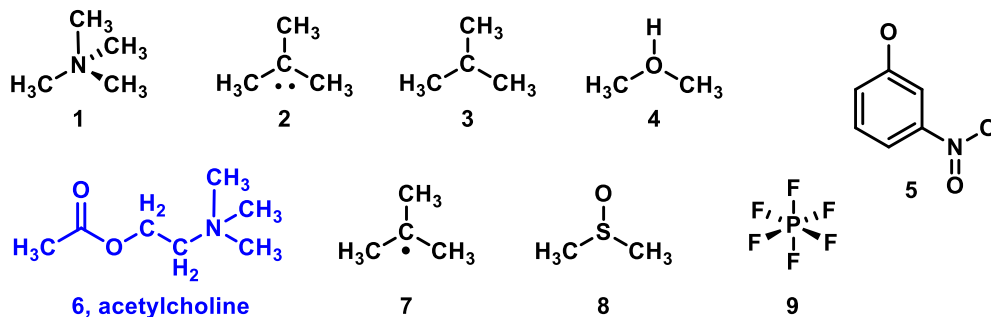


Homework 1 – 2017/03/27

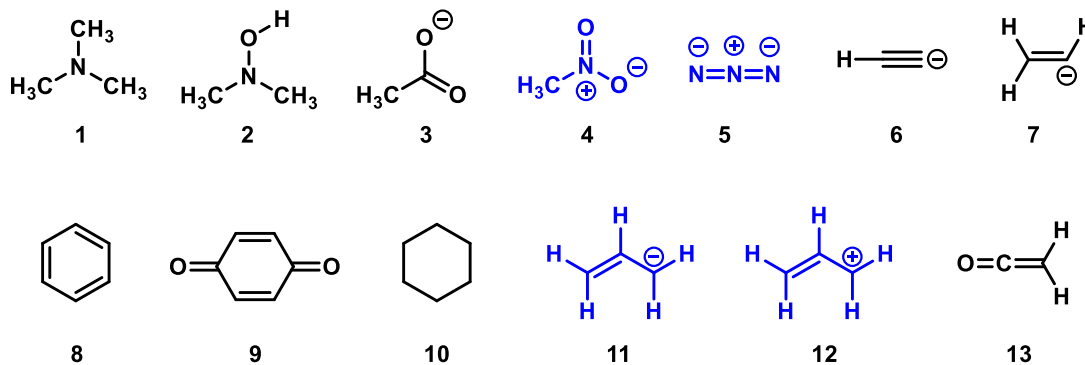
1) Add formal charges to the atoms. Where is the $\delta+$ and $\delta-$ end of the polar bonds? Do you see a conflict, and can you resolve it without recourse to lawyers, shrinks, or guns?



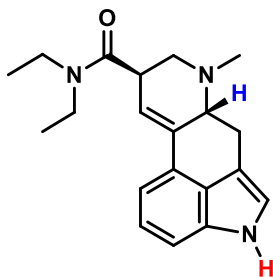
Here's a 10-minute lecture on acetylcholins, its target receptor, and how nicotine can hijack the lot.

https://www.youtube.com/watch?v=u6bn31Jo_Tg

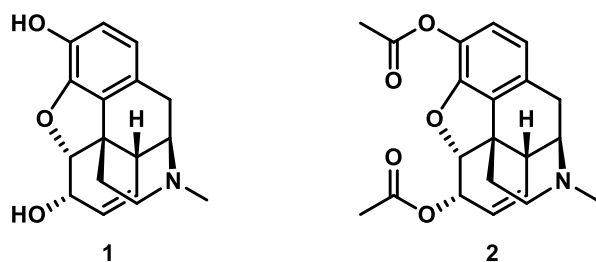
2) What are the hybridization states of each of the non-hydrogen atoms? For the **blue structures**, draw the reasonably low-energy resonance structures, and give the hybridization states for all the atoms.



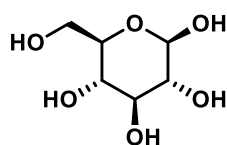
3) Draw in the missing hydrogen atoms! What are the approximate bond angles in these molecules? Which atoms/groups are on the same side of the molecule as the **blue** hydrogen? Which atoms are in the same plane as the **red** hydrogen?



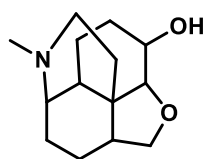
4) Compounds **1** and **2** are potent euphoria-inducing opioid alkaloids. Which one of these is more polar, and why? Which do you think is more potent, and why? (Unsubstantiated guesses based on your imagination are welcome.)



