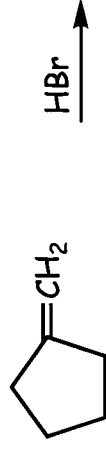


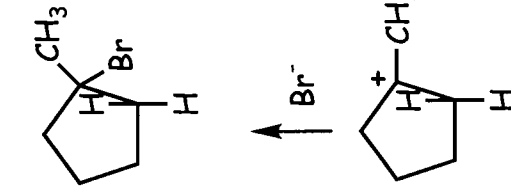
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A1



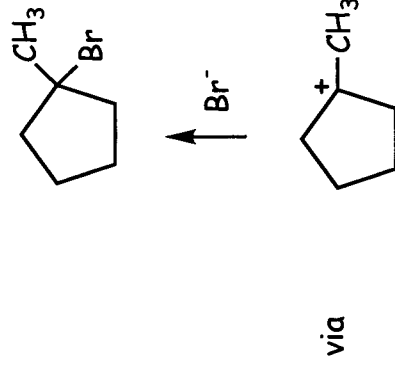
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A2



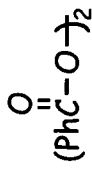
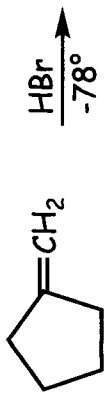
Answer:

NOTE: Markovnikov addition

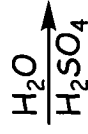
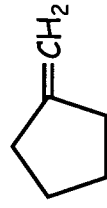
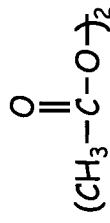


Answer:

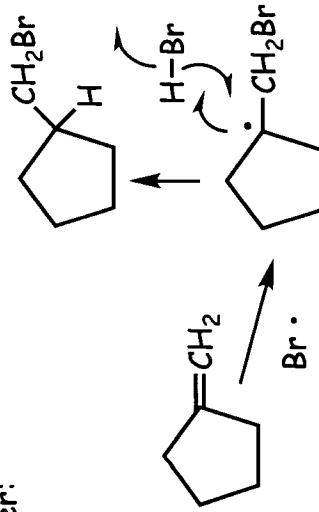
NOTE: Markovnikov addition



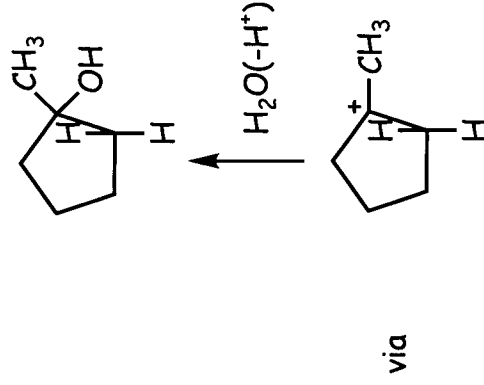
or



Answer:

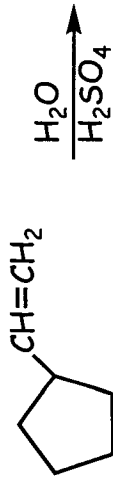


Answer:



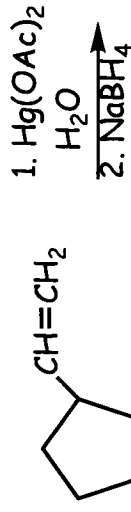
via

NOTE: Markovnikov addition



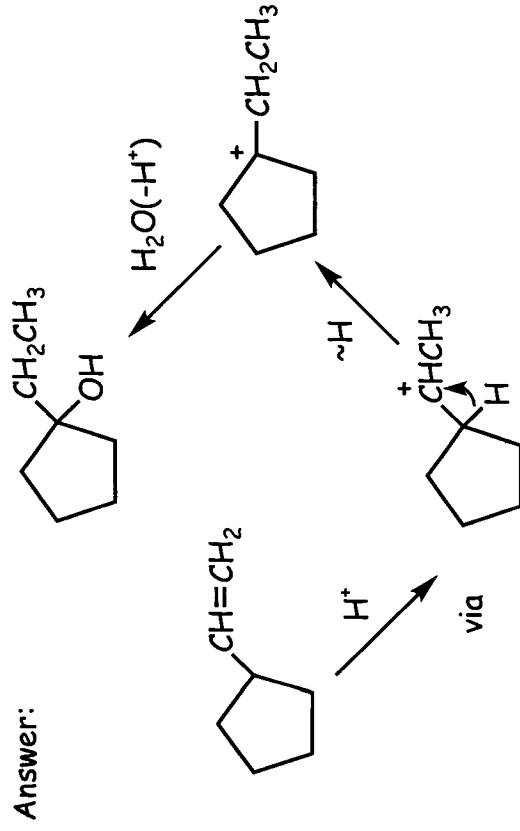
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A5

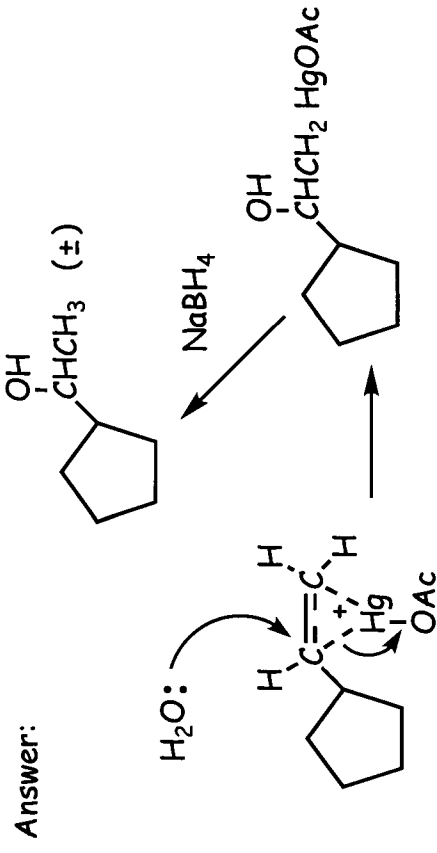


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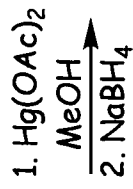
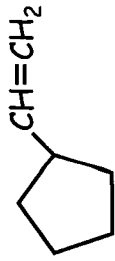
A6



