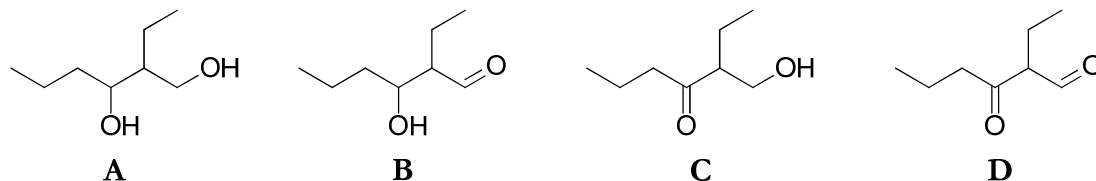


Experiment 33

Oxidation of a Diol: Determining Reaction Outcomes Spectroscopically

Study Questions

The starting material (A) and the three possible products (B, C, and D) are shown below.



- 1) How could you use IR to distinguish between these compounds? **Answer:** A would have no carbonyl peaks, B and C would each have one, and D would have two. A, B and C would all show a broad hydroxyl peak. Distinguishing between B and C might be difficult on IR.
- 2) How could you use $^1\text{H-NMR}$ to distinguish between these compounds? **Answer:** B and D would both show sharp aldehyde peaks at 10 ppm. C and D would both show a peak around 2.5 ppm, for the carbon next to the ketone. A, B and C would show peaks around 3.5-4 for the carbons next to the OH group, and depending on conditions, would show the OH groups themselves as a broad peak.
- 3) How could you use $^{13}\text{C-NMR}$ to distinguish between these compounds? **Answer:** B and D would show an aldehyde peak around 190-200 ppm. C and D would show a ketone peak around 205-220 ppm.