

3. (5 min) What are the **assumptions** of Eyring's transition state theory, **and** why is it often a more practical theory for understanding rates than a theory involving trajectories on the potential energy surface?

4. (9 min) **Draw four lines** to connect each radical in the second column with the corresponding dissociation energy (kcal/mole) in the first column for its bond to the CH₃ group.

Then **explain the size of the other three** values relative to that for the CH₃-CH₃ bond.

<u>BDE</u> <u>CH₃-R</u>	<u>R</u>
76.5	CH ₃
87.5	C(CH ₃) ₃
90.1	CH=CH ₂
101.4	CH ₂ -CH=CH ₂

5. (5 min) Propose an **example** and a plausible mechanistic **interpretation** of **ONE ONLY** of these three reaction orders:
0 or 1/6 or pseudo 1st order

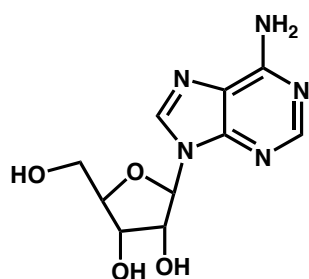
6. The secondary C-H bonds of propane are 2.5 kcal/mole weaker (*i.e.* lower in BDE) than its primary C-H bonds.

A) (4 min) Use this value to **estimate the ratio** of secondary to primary propyl radicals in equilibrium at room temperature. **Explain** your thinking.

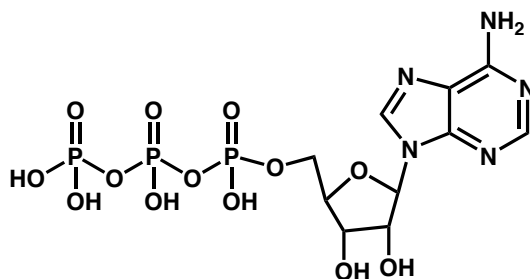
B) (8 min) Explain why it is curious that free radical bromination of propane at about **twice room temperature** gives a secondary-to-primary product ratio of about 10:1. **Also** say what lesson is to be learned from this fact.

7. (4 min) The first step in the Kenyon & Philips experiment that proved the stereochemistry of S_N2 substitution involved preparing a starting material by reacting a chiral alcohol, ROH with $Cl-SO_2-R'$. **Draw the product** of this first reaction and **explain why** it was prepared.

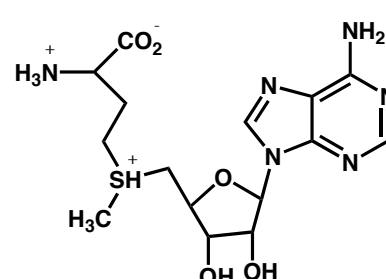
8. A) (2 min) In light of Question 7, suggest why, in making S-Adenosylmethionine, Nature chooses to use ATP rather than Adenosine itself.



Adenosine



ATP



S-Adenosylmethionine

- B) (2 min) Explain why S-Adenosylmethionine is chemically suited for the purpose to which Nature puts it.