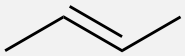
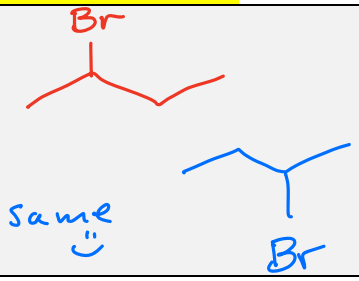
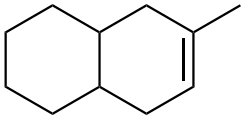
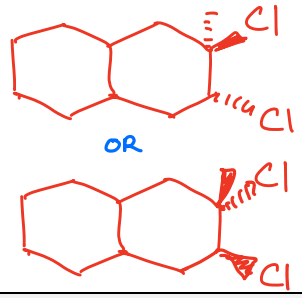
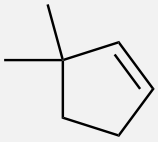
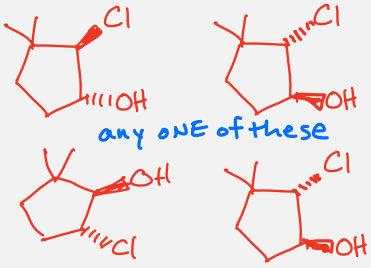
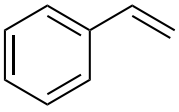
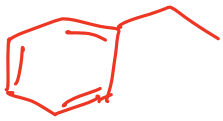
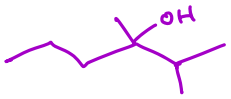
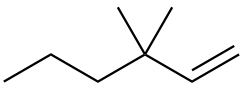
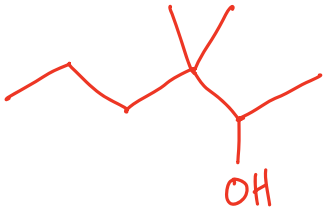
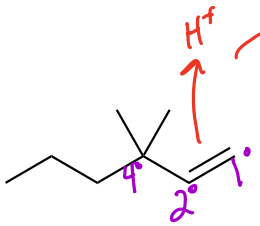
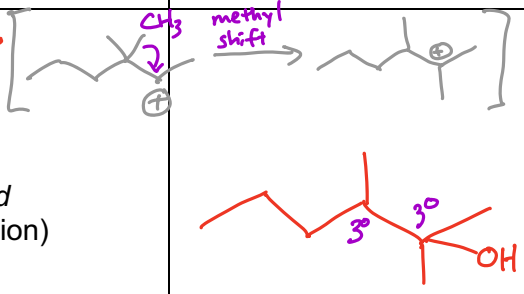
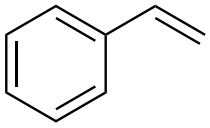
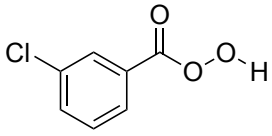
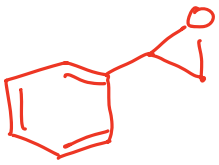
CHEM 8B Chapters 13-14 Homework – Alkene Reactions and Conjugated/Aromatic Compounds