NOTE: Markovnikov addition with rearrangement

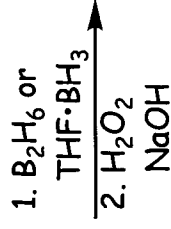
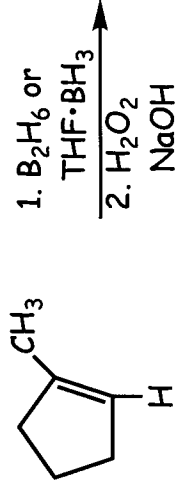


NOTE: Hydroxymercuration/demercuration



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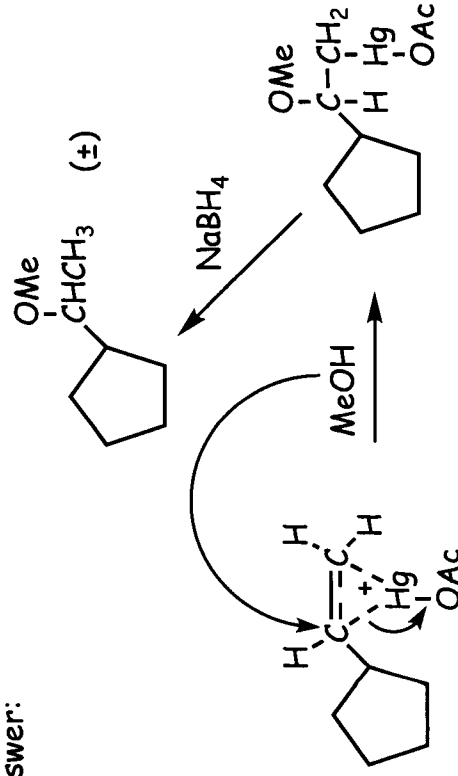
A7



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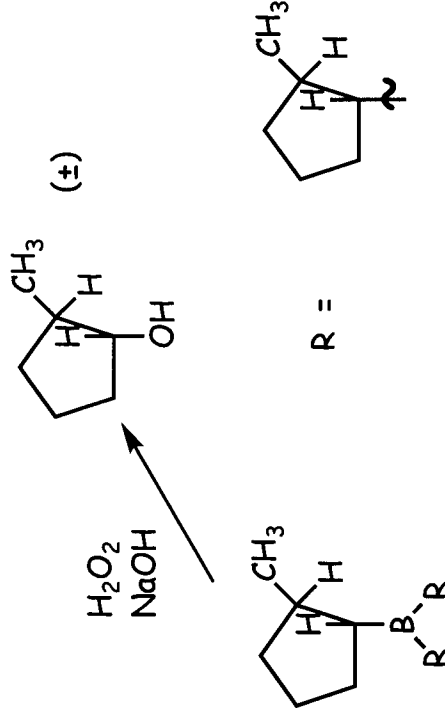
A8

Answer:

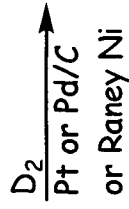
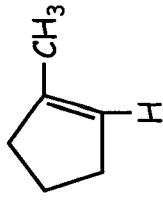


NOTE: Alkoxymercuration/demercuration

Answer:

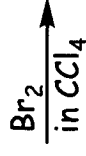
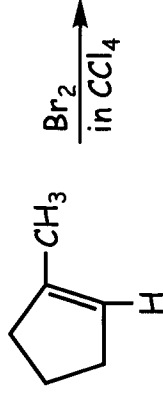


NOTE: Hydroboration/oxidation - syn addition



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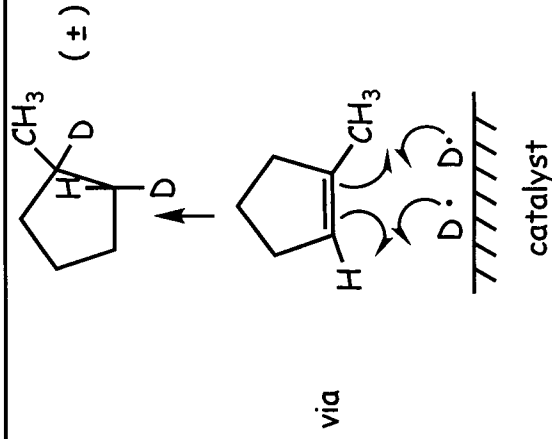
A9



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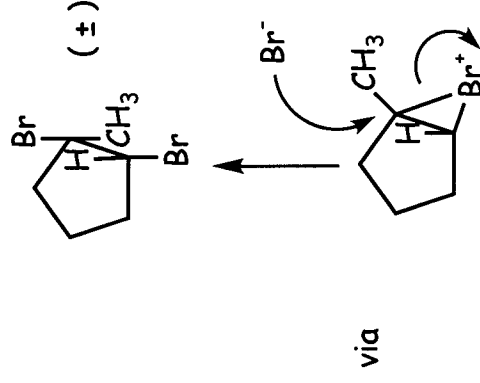
A10

Answer:

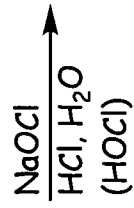
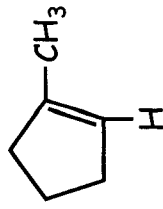


NOTE: Catalytic hydrogenation - syn addition

Answer:

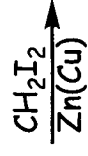
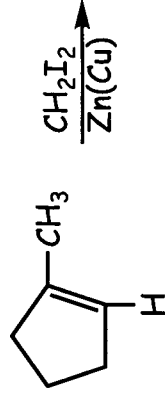


NOTE: Bromination-anti addition



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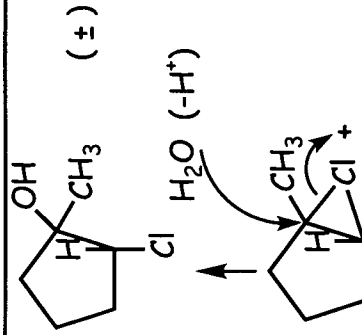
A11



