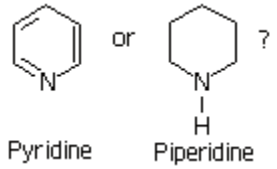
Assignment 6 Bonding

Exercise 1:

Why is RSH (pK_a ≈ 10) a weaker acid than H_2S (pK_a = 7)?

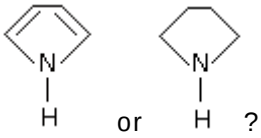
Exercise 2:

Which is the stronger base?



Exercise 3:

Which is the stronger base

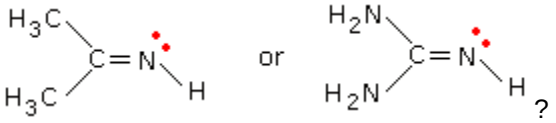


Exercise 4:

Which is a stronger acid, $CH_3CH_2CO_2H$ or $CH_2 = CH\text{-}CO_2H$?

Exercise 5:

Which is the stronger base



Exercise 6:

Why is H_2SO_4 a stronger acid than H_2SO_3?

Exercise 7:

Explain the following comparative values of pK_1, pK_2 and pK_3.

	pK_1	pK_2	pK_3
H_3PO_4	2.12 (stronger acid)	7.21	12.67
H_3AsO_4	2.30	7.03 (stronger acid)	11.53

Exercise 8:

Explain the following pK_a values:

HNO_3 *pK_a -1.3*

$HClO_3$ *pK_a -3.0*

Exercise 9:

Use the concept of hyperconjugation to explain

a. Addition of Br_2 is faster in propene than in ~~ethane.~~
b. Tertiary butyl free radical is more stable than isopropyl free radical.

Exercise 10:

Draw the Lewis structure of the following common open chain organic compounds. If there are more than one structures possible. Write down the structures of all of them.

a. $C_3H_6O_2$
b. C_3H_8O
c. C_4H_8O

Exercise 11:

In $N(CH_3)_3$ the geometry around the nitrogen atom is pyramidal. But the same is planar in the case of $N(SiH_3)_3$. Explain in terms of Lewis structure and resonance?

Exercise 12:

Draw the lewis structures of FNO and FNO_2. Indicate their shape and the hybridization of nitrogen in each case. One of these has a dipole moment μ = 1.81 and the other μ = 0.47 D. Which one is which and why?