Includes Chapter 12 alkene reactions

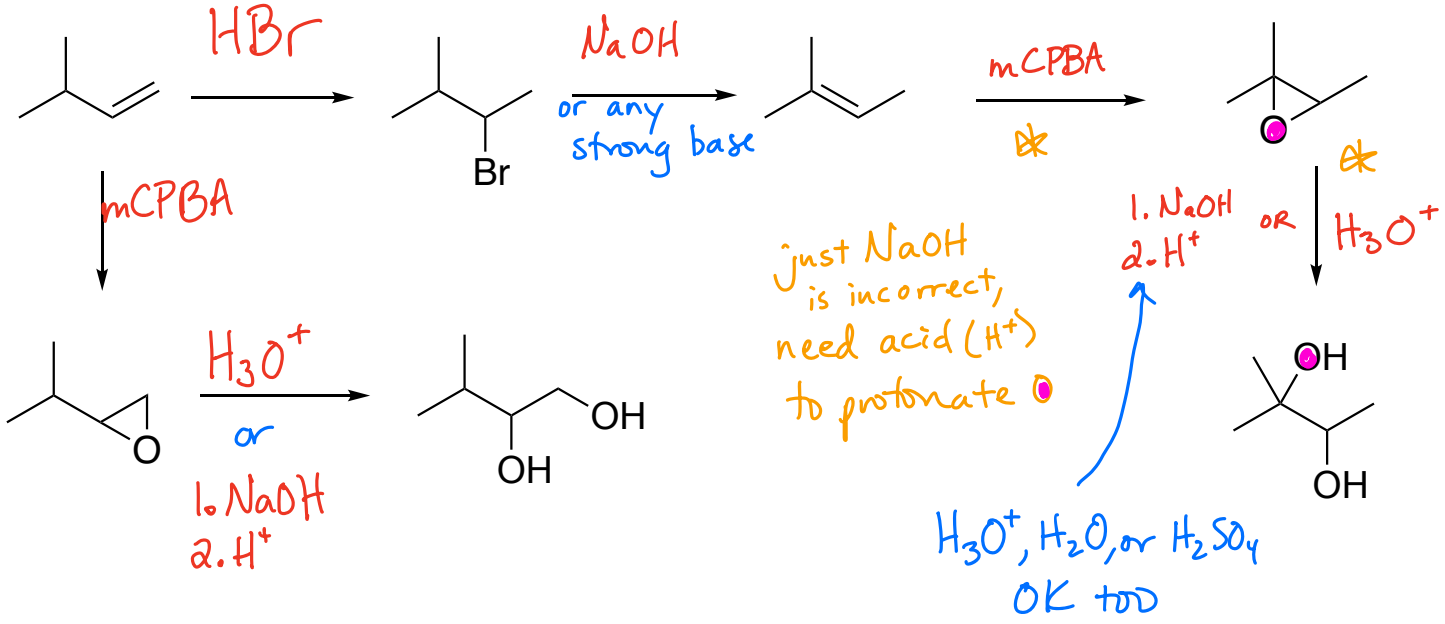
- Draw the product of each reaction: **starting material + reagent → Product.**
- Several correct products may be possible. **Draw ONE product to be graded** in the box.

	Starting Material	Reagents *& translation* * know this mechanism	Draw ONE Product	Alternate reagent
1		*** (a) HBr** *Hydrobromic acid* (Chapter 12 reaction)		Different halide, same mechanism: **HCl**, hydrochloric acid **HI**, hydroiodic acid
2		***(b) Cl_2** *Chlorine*		Different halide, same mechanism: Br_2, bromine I_2, iodine
3		***(c) Cl_2, H_2O** *Chlorine in water*		Different halide, same mechanism: Br_2, H_2O bromine in water I_2, H_2O in water
4		**(d) H_2, Pd** Hydrogen gas over palladium metal		H_2 with Pt, Ni, Ni_2B
5		**(e) 1. BH_3, THF** **2. H_2O_2, NaOH** *Hydroboration with borane in THF, then oxidation with basic peroxide*		No alternate reagent; this is a very unique reaction!

(6f) incorrect RRGT product  7pts

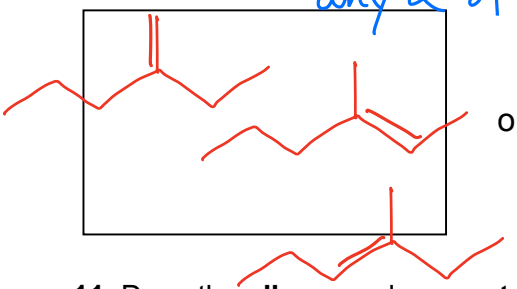
	Starting Material	Reagents & *translation* * know this mechanism	Draw ONE Product	Notes / Alternate reagents
6		**(f)** 1. $Hg(OAc)_2$, **H_2O** 2. $NaBH_4$ *Oxymercuration with mercury (II) acetate, **water**, then reduction with sodium boro**hydride***		Similar to **H_2O, H_2SO_4 -** except mechanism does not include carbocation (no hydride or alkyl shift possible)
7		***(g) H_2O, H_2SO_4** *Dilute sulfuric acid* (Chapter 12 reaction)		**H_3O^+** **Hydronium** is the reactive species in the mechanism
8		**(h) *m*CPBA**  *meta-chloro**peroxy**benzoic **acid***		peroxy acids peracetic acid CH_3CO_3H

9. Fill in the missing reagent(s) over each arrow.



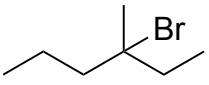
10. Draw **TWO potential alkene(s)** and necessary **reagent(s)** to synthesize this alkyl bromide.

any 2 of these



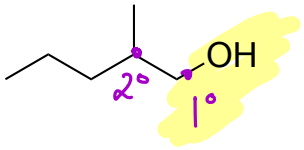
or

hydride shift occurs in the mechanism!

