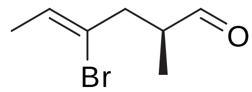
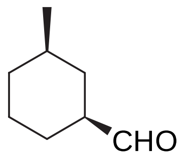
Chem 331: Problem Set #4 (Hour Test practice questions)

1) Draw the structure:

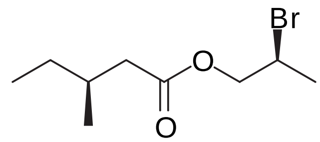
(2S, 4Z)-4-bromo-2-methyl-4-hexenal



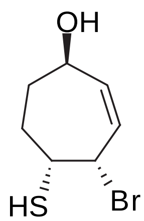
2) Give the IUPAC name for each compound



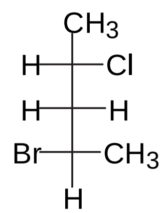
(1S,3R)-3-methylcyclohexane carboxaldehyde



(2S)-2-bromopropyl (3S)-3-methylpentanoate

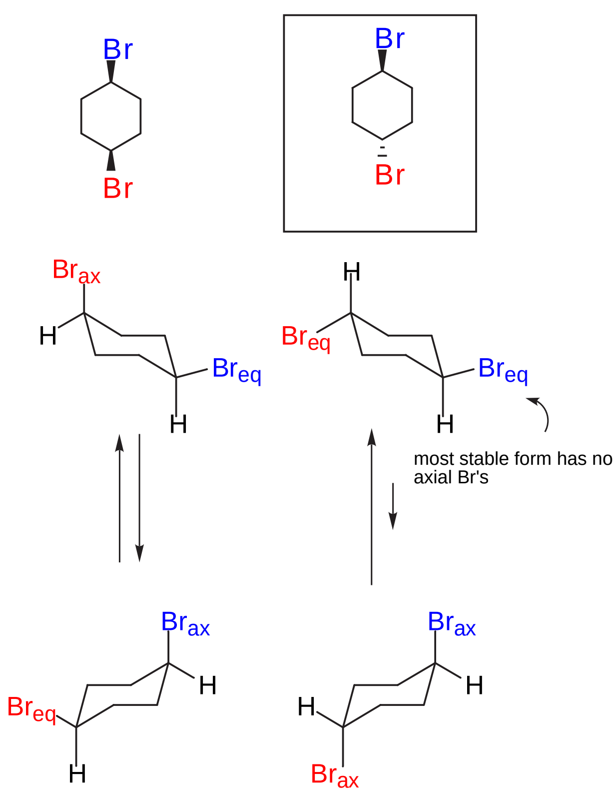


(1R,4S,5R)-4-bromo-5-mercapto-2-cycloheptenol

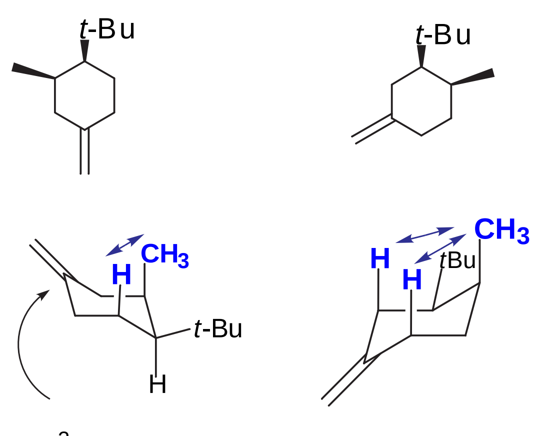


(2R,4S)-2-bromo-4-chloropentane

3) For each pair, indicate which is more stable. Use a clear picture to explain why



Both cyclohexanes are 'locked' with equatorial tBu's and axial methyl groups so the answer lies in the double bond



sp^2 center
There is no axial group here, and therefore there is only one 1,3-diaxial interaction make a model to convince yourself!

two 1,3-diaxial interactions

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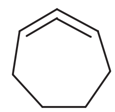
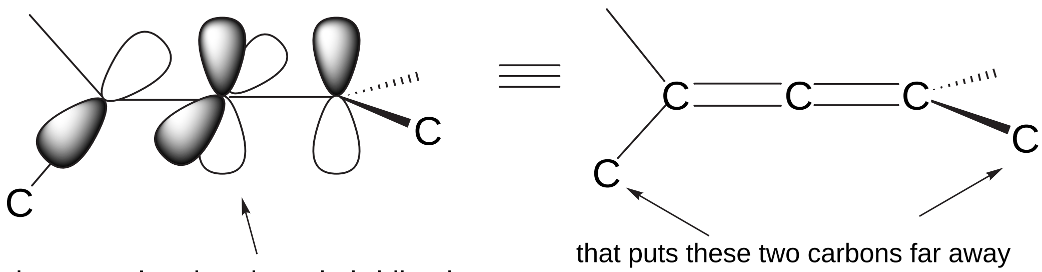
4) 1,2-cycloheptadiene is not a stable molecule. Use a clear picture and less than 20 words to explain why.



