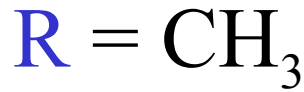


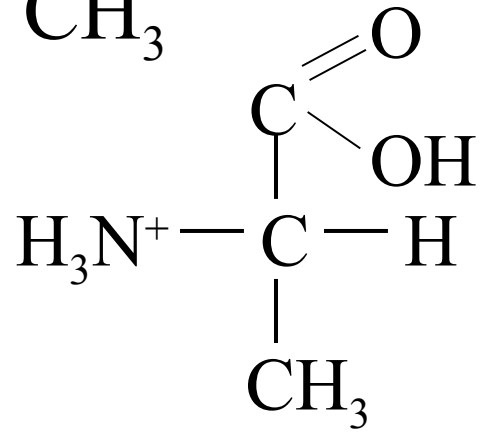
# Titration of an amino acid

alanine



$$pK_{a1} = 2.34$$

$$pK_{a2} = 9.69$$



$$K_{a1} = 10^{-2.34} = 4.57 \times 10^{-3}$$

$$K_{a1} = \frac{[\text{H}^+][\text{A}^-]}{[\text{HA}]}$$

$$0.1 \text{ M}$$

	[H <sup>+</sup> ]	[A <sup>-</sup> ]	[HA]
initial	0	0	0.1
change	+x	+x	-x
equil.	+x	+x	0.1-x

$$4.57 \times 10^{-3} = \frac{x^2}{0.1 - x}$$

$$x = 2.14 \times 10^{-2} = [\text{H}^+]$$

$$pH = 1.67$$