MAD ORG. CHEM. MIN. # 6

LAST NAME_____ FIRST NAME_____

PS #_____ Circle Class: AM PM

Determine the number of nonequivalent sets of protons and label each set (a, b, etc.). Predict the multiplicity of each signal (i. e., how many peaks is each signal split into) for each set of protons in the ^{1}H NMR of each compound.

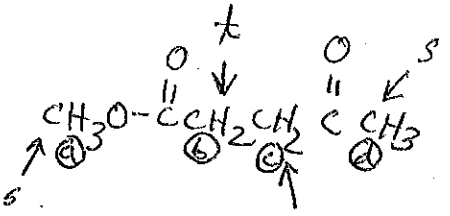
A. $CH_3O\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_2\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_3$ (a, b, c)

alternate structure

$H_a \Rightarrow n+1 = 0+1 \rightarrow$ singlet

$H_b \Rightarrow 0+1 \rightarrow$ singlet

$H_c \Rightarrow 0+1 \rightarrow$ singlet



structure on Your quiz

B. $CH_3\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_2CH_2\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_3$ (a, b, b, a)

$H_a \Rightarrow 0+1 \rightarrow s$

$H_b \Rightarrow 0+1 \rightarrow s$ (equivalent protons do not split each other)

C. $CH_3CH_2CH_2NO_2$ (c, b, a)

$H_a \Rightarrow a+1 = 2+1 \rightarrow$ triplet

$H_b \Rightarrow (n+1)(n+1) = (3+1)(2+1) =$ quartet triplet $\Rightarrow$ 12 lines

$H_c \Rightarrow n+1 = 2+1 \rightarrow$ triplet

D. CH_3CH_2 (e, d), $C=C$, H (a), H (b), CH_3 (c)

$H_a \Rightarrow n+1 = 1+1 =$ doublet

$H_b \Rightarrow n+1 = 1+1 =$ doublet

$H_c \Rightarrow n+1 = 0+1 = s$

$H_d \Rightarrow n+1 = 3+1 = q$

$H_e \Rightarrow n+1 = 2+1 = t$

E. $CH_3\text{-}CH(OH)\text{-}CH_3$ (a, b, a; OH = c, exchangeable)

$H_a \Rightarrow n+1 = 1+1 = d$

$*H_b \Rightarrow n+1 = 6+1 =$ septet

$*H_c \Rightarrow n+1 = 0+1 =$ singlet

* exchangeable (acidic) protons do not couple with adjacent protons under "ordinary" conditions