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A12

Answer:

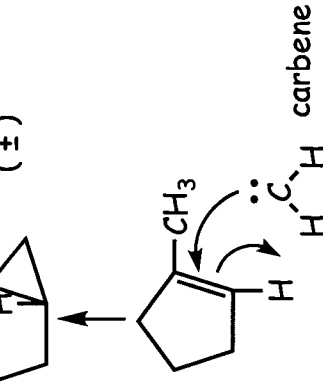


via

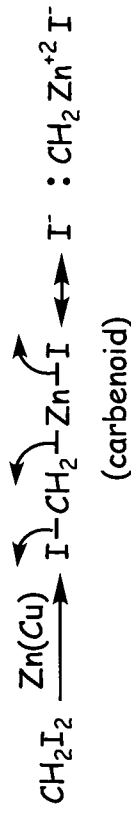
Answer:



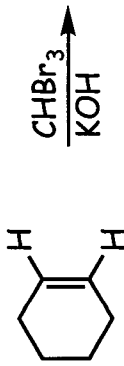
(±)



carbene

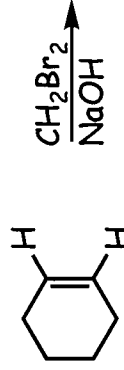


NOTE: Hydrochlorination - anti addition (Markovnikov)



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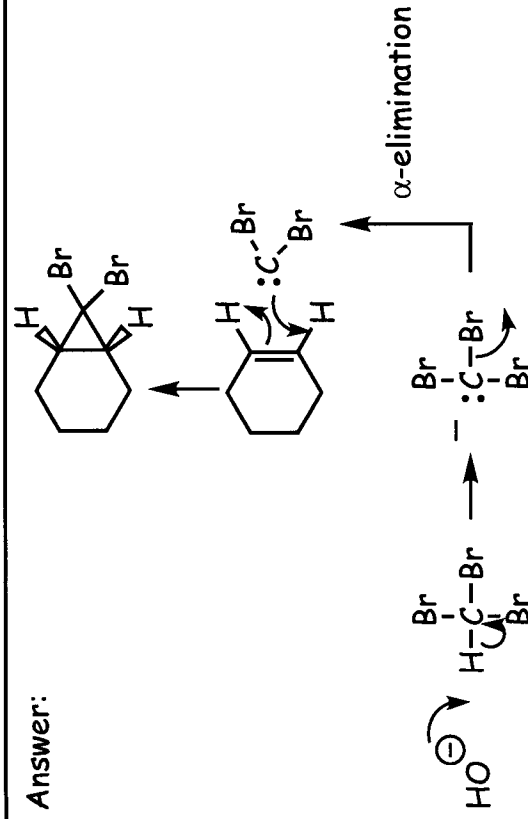
A13



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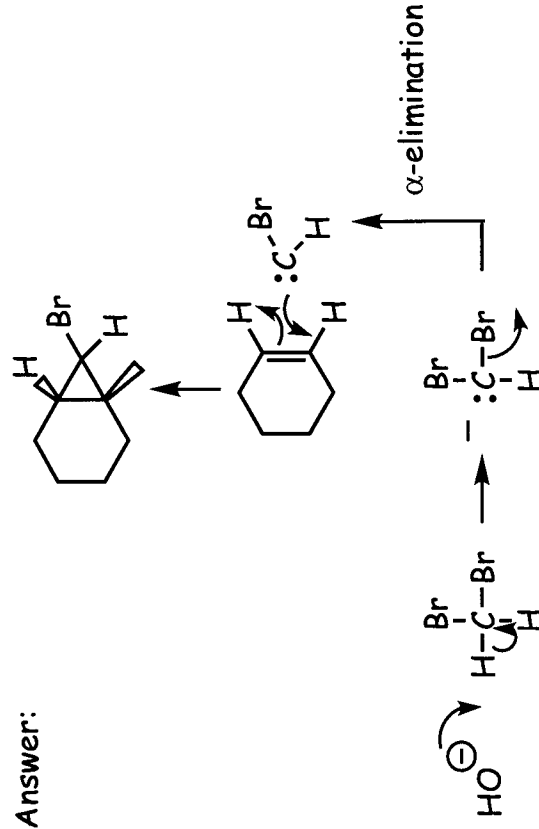
A14

Answer:

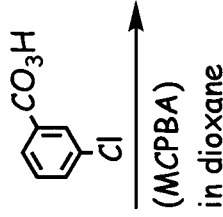
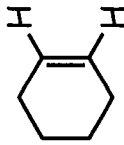


NOTE: Dibromocarbene is the electrophile

Answer:

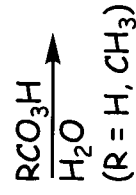
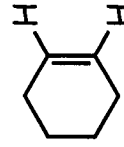


NOTE: Bromocarbene is the electrophile



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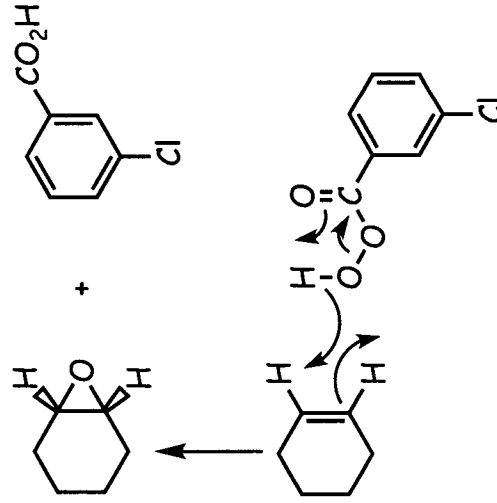
A15