Begin by drawing the MO for the **allene** (C=C=C) fragment

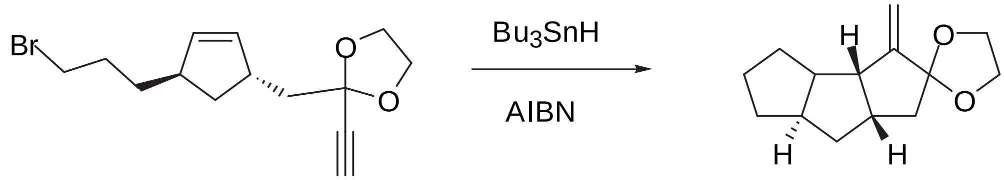


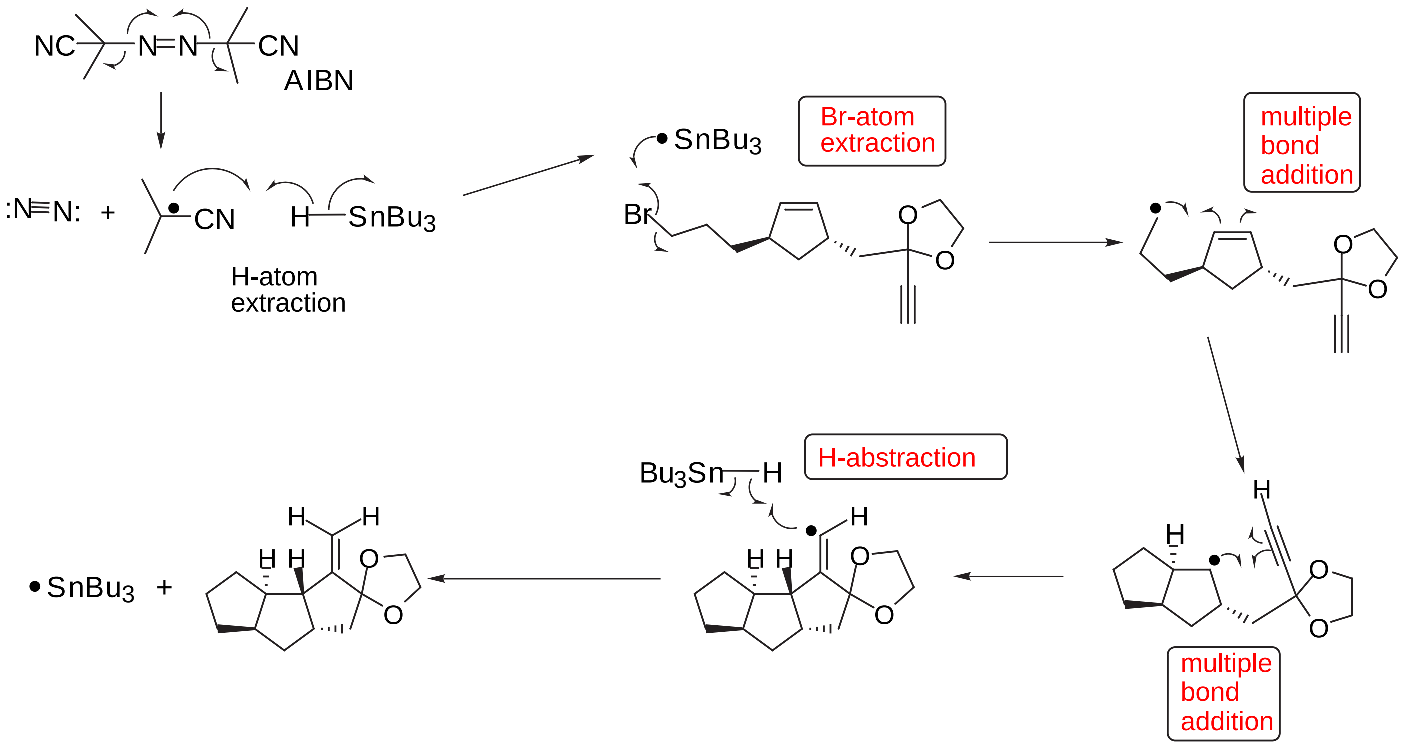
the central carbon is sp hybridized, and the ideal geometry for this fragment is linear

that puts these two carbons far away from one another, and you only have 2 carbons left to form the 7-membered ring. It is impossible to do it without severly bending the allene away from its ideal geometry of 180 ° (approximately a 30 ° distortion is required)

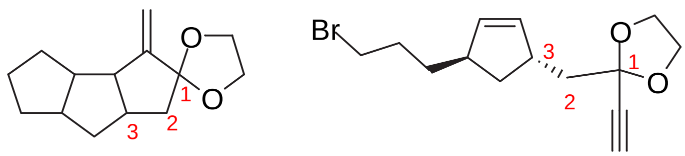
BUILD A MODEL!

5) Provide a mechanism

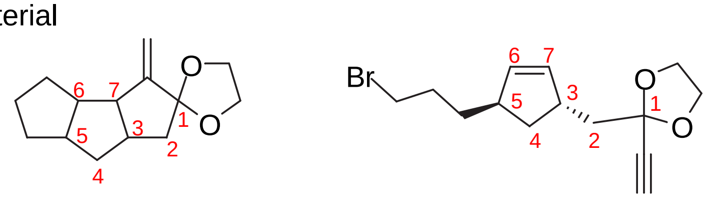




Having trouble getting started? Map it out first. Start with the acetal as your marker. You can see that it is one carbon away from a 5 membered ring



Now, we can see that the central 5-membered ring of the product is the ring from the starting material



finish labeling. We can see that a bond must be formed between the atoms indicated below