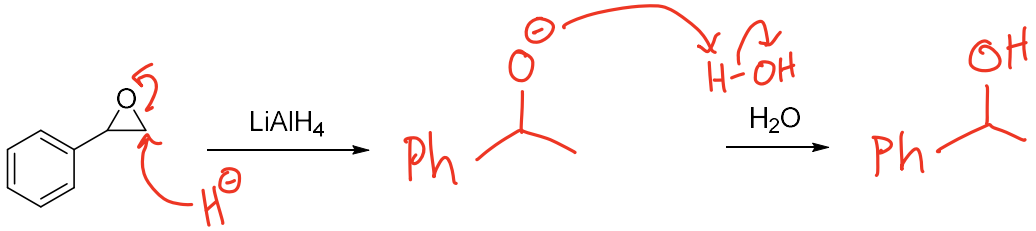
- Consider drawing the mechanisms on the next page to come up with the product.

	Starting Material	Reagents *& translation* *know this mechanism	Draw the Product with stereochemistry (wedges & dashes on chiral centers)
9		***(g) HBr** acidic *Hydrobromic acid*	
10		*** (h) 1. $LiAlH_4$** basic **2. H_2O** *lithium aluminum **hydride** followed by water*	
11		*** (i) 1. $NaSCH_3$** basic **2. H_2O** *Sodium **methyl thiolate** followed by water*	
12		*** (j)** **1.**  basic **2. H_2O** ***Phenyl** magnesium bromide followed by water*	
13		***(k) 1. NaCN** basic **2. H_2O** ***Sodium cyanide followed by water***	
14		***(l) EtOH, [H_2SO_4]** ***Ethanol** with sulfuric acid catalyst*	

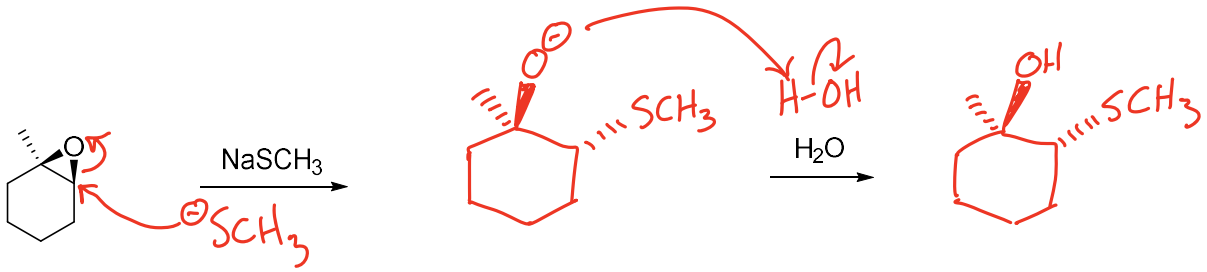
13D Epoxide-Opening Reaction Mechanisms - Draw the reaction mechanism and product for each reaction.

(9g)

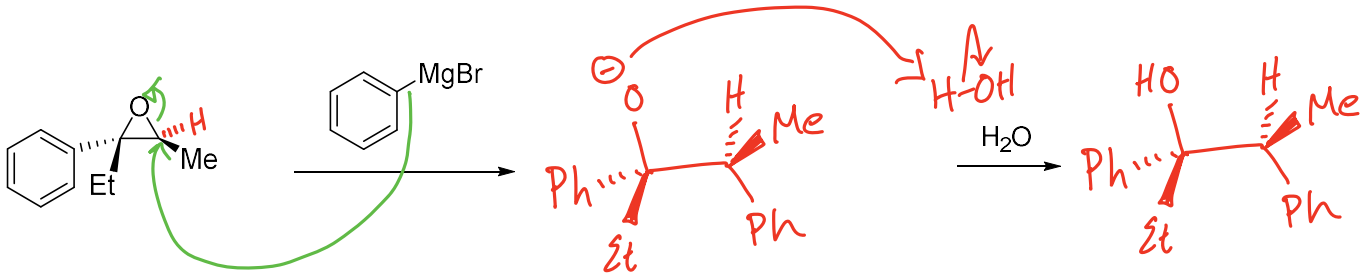
(10h)