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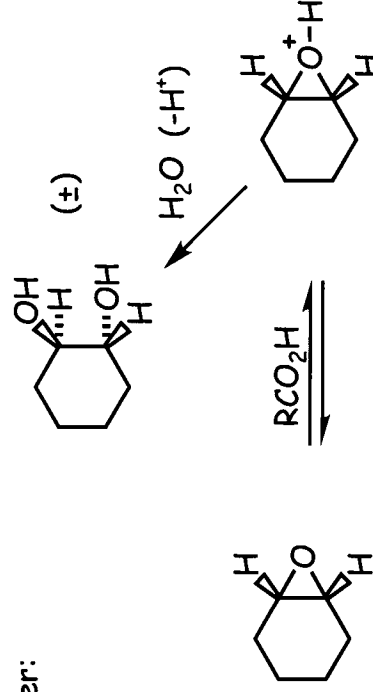
A16

Answer:

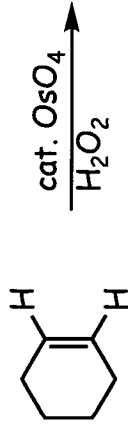


NOTE: Epoxidation reaction

Answer:

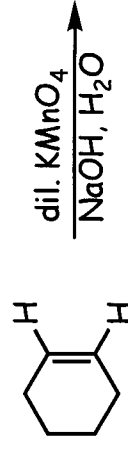


NOTE: Epoxidation followed by hydrolysis of the oxirane (anti-hydroxylation)



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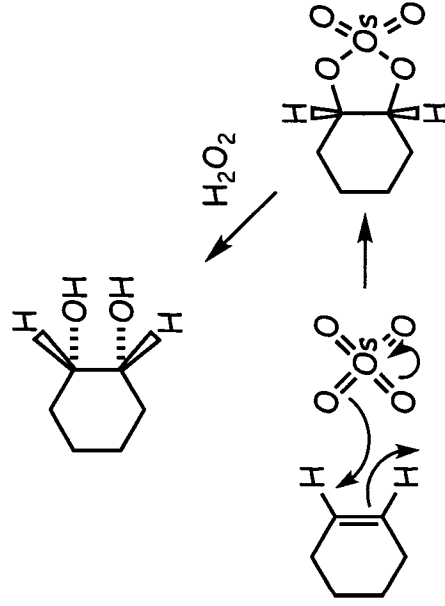
A17



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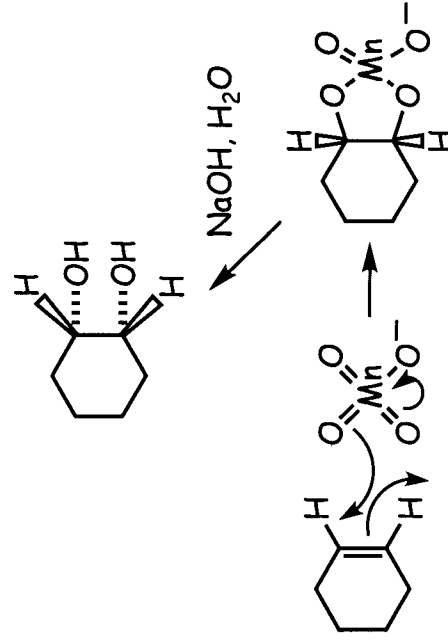
A18

Answer:

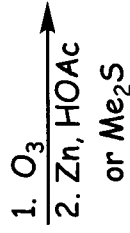
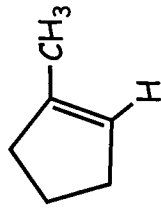


NOTE: *syn*-hydroxylation

Answer:

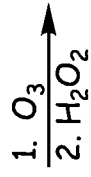
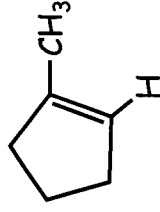


NOTE: *syn*-hydroxylation



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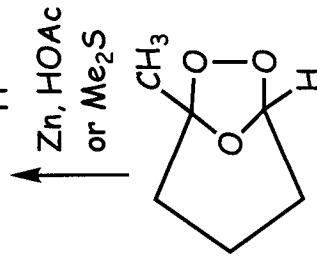
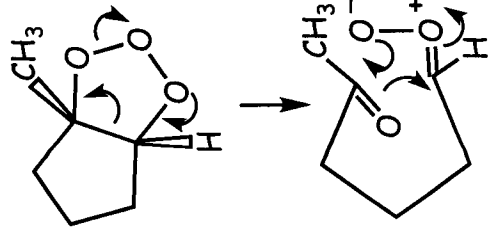
A19



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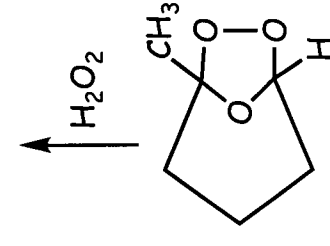
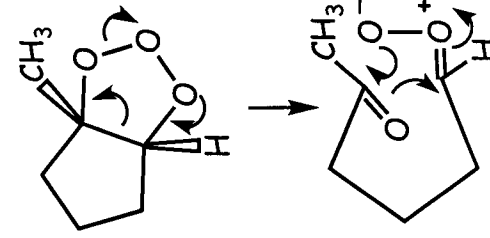
A20

Answer:



NOTE: Reductive Ozonolysis

Answer:

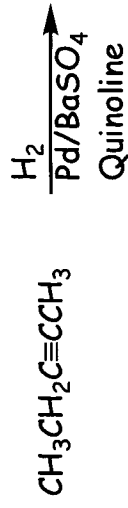


NOTE: Oxidative ozonolysis



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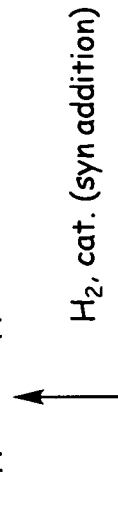
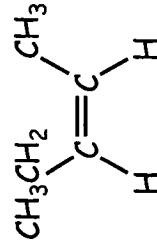
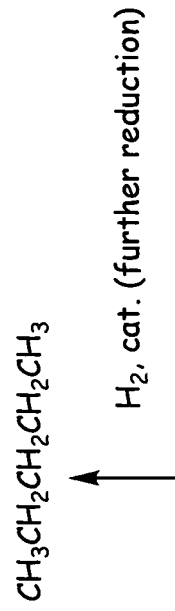
A21



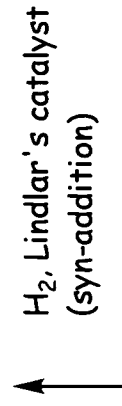
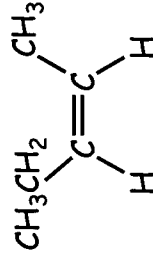
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A22

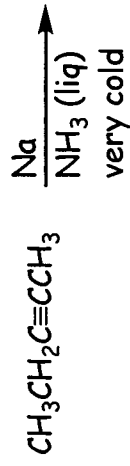
Answer:



Answer:

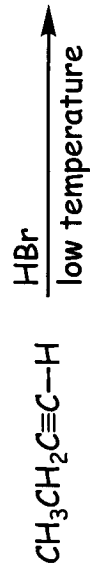


NOTE: Lindlar's catalyst can reduce alkynes to alkenes but can not reduce alkenes (poisoned catalyst).