$\xrightarrow[\text{Ch 12}]{HBr}$ 

11. Draw the **alkene** and **reagents** needed to synthesize this alcohol.

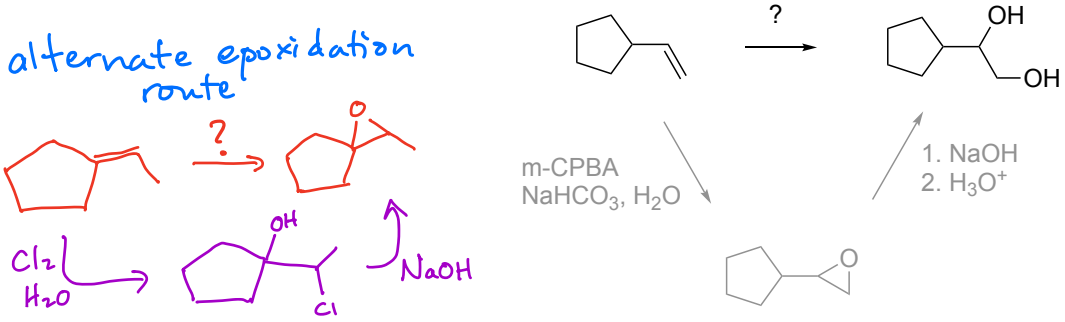
OK if missing solvent

$\xrightarrow[2.\ H_2O_2,\ NaOH]{1.\ BH_3,\ THF}$ 

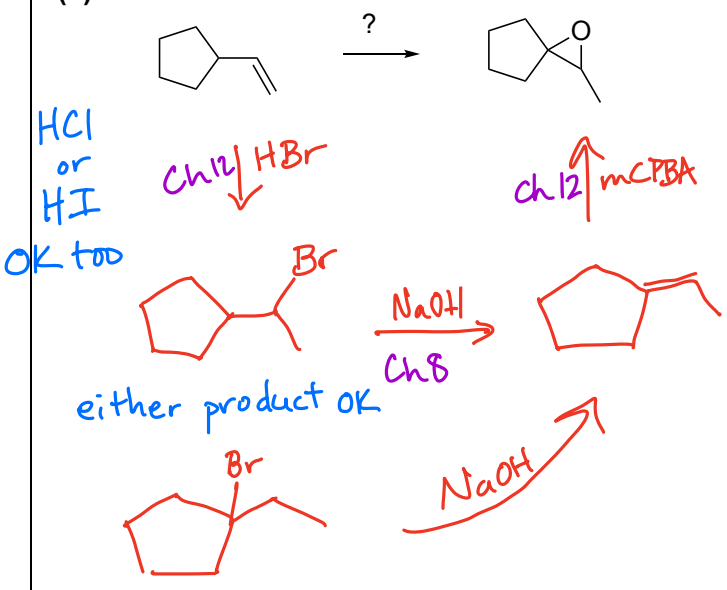
Ch 13 hydroboration oxidation product

12. Use your organic reaction toolbelt to propose a **multi-step synthesis** for each transformation below.

