

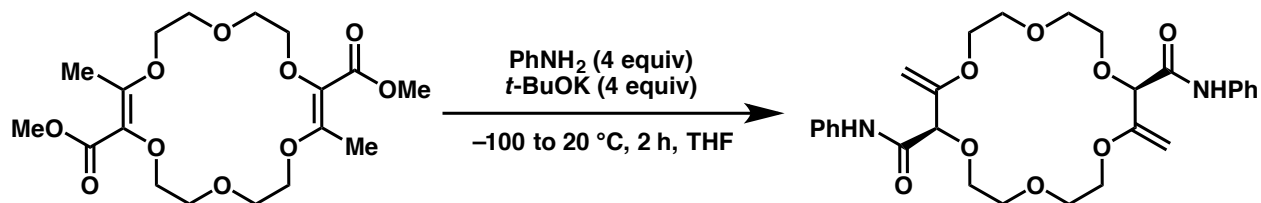
CHM-6315 (Hiver 2017)
MINI-DEVOIR 2/3 DE 4

Date de remise : 27 février 2017 avant 17 h par courriel à barbara.bessis@umontreal.ca en format PDF seulement

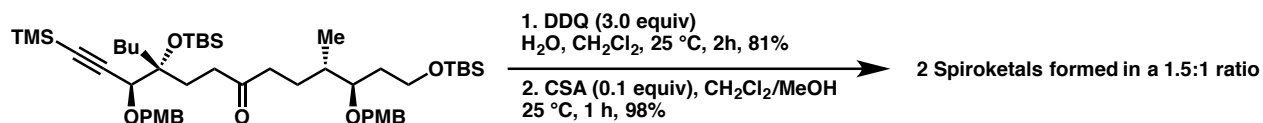
Si vous rédigez votre devoir manuellement, il est essentiel que vous le numérisiez en format pdf

Ce mini-devoir se veut une révision de réactions chimiques qui sont essentielles de connaître pour faire de la synthèse totale.

Question 1. Proposez un mécanisme pour la transformation suivante en prenant soin d'expliquer pourquoi le produit formé est déconjugué. Les tentatives de reconjuguer la double liaison n'ont pas porté fruit.



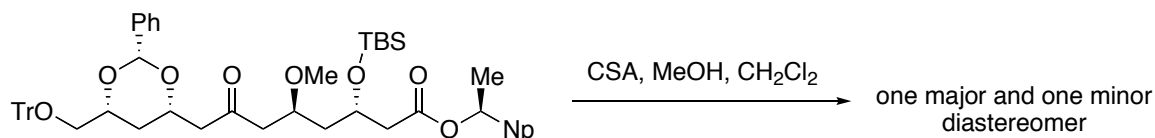
Question 2. Prédire la structure des deux composés spirocétaliques. Pour vous aider à analyser le problème, veuillez procéder par une analyse similaire à celle fournie ci dessous.



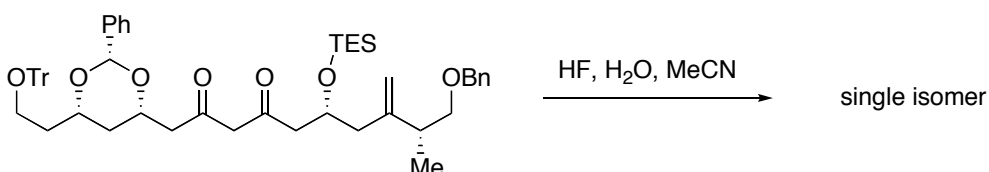
Exemple de solution (en anglais):

Compléter les réactions suivantes et prédire quelles seront les structures tridimensionnelles favorisées lors de la spirocétalisation. Justifier votre réponse. *Complete the following reactions and predict the three-dimensional structures of the products. Explain your prediction. (30 points - Explanation 15 points)*

→ *Angew. Chem. Int. Ed.* **1997**, 36, 2738.

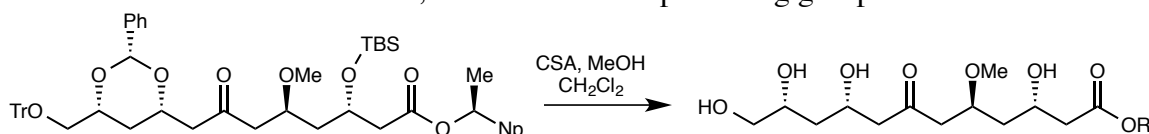


Np: naphthyl
Tr: trityl
CSA: camphorsulfonic acid
TES: triethylsilyl

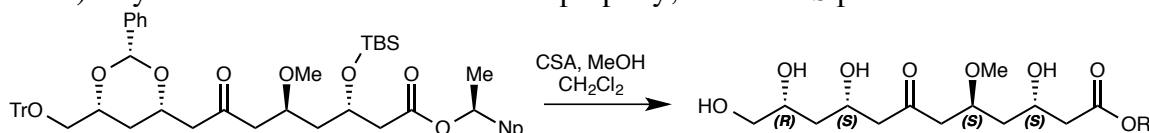


Detailed analysis:

