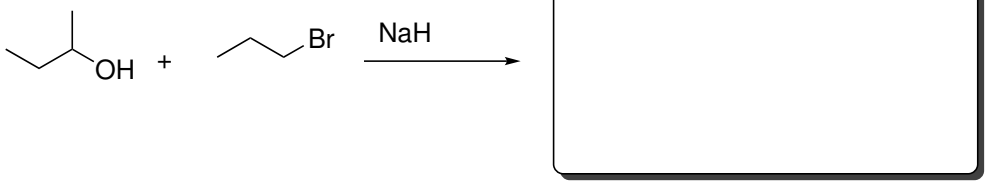
Name:_____

1. (5 points each; 30 total) Write the expected product(s) for each of the following reactions. Specify stereochemistry where appropriate, and include all expected products.

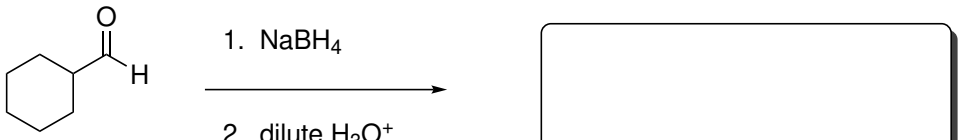
A.



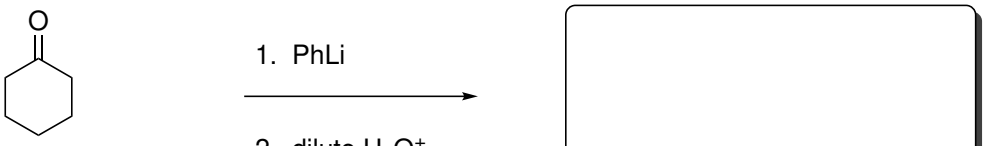
B.

C.

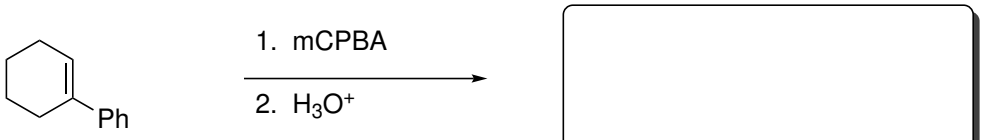
D.



E.



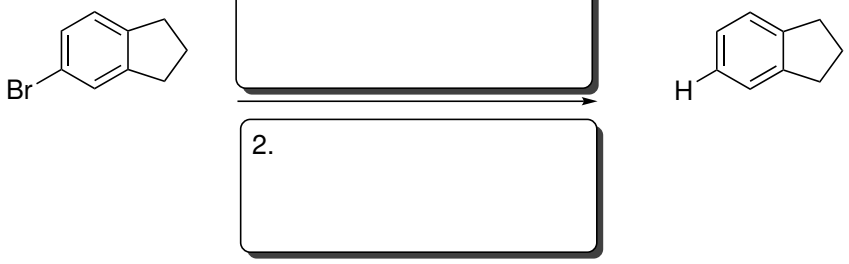
F.



Name:_____

2. (5 points each; 25 total) Write (in the box provided) the reagents and/or conditions needed to accomplish the following transformations.