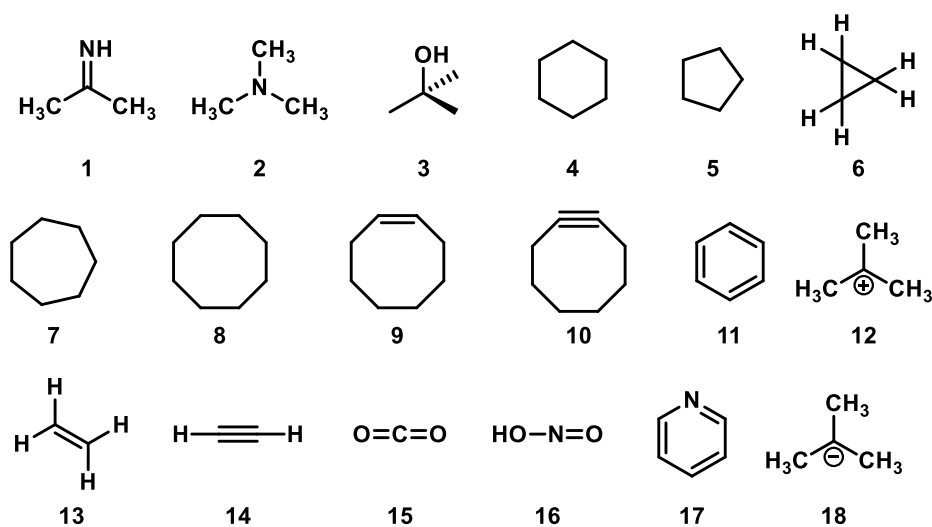
5) How many stereoisomers does β -D-glucose have? Label them *R* or *S*.



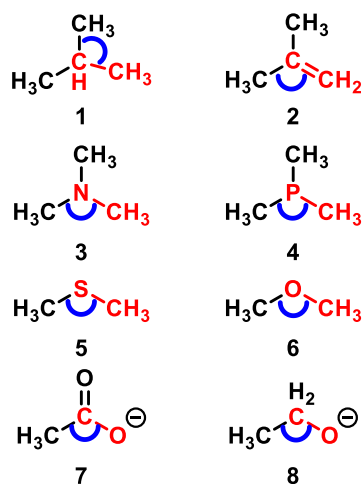
6) Which are the asymmetric carbons? Label them *R* or *S*. How many stereoisomers does this molecule have in theory? Some of these would have pretty unrealistic structures, which ones, and why?



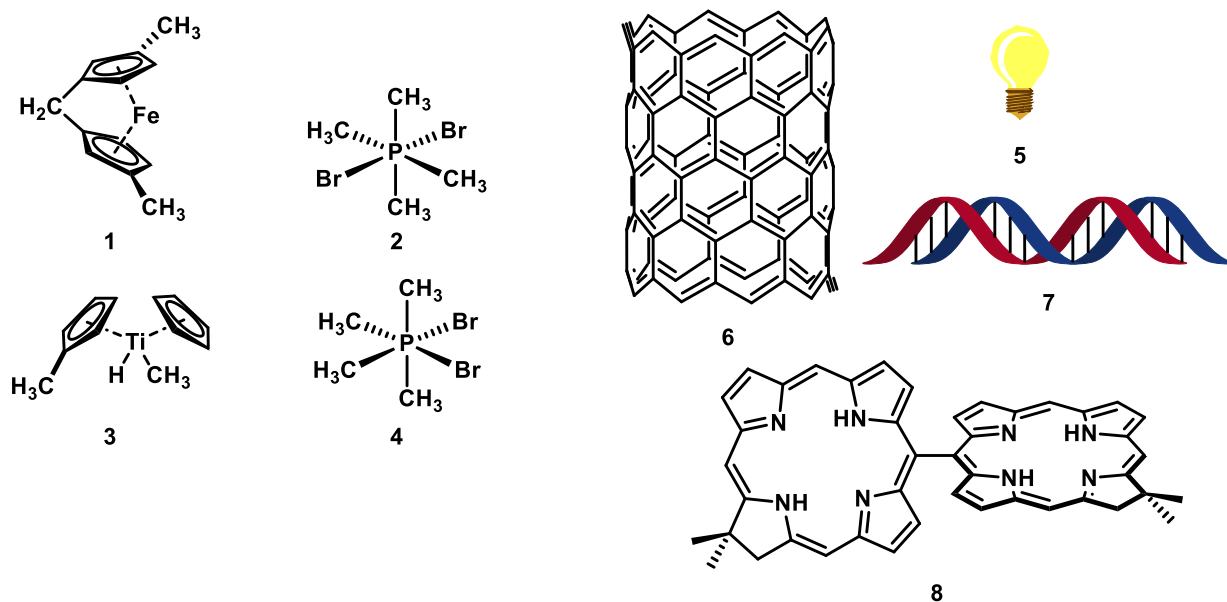
7) What are the bond angles in these molecules? (Hint: draw in the missing hydrogen atoms. Also, not all things drawn straight/flat/octagonal/whatever are straight/etc. so some of these might require a bit of mental 3D-modelling. Stuff definitely not in order of increasing difficulty.)



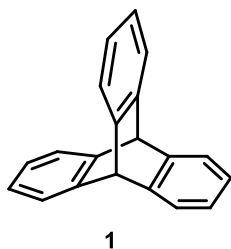
8) Which bond highlighted in **red** is longer? Which **bond angle** is larger?



9) Chiral or not?



10) Replace one of the hydrogen atoms with a methyl group in **1**. How many possible isomers are there? And if you replace two hydrogens with methyls?



Solutions can be handed in to Daniel Kovacs or to me in person, or you can mail them to eszter.borbas@kemi.uu.se

As long as you attempt to answer at least one question I'll give you detailed feedback.

/Eszter