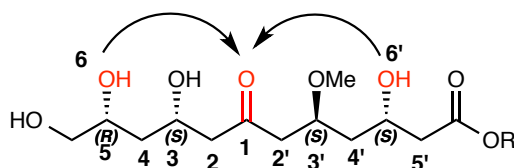
You need to be very systematic when you analyze both problems. When you treat the starting material under acidic conditions, all the acid labile protecting groups will be cleaved:



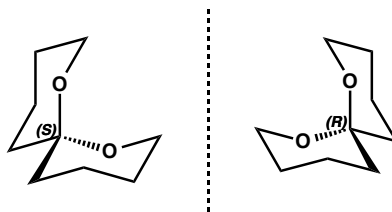
The next step is to determine the absolute configuration of each center (this is a piece of cake nowadays with Chemdraw (select the structure and click "show stereochemistry" under the object menu). If your chemical structure is drawn properly, the *R* and *S* prediction is reliable.



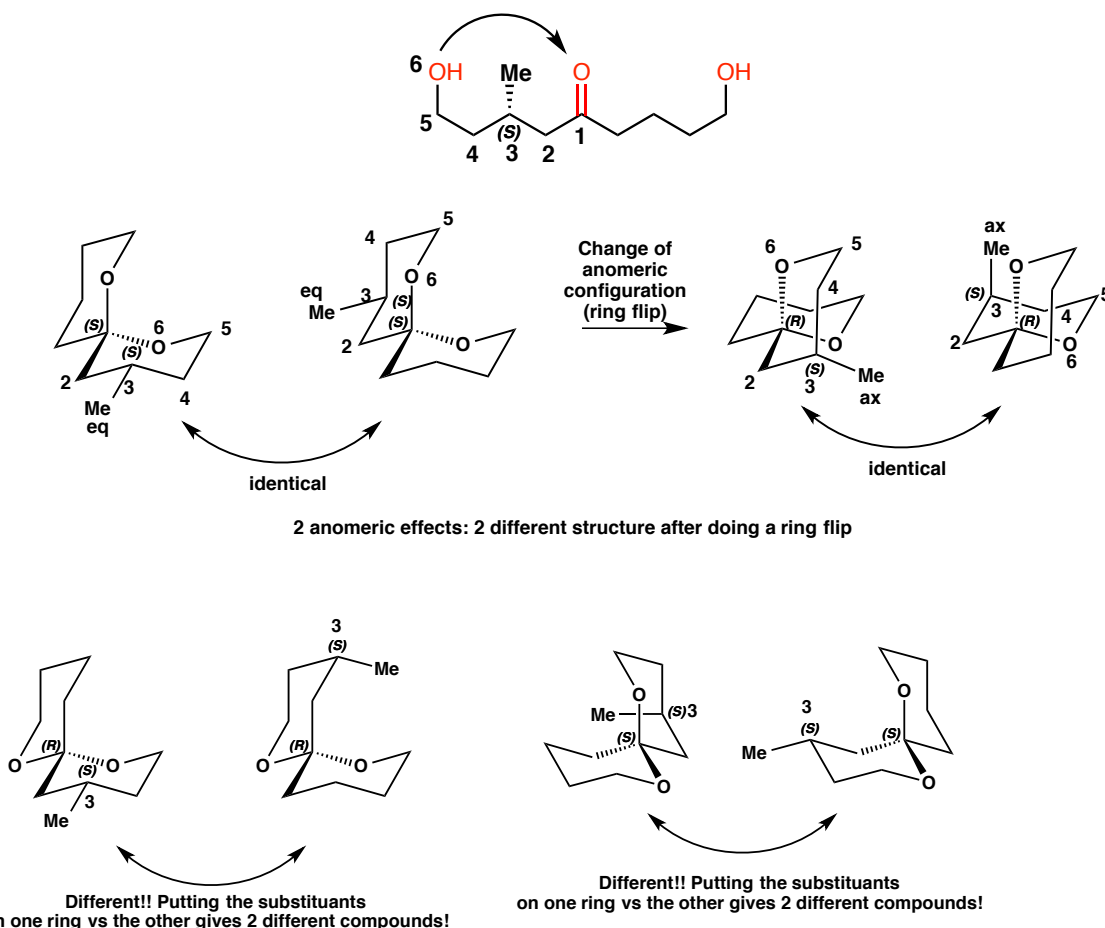
Now with this information, you need to locate which groups will be involved in the spiroketal formation, and it is a very good idea to number each atom on each side so you don't get confused. Stick to that numbering to to avoid confusion.



