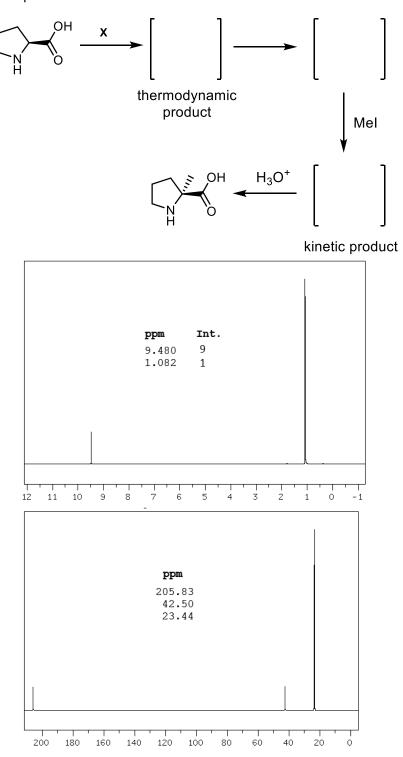
1. Seebach developed a clever way to alkylate amino acids while retaining the enantiomeric purity of the starting material. The kinetic selectivity of the final alkylation is directly dependant on the thermodynamic stability of the intermediates. Rationalize the chosen thermodynamic product with a 3D drawing and use it to explain the later kinetic selectivity in the sequence. However, in order to generate the bicyclic intermediate necessary for the sequence, you must first identify **X** from the nmr spectra below!



The above trick has been termed the "self-generation of stereocenters" (SRS) and depends on the temporary storage of stereogenic information present at one location into another so that it can be transferred back at a later time.

2. Find the mechanism for the following transformation

NCS 1,4-dimethylpiperazine (binap)Pd(SbF₆)₂ (20 mol%)
$$CH_2CI_2$$
, 0 °C; (20 mol%) CI_3CCO_2H CI_3CCO_2H CI_3CI_2 , 0 °C CI_3CI_3 CI_3 CI