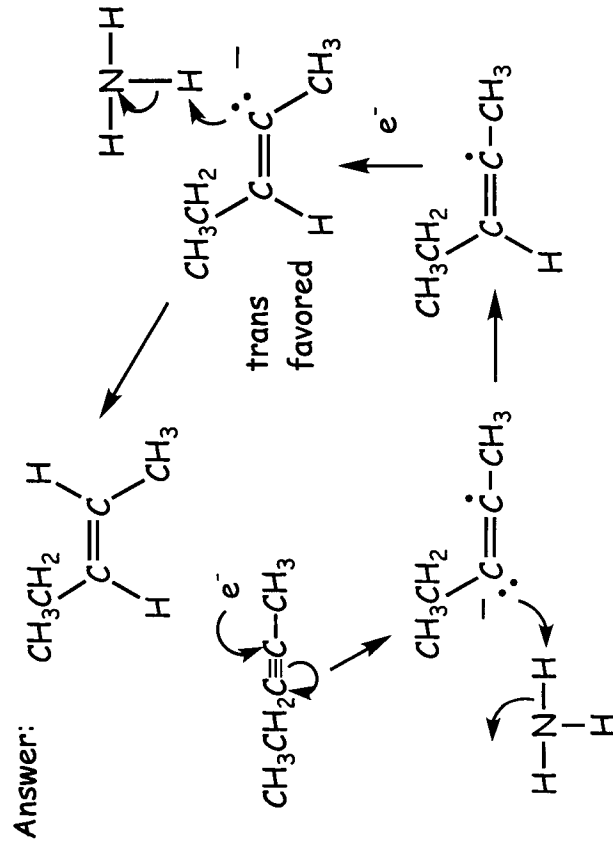
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A23

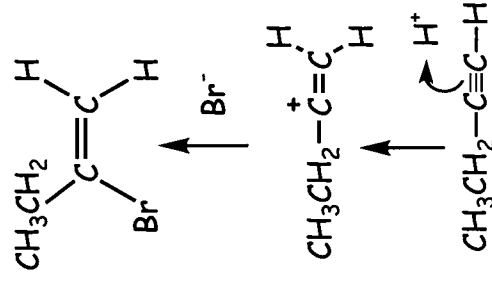


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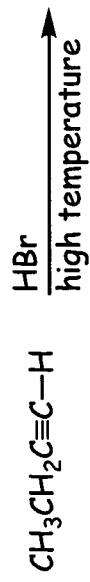
A24



Answer:

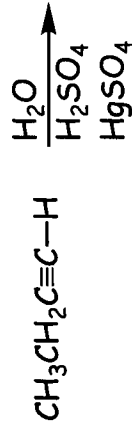


NOTE: Markovnikov addition



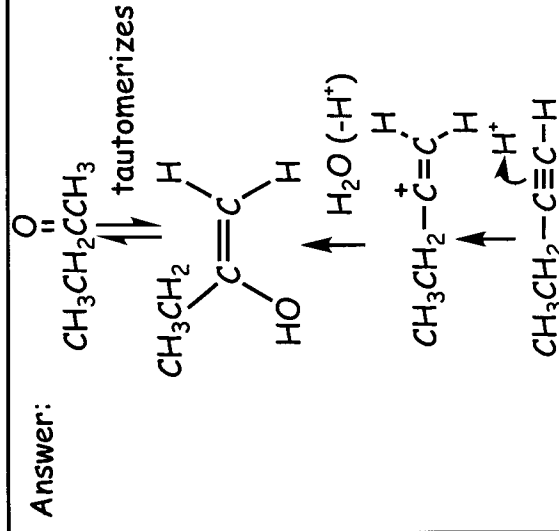
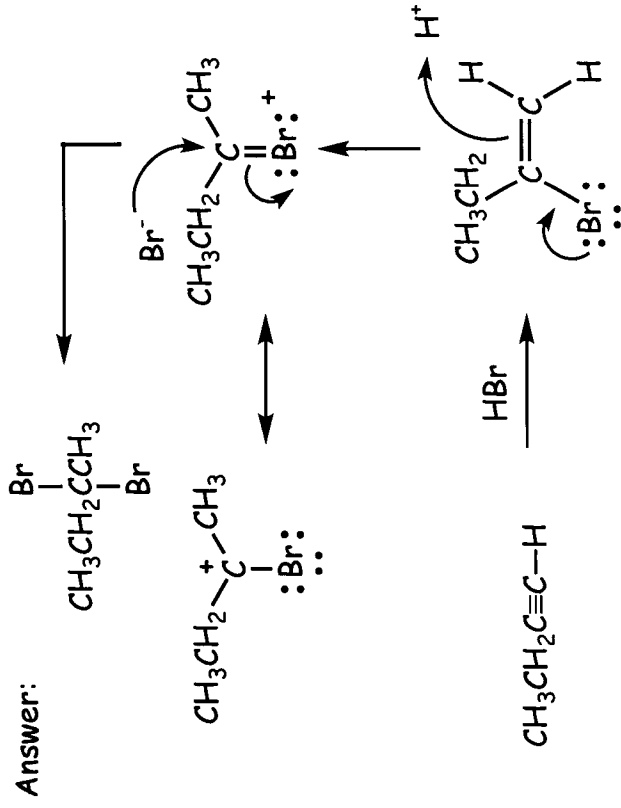
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A25