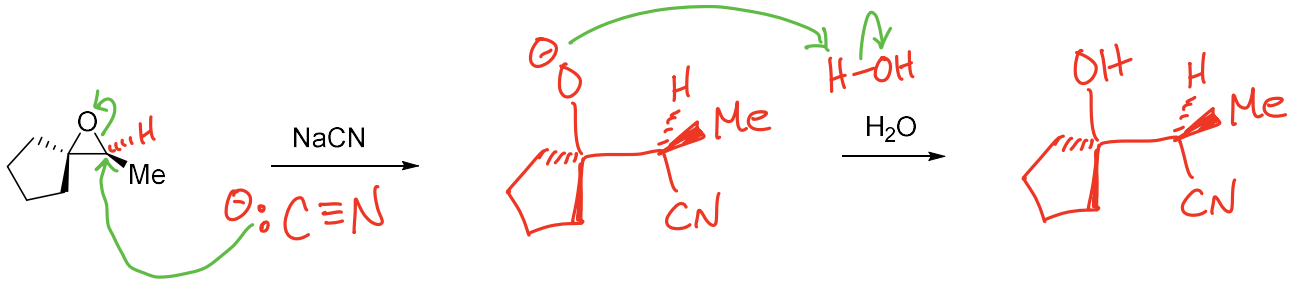
(11i)



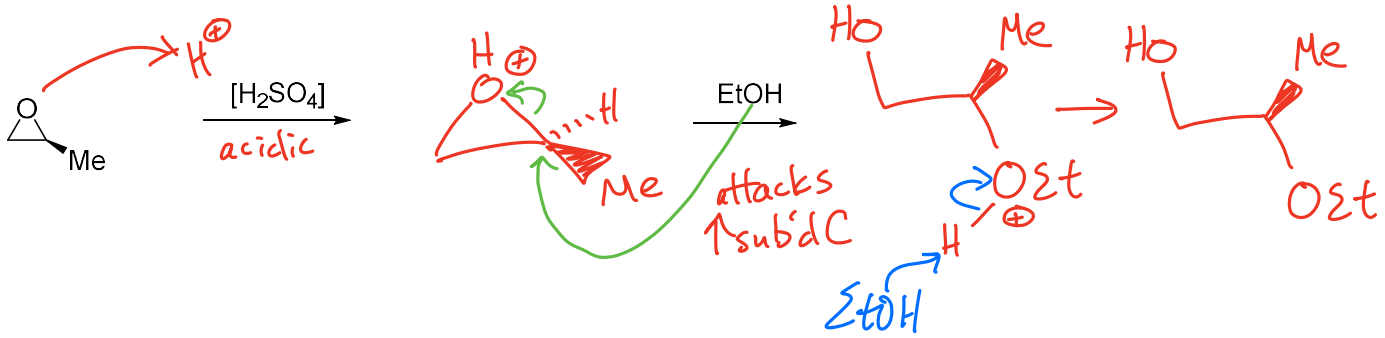
(12j)



(13k)

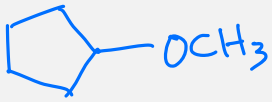
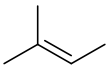
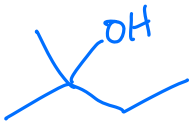
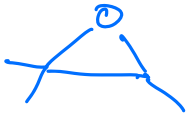
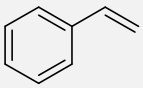
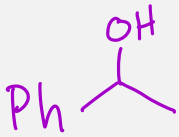
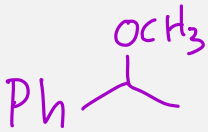
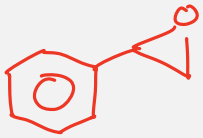


(14l)

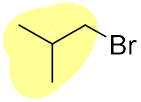
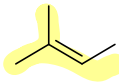
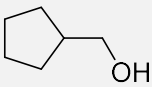
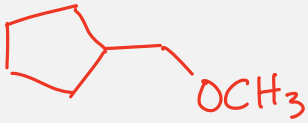
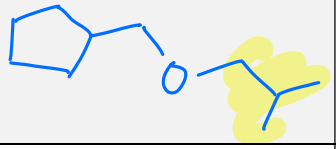
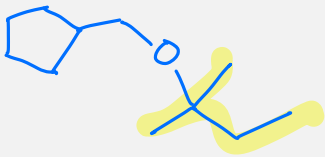
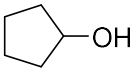
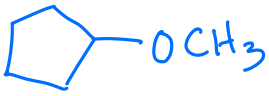
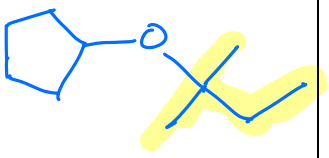
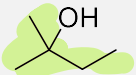
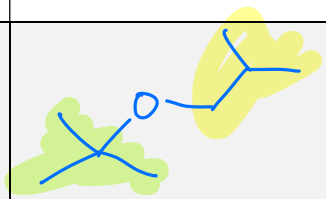
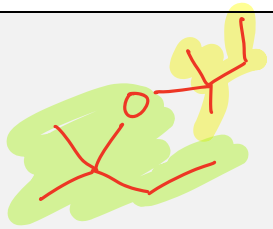


BONUS: Mix & Match with Reaction Bootcamp!