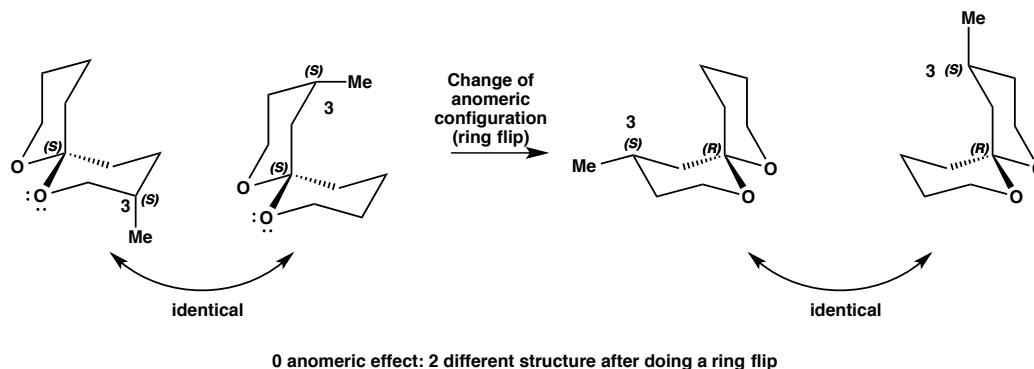
Next, if you look at the slide B-29 and understand that there are three possibilities: spiroketal structures with 2 anomeric effects, 1 anomeric effect and 0 anomeric effect. However, these drawings illustrate only one of the two possible absolute configurations at the anomeric center! For example, both compounds (that are mirror images) cannot be superimposed:



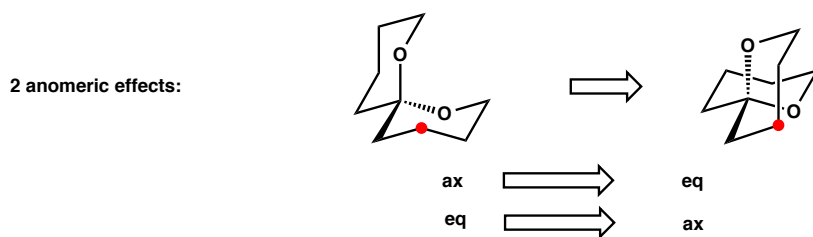
For each one of them, substituents on the ring can be axial or equatorial based on the configuration of the anomeric center. The spiroketal center "locks" the 6-membered ring in a chair conformation (and there are 2 possible chair conformations when there is at least one substituent on the ring). Let me illustrate this with a simpler substrate for each possibilities (2, 1 and 0 anomeric effect)



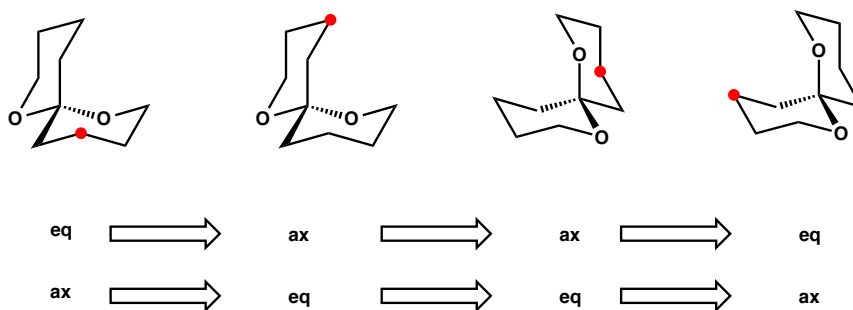
1 anomeric effect: 4 different structures after doing a ring flip 2 possible conformation for each possible anomeric configuration!! All four structures must be examined!!



The conclusion of this whole exercise is that you have to examine *8 possible structures* by putting the substituents at the right place and with the right absolute configuration. The basic three-dimensional structures you need to look at are the following (the red dot indicates where you should put carbon 3 on all the structures).



