

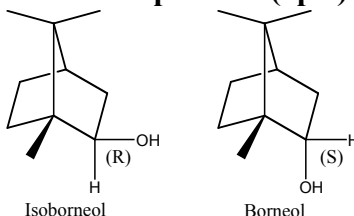
NAME: Answer Key

TA: Robert

Section: 1E

Quiz #2

1. In today's experiment, we will be reducing camphor with sodium borohydride in the presence of excess methanol. Draw and label the major product isoborneol and the minor product borneol (4pts). What is the stereochemistry at the new chiral centers produced for each product (2pts).



2. Explain why isoborneol is the preferred product. Is isoborneol the endo or the exo product? (2pts)

The pro-R approach (endo approach) is favored because the top part of the molecule is shielded by the methyl group on the bridge, which is on the same side as the carbonyl function. The Exo product is the major product because endo is favorable (less hindered).

3. How much material is needed to get an accurate melting point? (2pts)

Very little: one crystal

4. What is the driving force for the reduction of camphor using sodium borohydride? (2pts)

The driving force is the formation of very strong B-O-bond ($\Delta H=523$ kJ/mol) in the tetraalkyl borate which are significantly stronger than π -bonds in the carbonyl ($\Delta H=380$ kJ/mol).

5. When using the rotary evaporator, why should you not fill the round bottom flask more than halfway? (4pts)

Filling the RBF more than halfway will cause the solvent to bump, which may introduce impurities.

6. Why is NaBH_4 used in this reaction today instead of LiAlH_4 ? (4pts)

Both will generally yield the same product. LiAlH_4 reacts more violently with water and is often times pyrophoric. NaBH_4 is stable in water at room temperature and is much easier to handle.