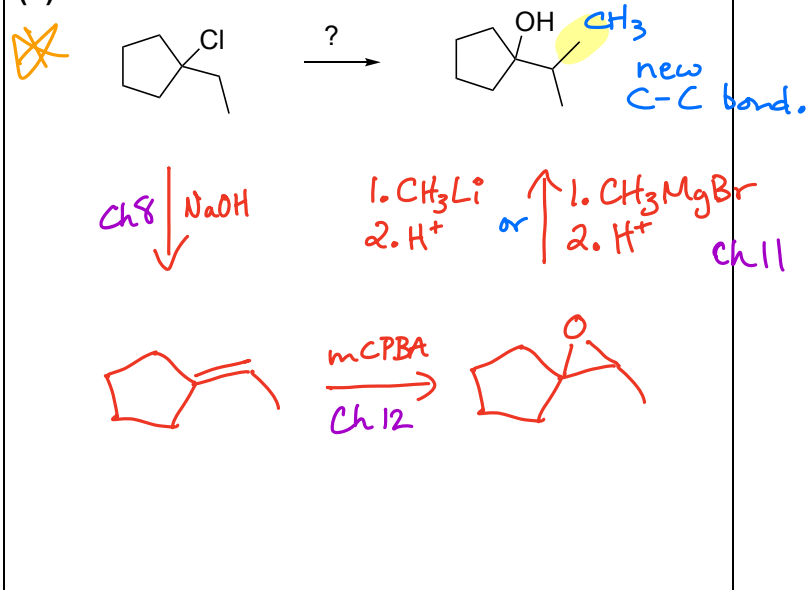
- Each problem requires **at least 2 synthetic steps** (reactions).
- **No mechanisms** (curved arrow notation) required.
- Include all **reagents** and draw the **product** of each reaction.
  - Worked Example:



(a)



(b)

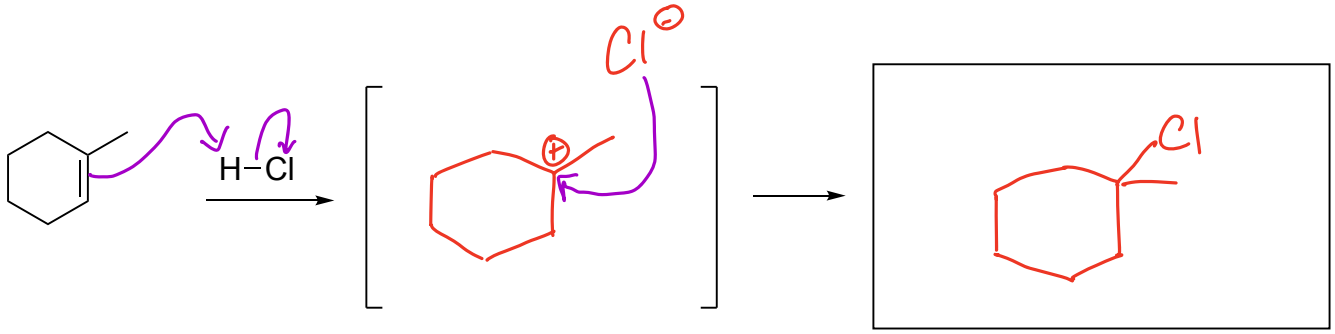


MORE PRACTICE: Mechanisms

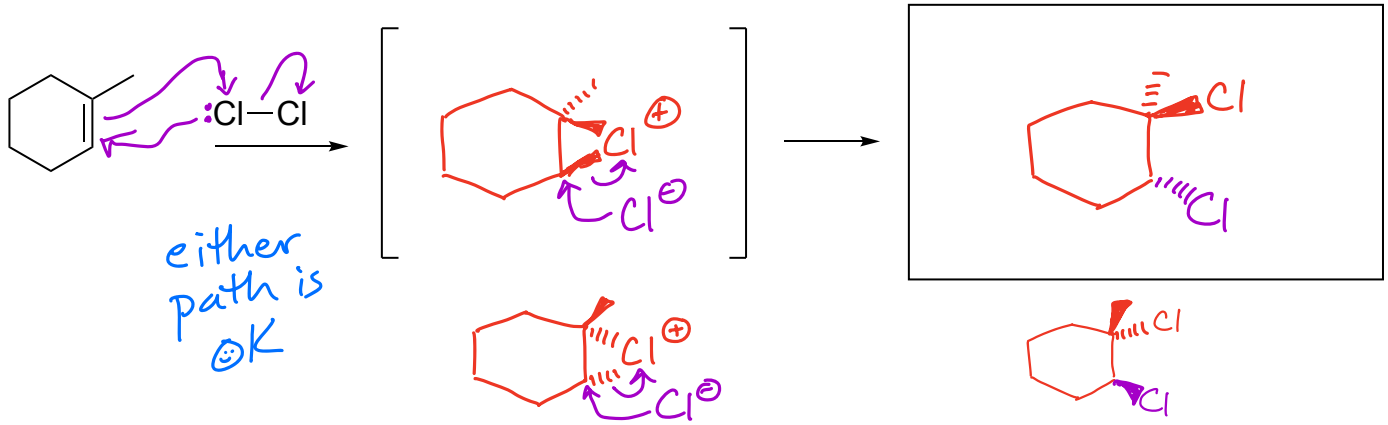
added 1-16-24, NOT required in HW submission

