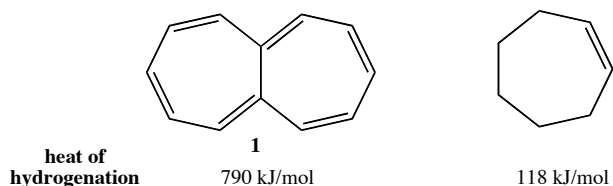
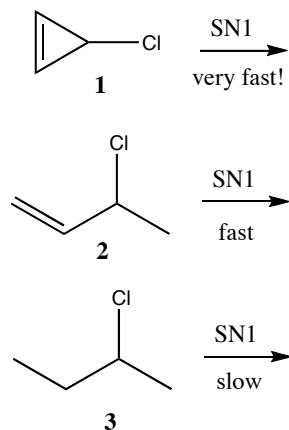


Chapter 18 Practice Problems

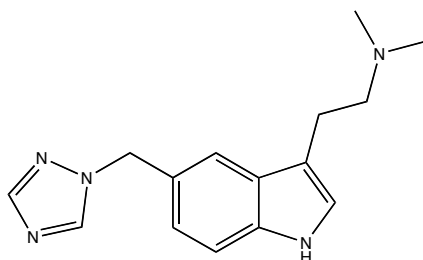
1. Compound **1** below has been synthesized. It is known to be a planar molecule. Its heat of hydrogenation, and the heat of hydrogenation of a reference compound (cycloheptene) is provided. Predict whether the compound is aromatic, anti-aromatic or non-aromatic. Use the heat of hydrogenation data to corroborate your answer. Predict what the bond lengths should be.



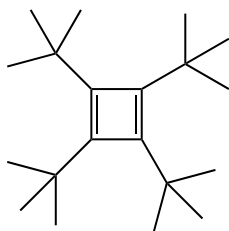
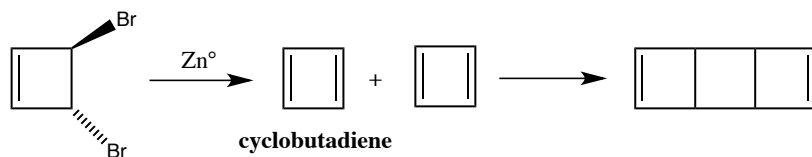
2. The three 2° alkyl chlorides below were subjected to SN1 reaction conditions. There was a huge difference in the rate of their reactions as show below. Explain why compound **2** reacts faster than **3**, and why **1** reacts faster than **2**.



3. MAXALT™ (structure below) is a drug used to treat migraines. For each of the 3 cyclic systems, determine if they are aromatic or not. For each of the nitrogen atoms, is the lone pair contributing to the pi system or is it not?

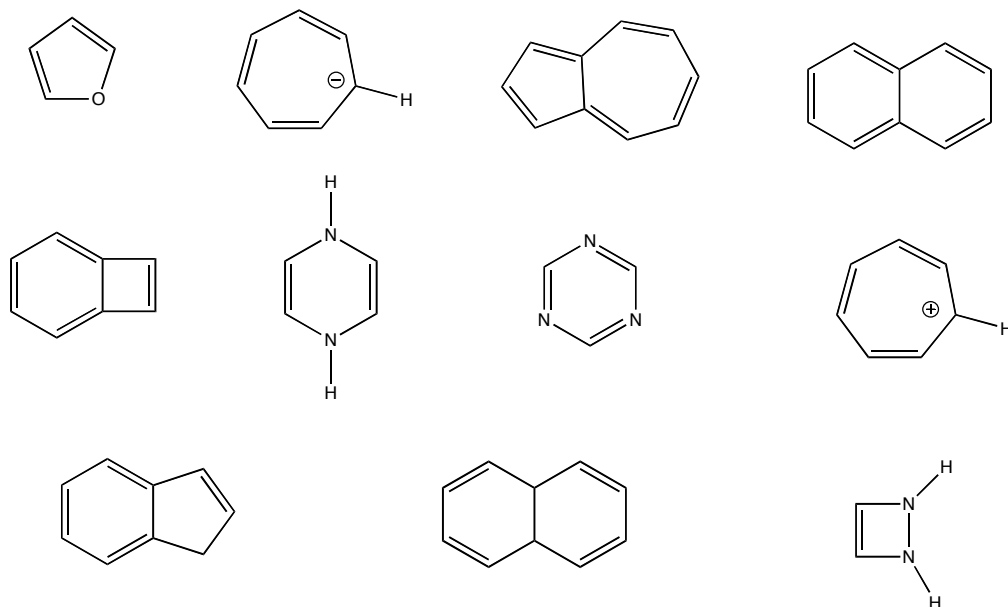


4. Cyclobutadiene is a highly unstable anti-aromatic molecule. As soon as it is generated (see below) it immediately reacts with another molecule of itself (i.e. dimerizes) to form the compound shown. Interestingly, tetra-*tert*-butylcyclobutadiene was generated and found to be stable up to temperatures of 105 °C (!!). Why might the tetra-*tert*-butyl derivative be stable whereas the parent compound is not?

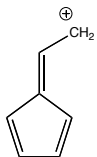


tetra-*tert*-butylcyclobutadiene

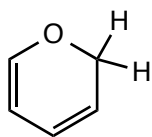
5. Which of the following compounds might be expected to be aromatic (HINT: consider the lone pairs on all heteroatoms and/or negatively charged carbons)?



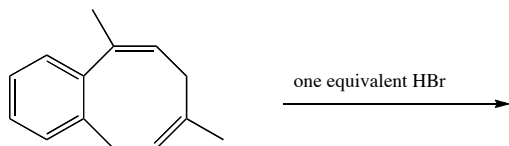
6. Draw all of the important resonance forms for the following carbocation (use curved arrows to interconvert structures and the proper resonance arrow):



7. Deprotonation of one of the H's indicated on the compound below leads to a resonance stabilized anion. Draw all of the important contributing resonance forms:



8. What is the expected product of the following reaction?



9. Which of the following compounds has the potential to be aromatic?

