

Answer on Question #72936 – Chemistry – Organic Chemistry

Task:

Arrange the following in the increasing order of their acid strength.

Propanoic acid, ethanoic acid, 2-fluoroethanoic acid, 2-chloroethanoic acid, dichloroethanoic acid.

Solution:

Name	Structure	Acidity (pK _a)
propanoic acid	$\begin{array}{c} \text{H}_2 \\ \\ \text{H}_3\text{C}-\text{C}-\text{COOH} \end{array}$	4.88
ethanoic acid	$\text{H}_3\text{C}-\text{COOH}$	4.76
2-fluoroethanoic acid	$\begin{array}{c} \text{H}_2 \\ \\ \text{F}-\text{C}-\text{COOH} \end{array}$	2.58
2-chloroethanoic	$\begin{array}{c} \text{H}_2 \\ \\ \text{Cl}-\text{C}-\text{COOH} \end{array}$	2.87
dichloroethanoic acid	$\begin{array}{c} \text{COOH} \\ \\ \text{Cl}-\text{CH} \\ \\ \text{Cl} \end{array}$	1.479

The lower the value of pK_a - the stronger the acid.

Then,

Acids in the increasing order of their acid strength:

propanoic acid < ethanoic acid < 2-chloroethanoic < 2-fluoroethanoic acid < dichloroethanoic acid.