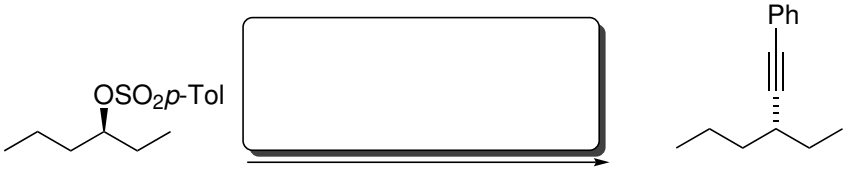
A



B

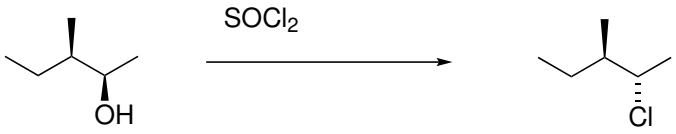
C

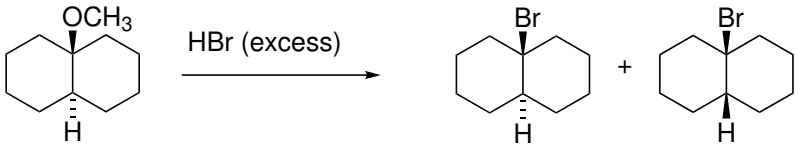
D



Name:_____

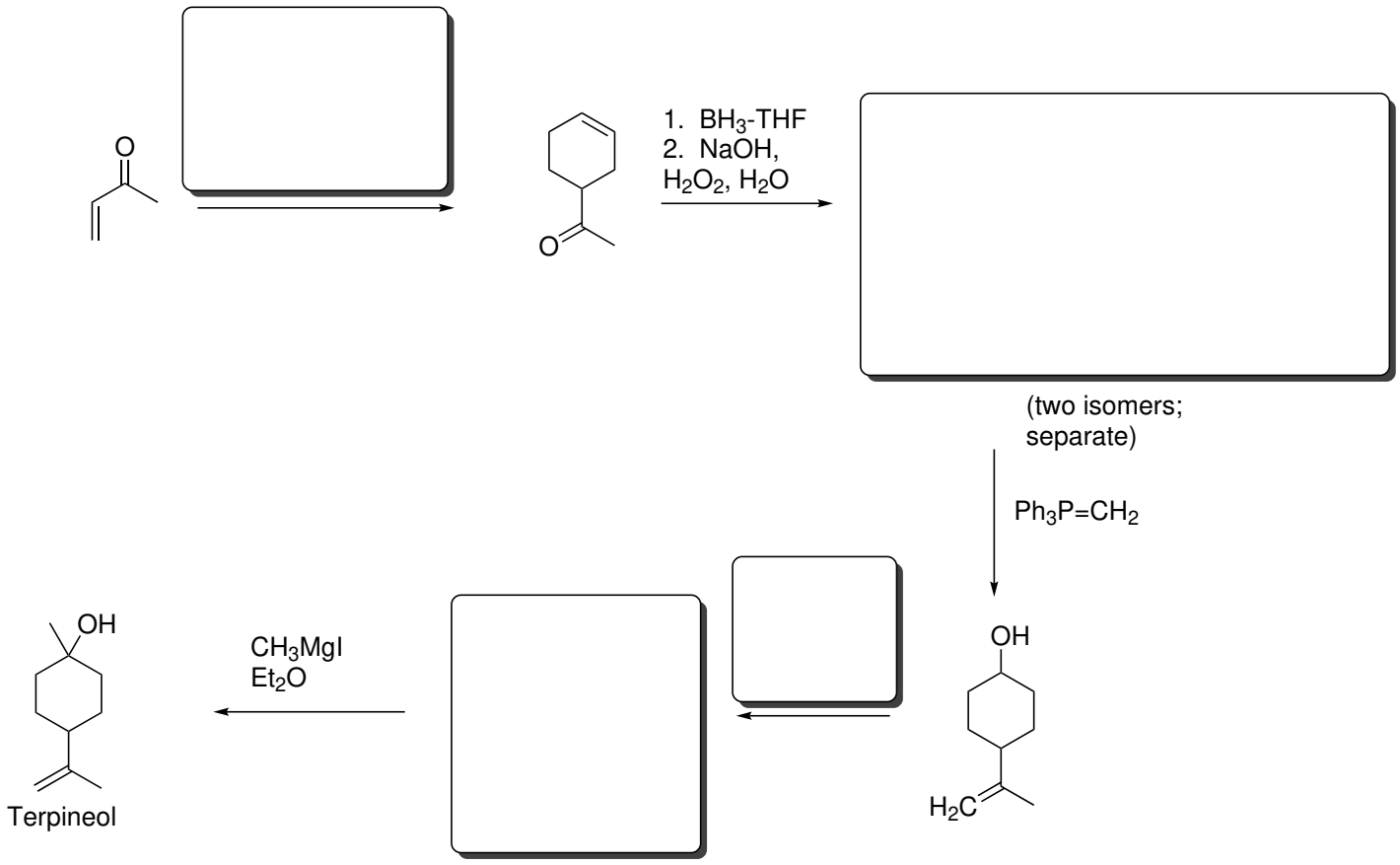
3. (10 points each; 20 total) Write multistep mechanisms (using the correct electron-pushing formalism, and as many steps as needed) for each of the following transformations. Be sure to draw resonance structures for any intermediate so stabilized.





Name:_____

4. (4 points per box for A, B and D plus 3 points for C; 15 total) Fill in the blanks (intermediate structures—molecular formulas given--or reagents/conditions) for the following multistep synthesis.



Name:_____

5 (10 points) Ozonolysis and reductive workup of 1,4-dimethyl-1,3-cyclohexadiene (**A**), gives a compound **B**. $NaBH_4$ reduction and acidic workup of **B** leads to two compounds (**C** and **D**) that are separable. Surprisingly, both have almost identical IR spectra (a broad, strong peak 3600-3400 cm^{-1}) and almost identical but different ^1H NMR spectra (a 6H doublet at 1.1 ppm, a complex 4H multiplet at 1.4 ppm, a broad 2H singlet at 3.0 ppm, and a 2H sextet at 3.3 ppm).

Treatment of either **C** or **D** with PCC gives **B**.

What are **B**, **C** and **D**? Explain as much of the reaction chemistry and spectroscopic behavior as you can for partial credit.

B

C

D