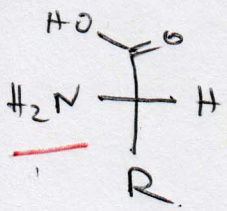
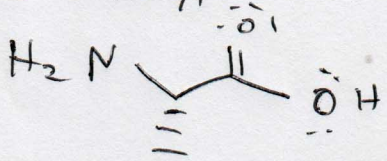


L-amino acid

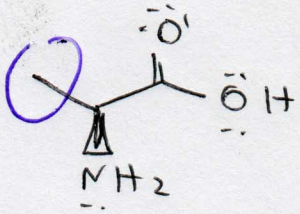
essential amino acids – those amino acids that the body is not able to produce (or produce easily) and must be supplied by other sources (food).

20 "most common" amino acids

1) R = alkyl

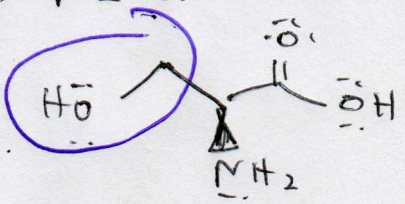


or



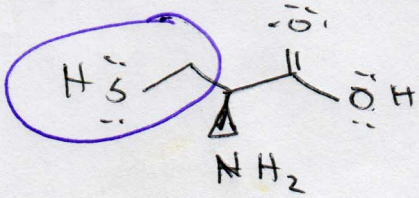
L-alanine

2) R = alcohol-containing



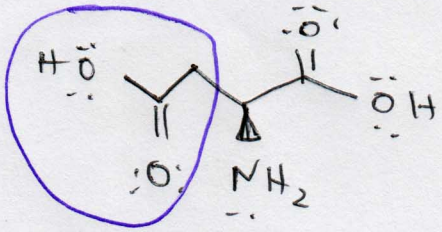
L-serine

3) R = sulfur-containing



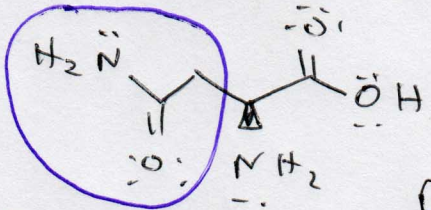
L-cysteine

4) R = carboxylic acid-containing



L-aspartic acid

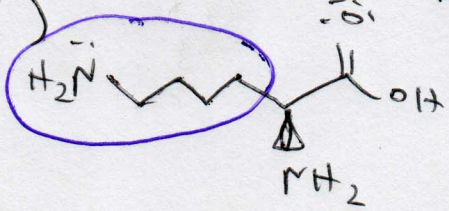
5) R = amide



L-asparagine

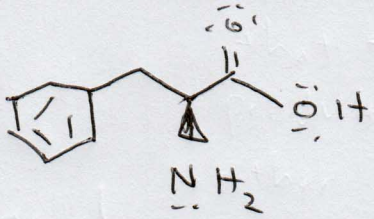
R = amine-containing

6)



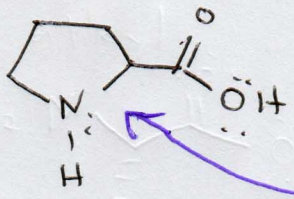
L-lysine

7) R= benzene-containing



L-phenylalanine

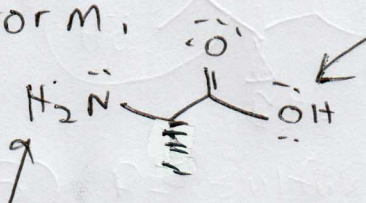
8) R= heterocycle



L-proline

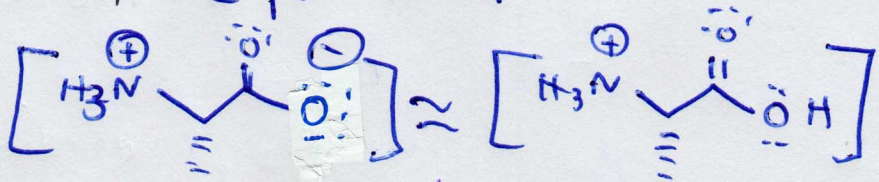
2° amine

Isoelectric point – pH at which ~~the~~ an amino acid appears, in greatest percentage, in neutral form.



