All amino acids are soluble both in acids as well as bases. Whether the solvent is acidic, basic or plain neutral water, it should be remembered that amino acids in aqueos solutions always contain charged groups.

Any amino acid is associated with at least two pk_a values – one corresponding to the CO_2H group and the other corresponding to the NH_2 group. For the NH_2 group, actually, the pk_a value corresponds to ka of the conjugate acid NH_3^+. These are usually referred to as pk_1 and pk_2 respectively. In addition, the side chain may also contain acidic groups such as –COOH and $–C_6H_5OH$ or basic groups such as $–NH_2$. The ka for acidic or basic side chain group is given by pk_R.

The pk_1, pk_2 and pk_R values not only reflect the acid base behavior of amino acids, they also tell us about the distribution of charges in the molecule when dissolved in buffer of a particular pH.

For every amino acid there exists a buffer pH when the concentrations of positively and negatively charged species are exactly equal. This pH value is called the isoelectric point pI for the given amino acid. In a buffer with pH equal to its isoelectric point there will be no net movement of amino acids during electrophoresis.

The isoionic point is equal to the isoelectric point of the amino acid and has a value
$pI = ½(pk_1 + pk_2)$

For amino acids with basic side chain isoelectric point is at $(pk_2 + pk_R)/2$

For amino acids with acidic side chain isoelectric point is at $(pk_1 + pk_R)/2$

Amino Acid Name	pk_1	pk_2	pk_R	pI
Glycine	2.35	9.78		6.06
Alanine	2.35	9.87		6.11
Valine	2.29	9.74		6.02
Leucine	2.33	9.74		6.04
Isoleucine	2.32	9.76		6.04
Methionine	2.13	9.28		5.70
Proline	1.95	10.64		6.30
Phenylalanine	2.20	9.31		5.764
Tryptophan	2.46	9.41		5.94
Serine	2.19	9.21		5.7
Threonine	2.09	9.10		5.60
Aspargine	2.14	8.72		5.43
Glutamine	2.17	9.13		5.65
Tyrosine	2.20	9.21	10.46(phenol)	6.33
Cystein	1.92	10.70	8.37(sulphyl-dryl)	5.14
Lysine	2.16	9.06	10.54	9.8
Arginine	1.82	8.99	12.48(guanidine)	10.74
Histidine	1.80	9.33	6.04(imidazole)	7.68
Aspartic Acid	1.99	9.90	3.90	2.94
Glutamic Acid	2.10	9.47	4.07	3.08