13. Draw the **mechanisms** for both reactions with curved arrows and intermediate with labeled charges. Draw the **product** of the reaction in the box.

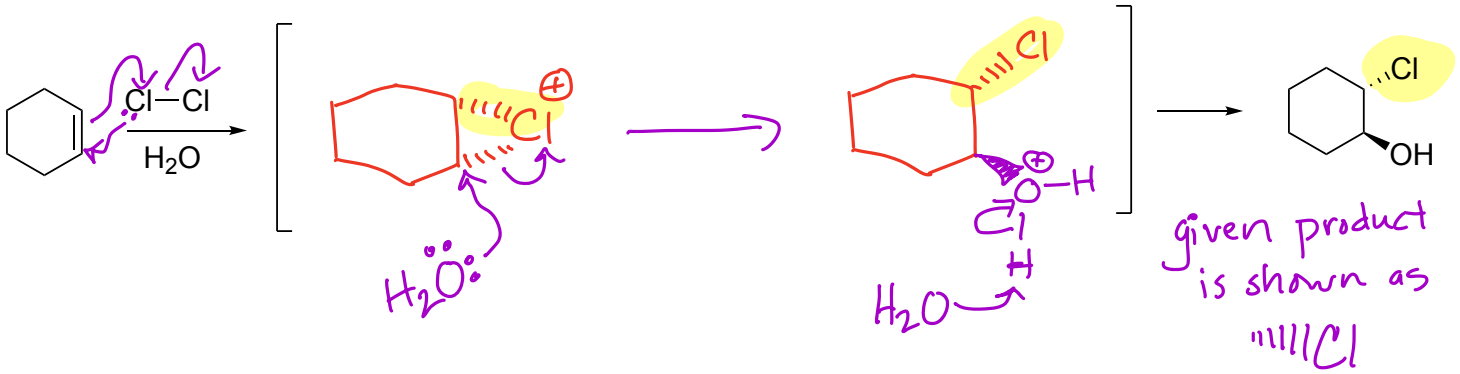
(a)

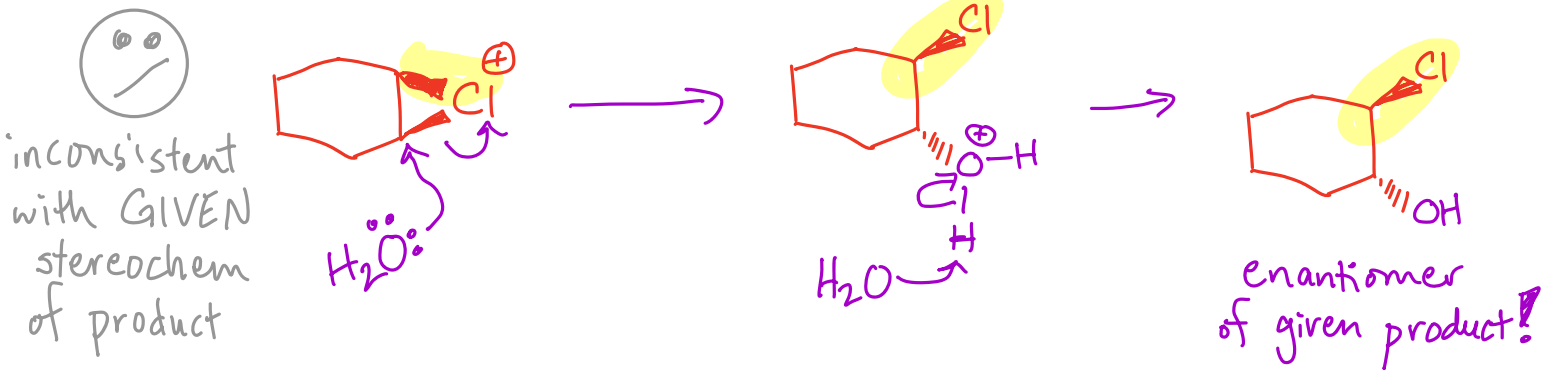


(b)