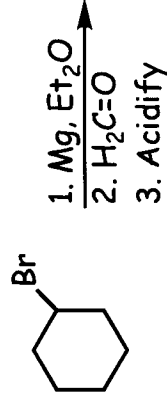
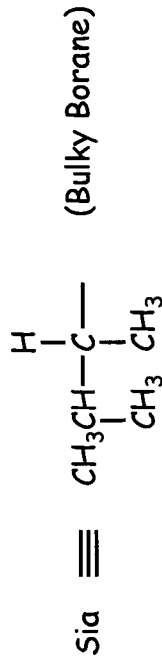
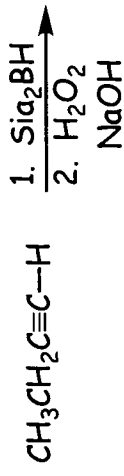


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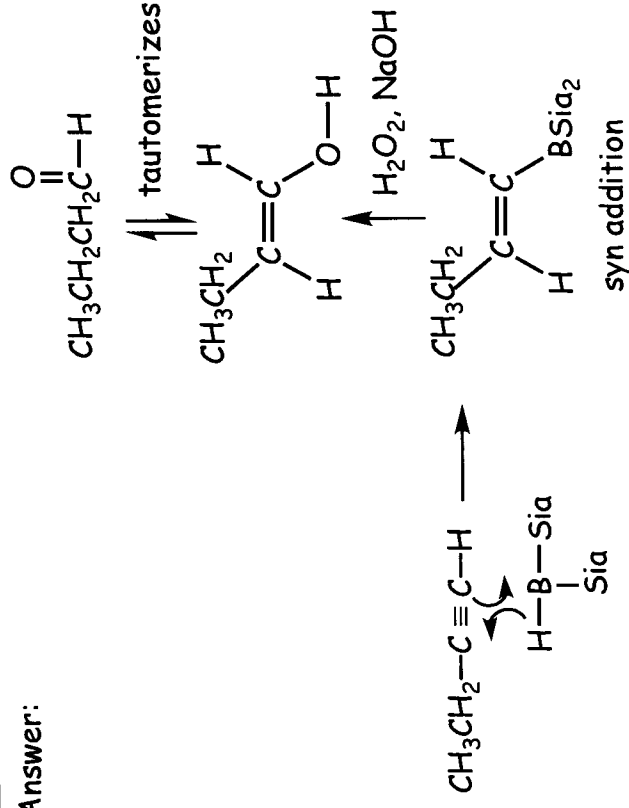
A26



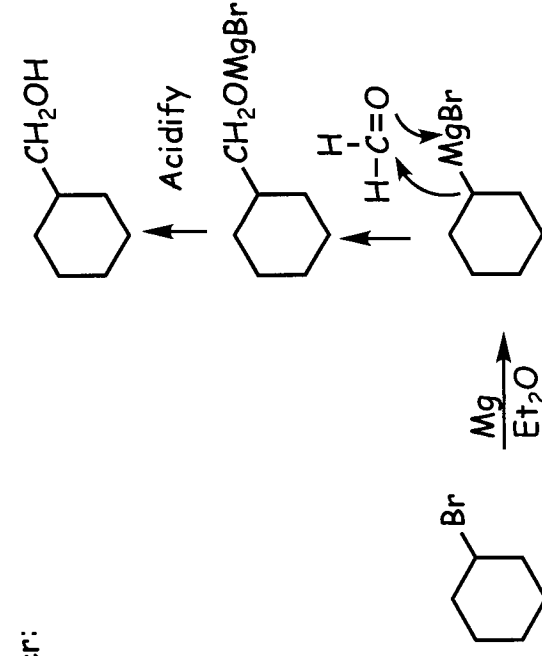
NOTE: Hg^{+2} catalyzes reaction; see text.

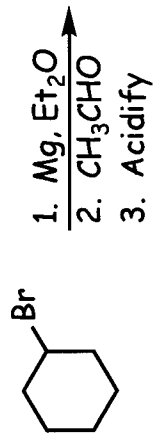


Answer:



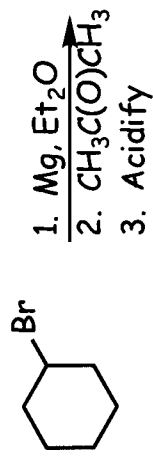
Answer:





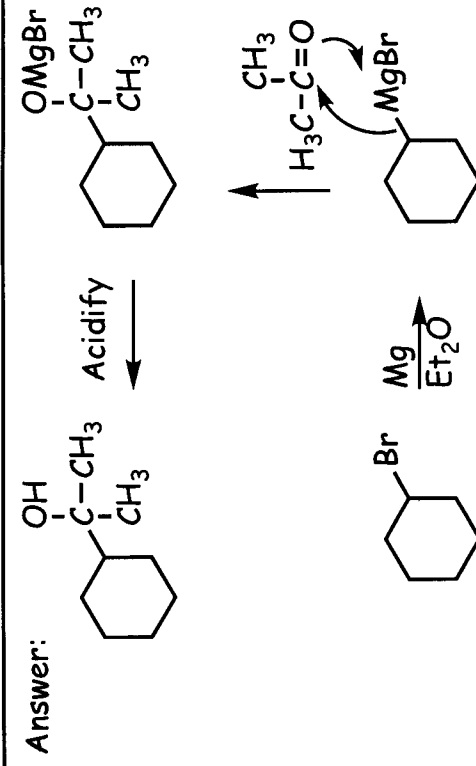
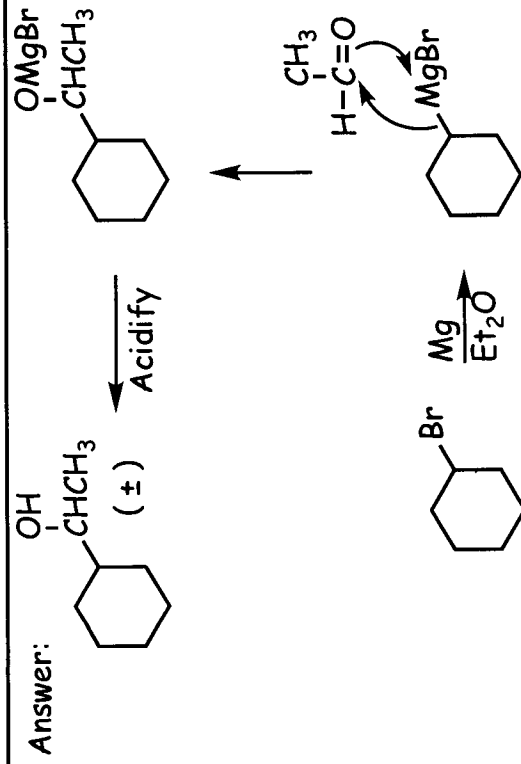
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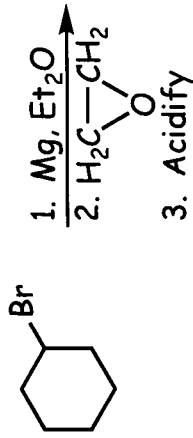
A29