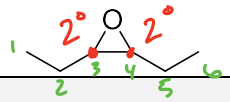
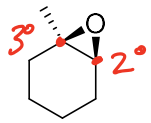
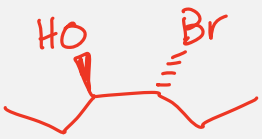
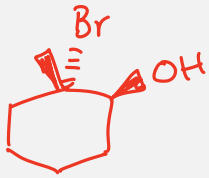
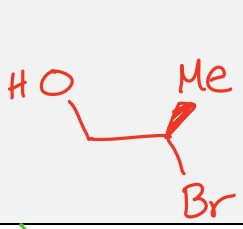
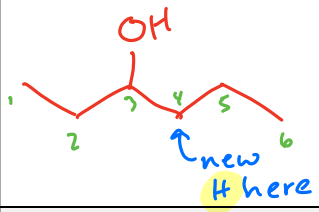
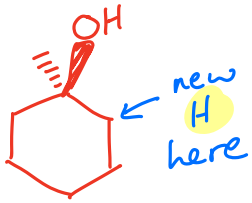
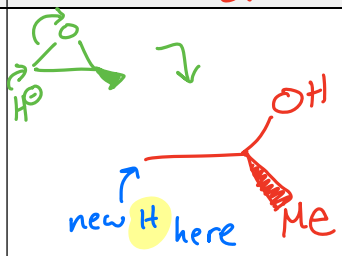
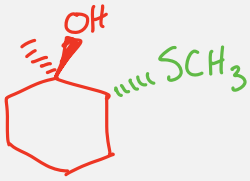
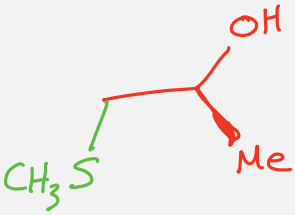
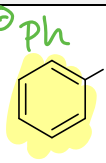
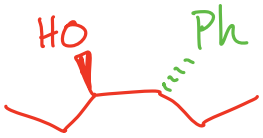
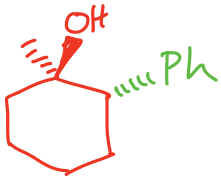
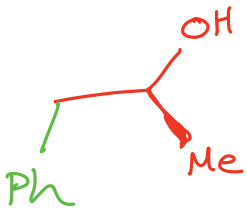
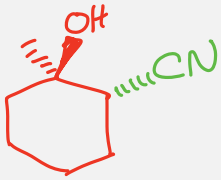
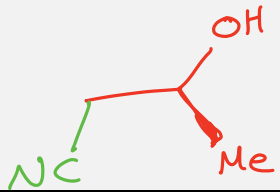
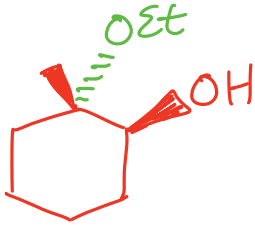
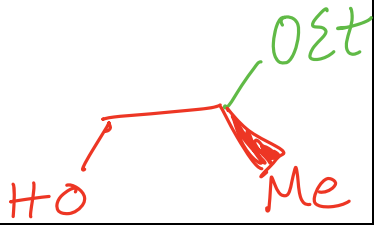
13A Alkene Reactions

	Starting Material	(a) 1. Hg(OAc), H_2O 2. $NaBH_4$	(b) 1. Hg(OAc), CH_3OH 2. $NaBH_4$	(c) *m*-CPBA
1				
2				
3				

13B Alcohol Reactions

	Starting Material	(d) 1. NaH 2. CH_3Br	(e) 1. NaH 2. 	(f) 1. $Hg(OAc)_2$  2. $NaBH_4$
4				
5				
6				

BONUS: Mix & Match with Reaction Bootcamp!

Reagents	9. 	11. 	14. 
SN1 acidic Br goes to more sub'd C **(g) HBr** *Hydrobromic acid*			
basic SN2 H goes to less sub'd C **(h) 1. $LiAlH_4$** **2. H_2O** *lithium aluminum* ***hydride*** *followed by water*			
$^{\ominus}SCH_3$ basic SN2 goes to less sub'd C **(i) 1. $NaSCH_3$** **2. H_2O** *Sodium* ***methyl thiolate*** *followed by water*			
(j) **1.**  $^{\ominus}Ph$ **MgBr** basic SN2 **2. H_2O** ***Phenyl*** *magnesium bromide followed by water*			
(k) 1. NaCN $^{\ominus}:CN$ **2. H_2O** *Sodium* ***cyanide*** *followed by water*			
(l) EtOH, [H_2SO_4] nuc acidic ***Ethanol*** *with sulfuric acid catalyst* SN1			

EtO goes to more sub'd C, if there is one