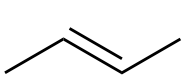
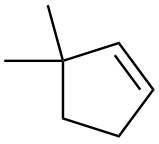
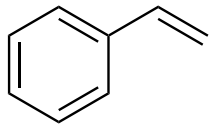
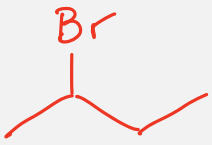
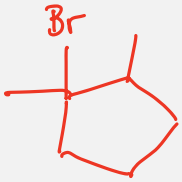
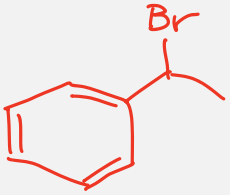
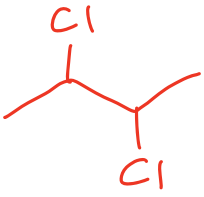
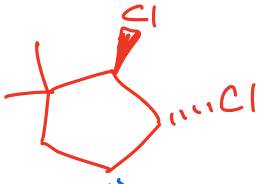
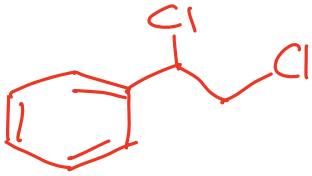
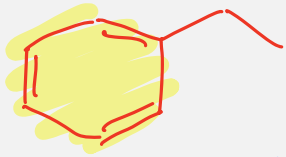
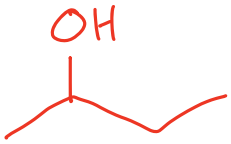
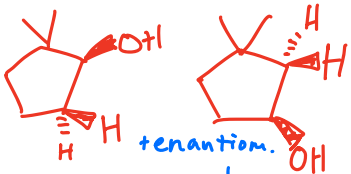
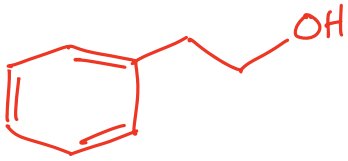
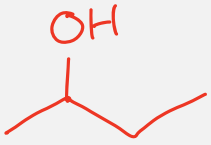
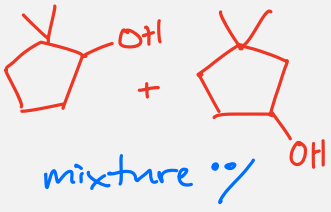
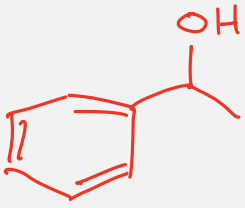
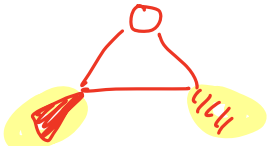
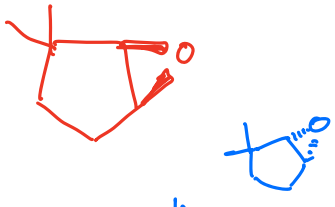
14. Draw the **mechanism** for this reaction, including curved **arrows** and **intermediates** with labeled charges.





MORE PRACTICE: Mix & Match with Reaction Bootcamp!

added 1-16-24, NOT required in HW submission

React each alkene **1-3** with each reagent below and draw the product in the box		**1** 	**2** 	**3** 
(a)	**HBr**		 C⊕ shift in mechanism!	
(b)	**Cl_2**		 + enantiomer	
(d)	**H_2, Pd**			 Benzene ≠ alkene! does NOT react
(e)	1. BH_3, THF 2. H_2O_2, Na**OH**		 tenantiom. messy mixture of regio ! stereo- isomers **	
(f)	1. $Hg(OAc)_2$, **H_2O** 2. $NaBH_4$		 mixture **	
(h)	***m*CPBA**	 trans-epoxide from trans-alkene	 enantiomer