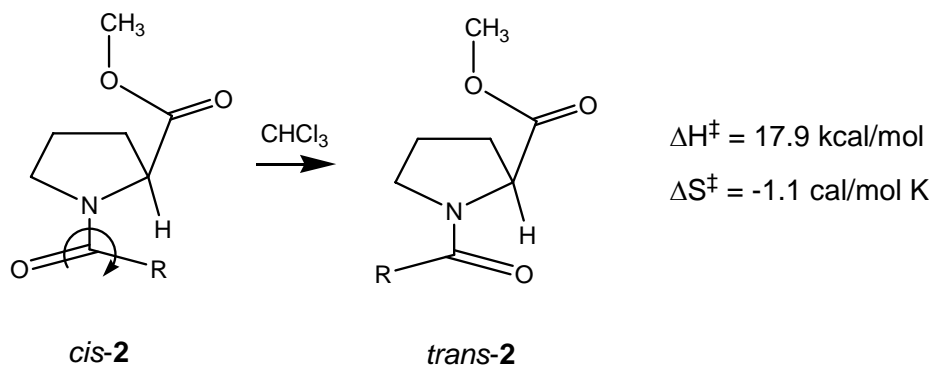
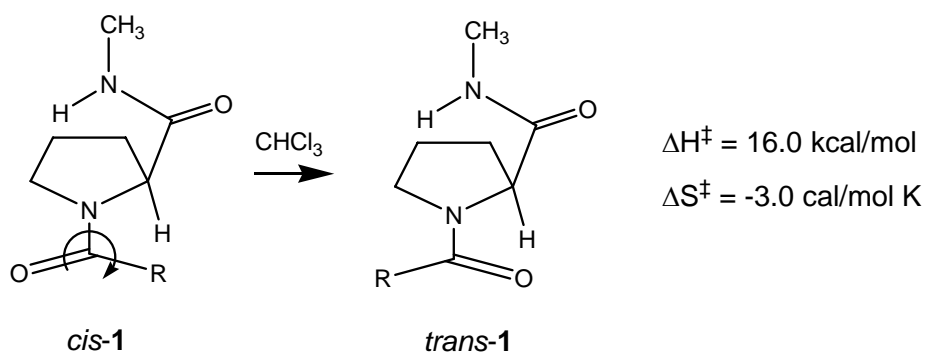


## Section Question 6

Prolines can interconvert between *cis*- and *trans*- isomers, and this process is important for the folding of some proline-containing proteins. Cox and Lectka have investigated how the structure of the transition state affects the rate of this isomerization. For example, the compounds **1** and **2** convert from *cis*- to *trans*- with the given activation parameters:<sup>1</sup>



- Draw the transition state for each of the two reactions.
- What timescales do the  $\Delta H^\ddagger$  and  $\Delta S^\ddagger$  values correspond to at room temperature (298 K)? Typical, free bond rotations happen in femtoseconds-- why is this bond rotation so slow?
- Why are  $\Delta H^\ddagger$  and  $\Delta S^\ddagger$  different for the two reactions?

<sup>1</sup> Cox, C.; Lectka, T. *J. Am. Chem. Soc.* **1998**, *120*, 10660-10668.