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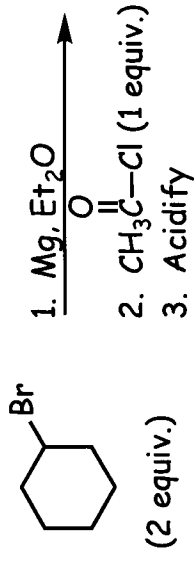
A30





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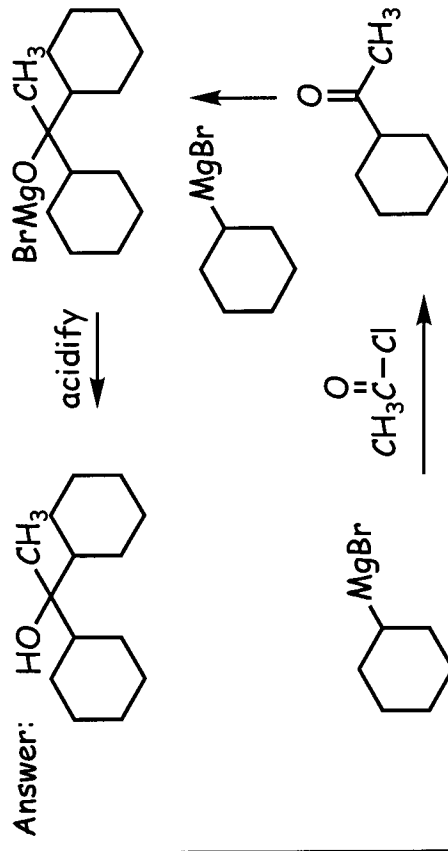
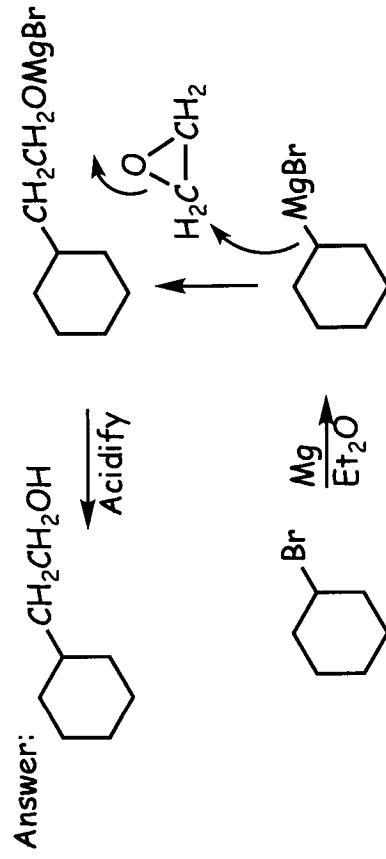
A31



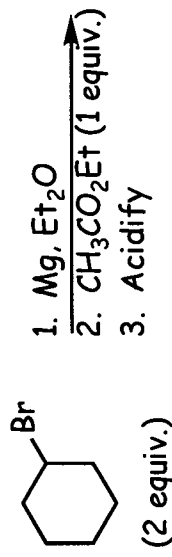
Note: Starting material in excess over acetyl chloride

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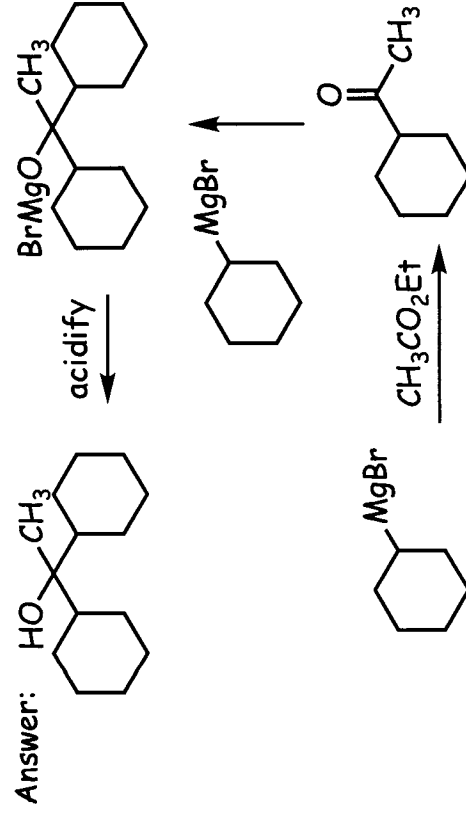
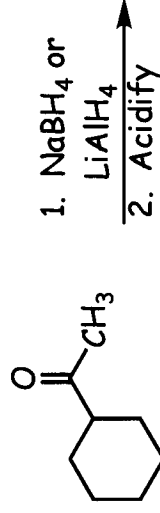
A32