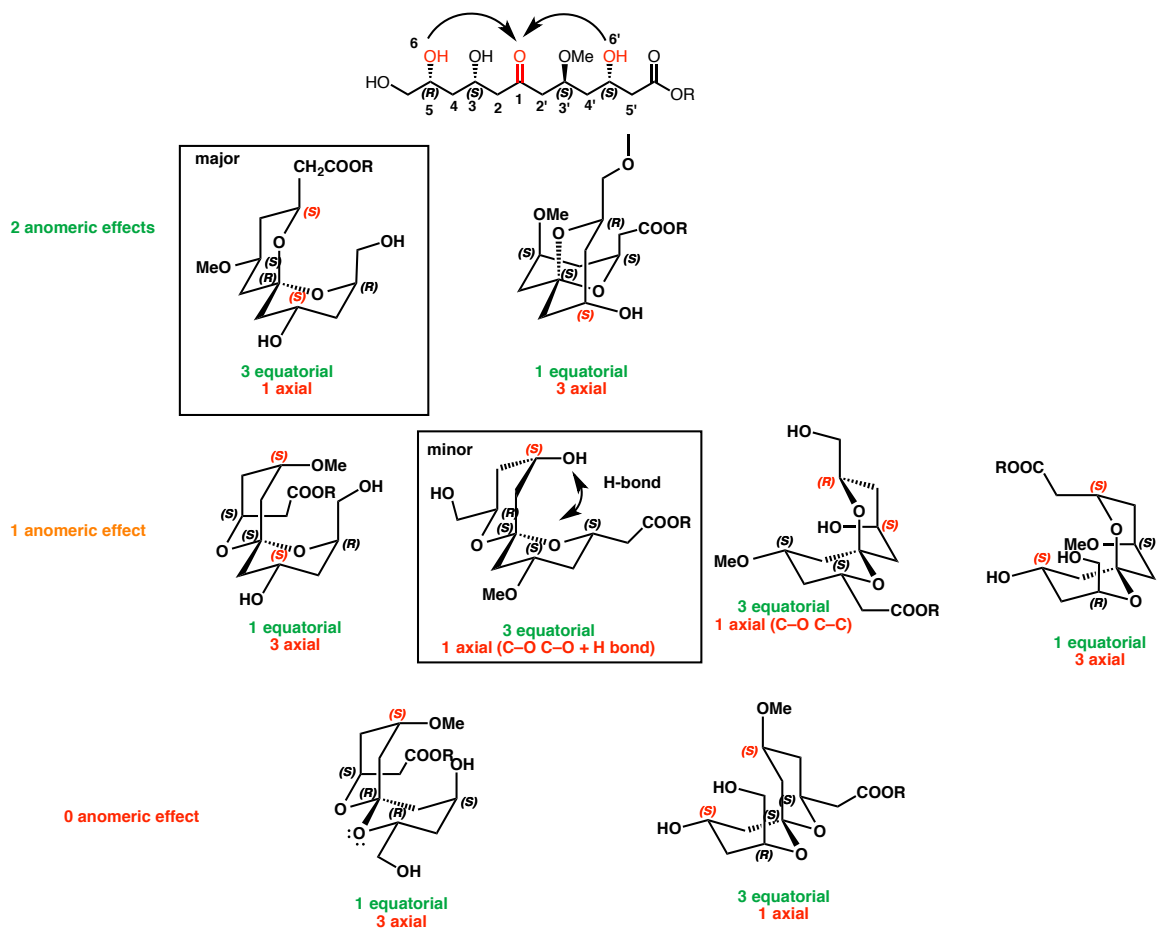
1 anomeric effect:



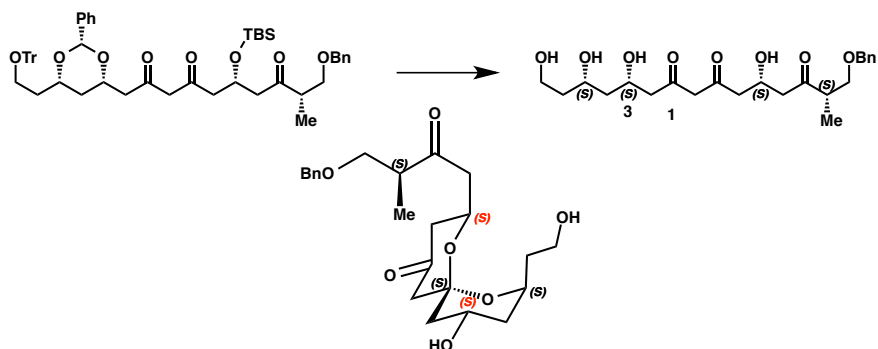
0 anomeric effect:



If we apply that to the problem, you should be able to draw the following eight structures for both spiroketalization processes of the main problem.



The major product of the second example can be deduced by the same analysis:



There was actually an error in that question. The substrate's structure should have been (that displays 2 anomeric stabilization + one intramolecular hydrogen bond).

