KEY

Structural Isomers

Structural isomers are molecules with the same molecular formula (the inventory of C, H, etc) but different connectivity. You can find structural isomers by "brute force", meaning you can just start drawing, but the Index of Hydrogen Deficiency or IHD concept can be very helpful:

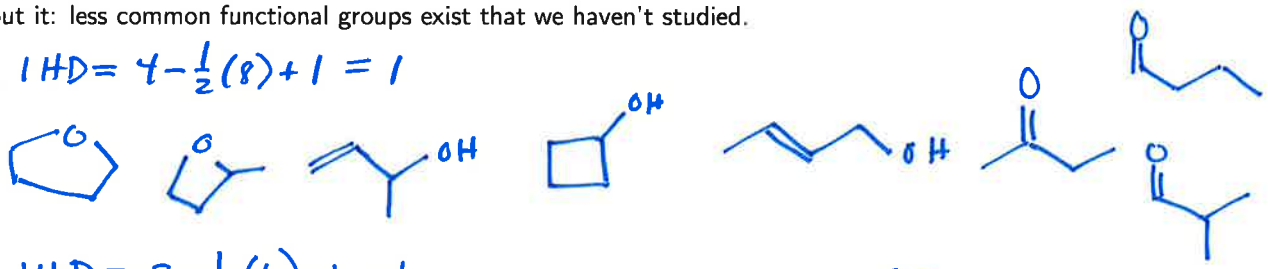
$$IHD = \#C - \frac{1}{2}\#H + \frac{1}{2}\#N + 1$$

Basically, IHD is a way of counting structural features. A ring or a double bond (alkene) each contribute an IHD count of 1. A triple bond contributes an IHD count of 2.

For each molecular formula below, draw three structural isomers (in any style you like). In most cases, there are more than three possible. Be sure to check that all atoms have the correct number of bonds. Try to come up with structures that have variety: If the IHD is 1, draw structures that have a ring and other structures with a double bond, don't just draw different rings.

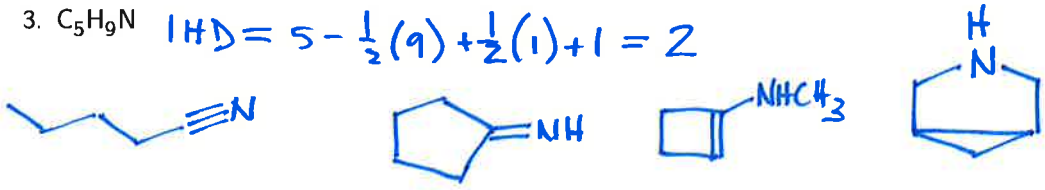
For extra practice, after you have drawn your structures, circle and name the functional groups in your molecules. You may end up creating random or new "functional groups" in this exercise, so if it is not on our list of functional groups don't worry about it: less common functional groups exist that we haven't studied.

1. C_4H_8O $IHD = 4 - \frac{1}{2}(8) + 1 = 1$



2. $C_3H_6O_2$ $IHD = 3 - \frac{1}{2}(6) + 1 = 1$

3. C_5H_9N $IHD = 5 - \frac{1}{2}(9) + \frac{1}{2}(1) + 1 = 2$

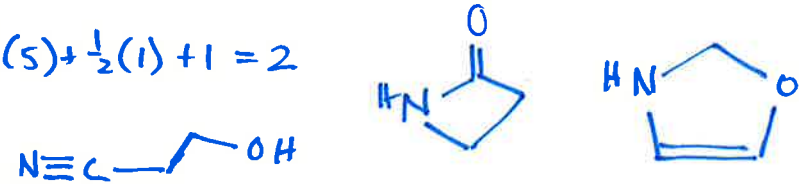


there are other possibilities for all of these!

4. C_5H_8 $IHD = 5 - \frac{1}{2}(8) + 1 = 2$

5. C_3H_5NO $IHD = 3 - \frac{1}{2}(5) + \frac{1}{2}(1) + 1 = 2$

note: corrected!



6. C_6H_{14} $IHD = 6 - \frac{1}{2}(14) + 1 = 0$