NOTE: See text for complete mechanism

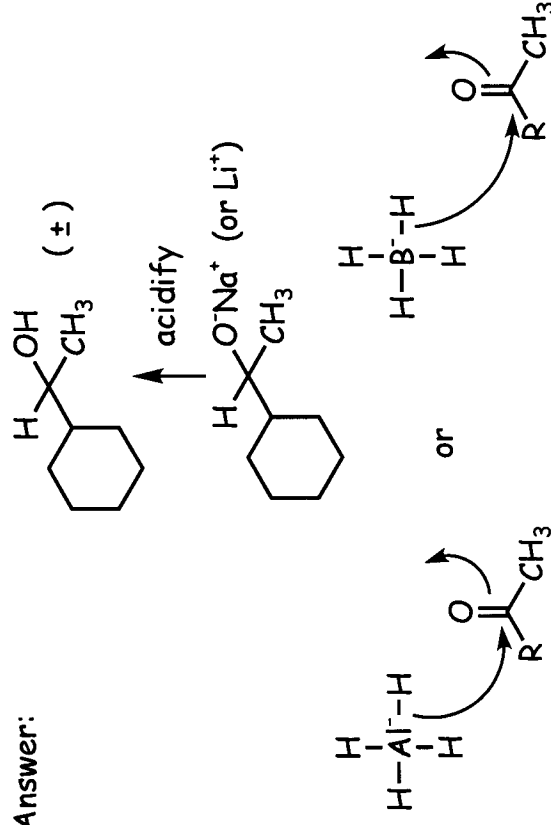


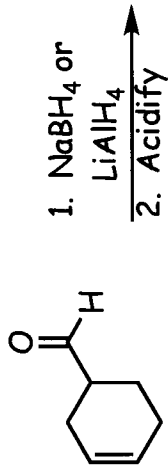
NOTE: starting material in excess over ethyl acetate



NOTE: See text for complete mechanism

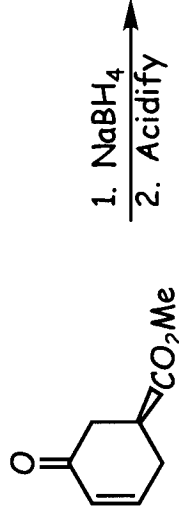
Answer:





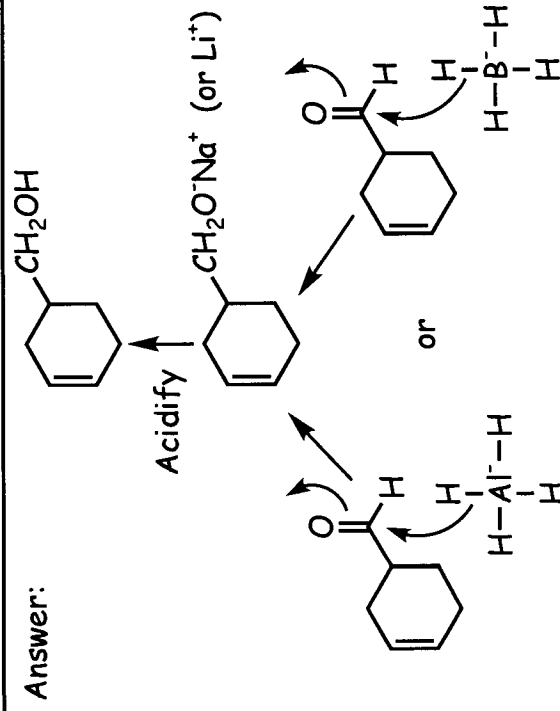
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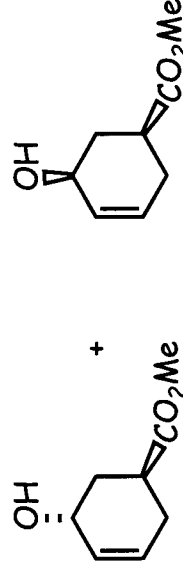


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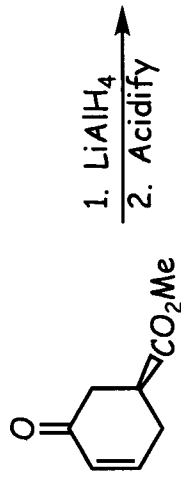
A36



Answer:

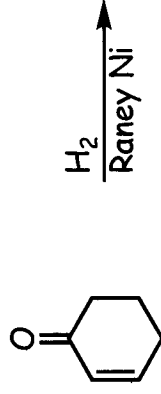


NOTE: NaBH_4 reduces aldehydes and ketones but does not reduce esters or alkenes.



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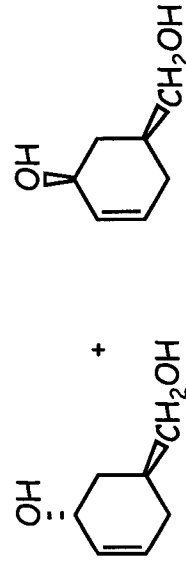
A37



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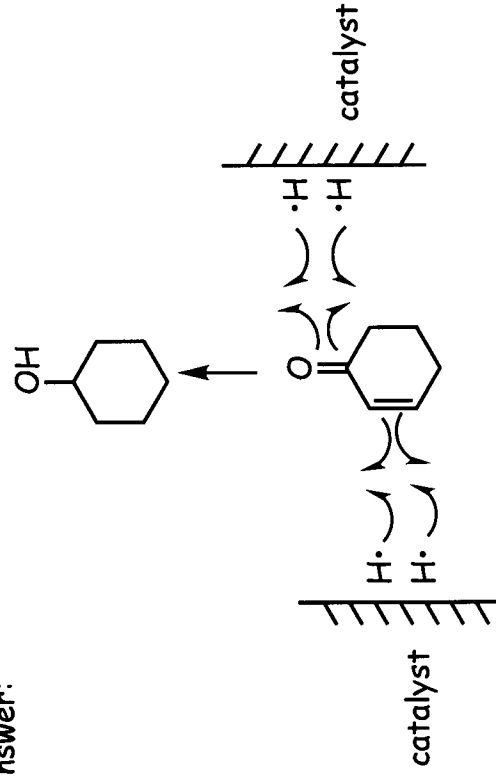
A38

Answer:



NOTE: LiAlH_4 reduces aldehydes, ketones, and esters but not alkenes.

Answer:



NOTE: Raney Ni and H_2 also reduces alkynes to alkanes