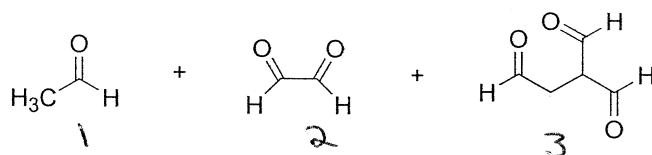
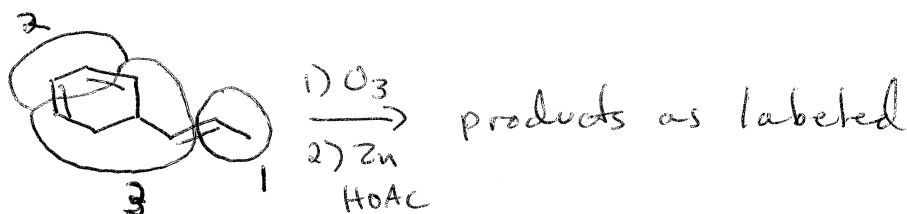


1. (8 pts) A certain molecule, **A**, reacts with three equivalents of hydrogen gas over a platinum catalyst to give propylcyclohexane. When **A** is ozonized and reduced with metallic zinc in acetic acid, the following products are produced:

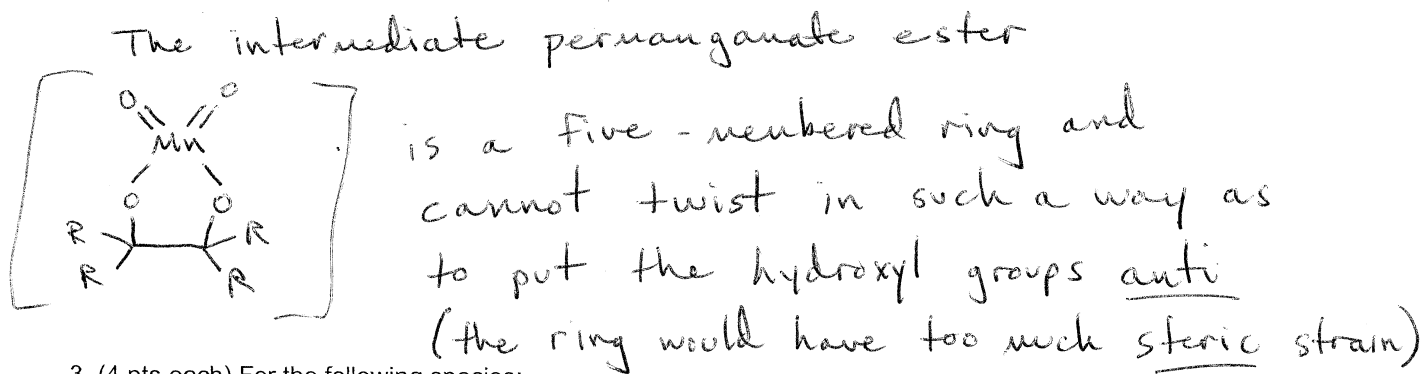


What is the structure of **A**? Explain your reasoning.

3 equivalents of H<sub>2</sub> means. 3 double bonds.

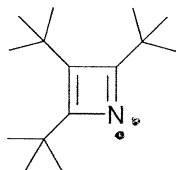


2. (4 pts) Describe using words and pictures, WHY dihydroxylation with cold KMnO<sub>4</sub> produces only the syn vicinal diol and not the trans vicinal diol.

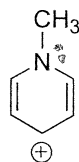


3. (4 pts each) For the following species:

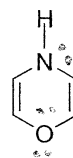
- Draw in any missing lone pairs.
- Indicate the number of electrons in p orbitals.
- Indicate whether the system is aromatic, antiaromatic, or not aromatic (assume each ring is fully planar).
- For each nitrogen atom, indicate if it is basic or not basic.



4 e<sup>-</sup> in p orbitals  
antiaromatic  
N is basic



6 e<sup>-</sup> in p orbitals  
aromatic  
N is not basic



8 e<sup>-</sup> in p orbitals  
antiaromatic  
N is basic