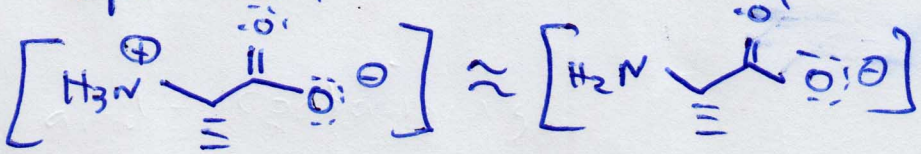
L-alanine

$pK_{a_1} = 2.34$ @ pH 2.34

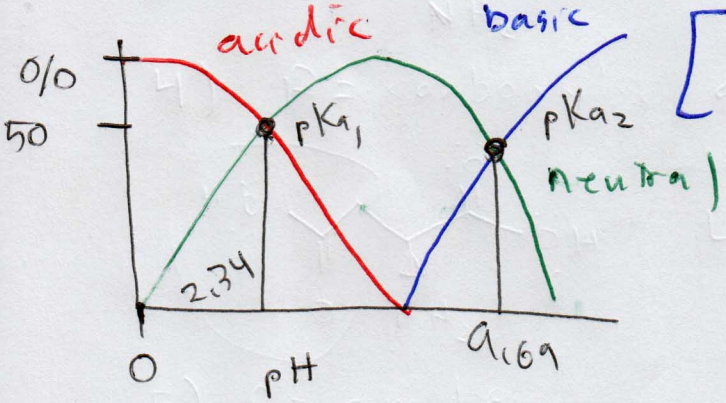


neutral = cationic

pK_{a_2}(conjugate) = 9.69 @ pH 9.69



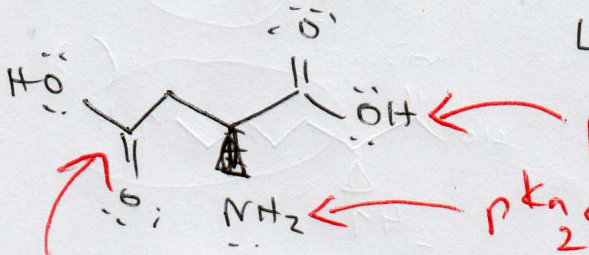
neutral = anionic



$$pI = \frac{pK_{a_1} + pK_{a_2}}{2} = 6.07$$

For "simple" amino acids that do not have ionizable side chains, the pI is simply the average of the pKa's of the acid + ammonium groups.

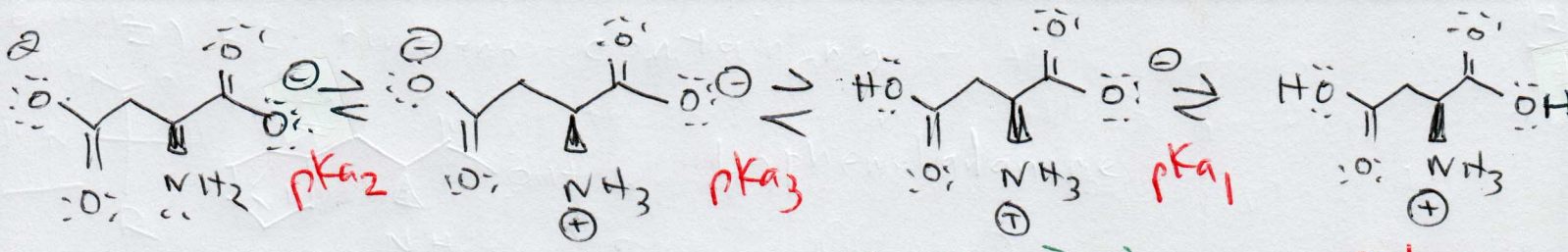
L-aspartic acid



$pK_{a_1} = 2.09$ ← comes off first (strongest acid)

pK_{a_2}(conjugate) = 9.82 ← comes off last (weakest)

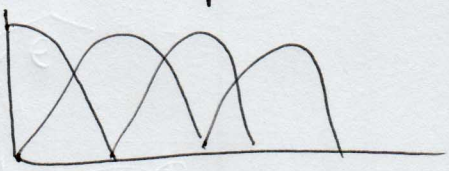
pK_{a_3}(side chain) = 3.86



double anionic anionic zwitterionic (neutral) cationic

$\therefore pI = \frac{pK_{a_1} + pK_{a_3}}{2}$ ← Equation changed due to acidic side group

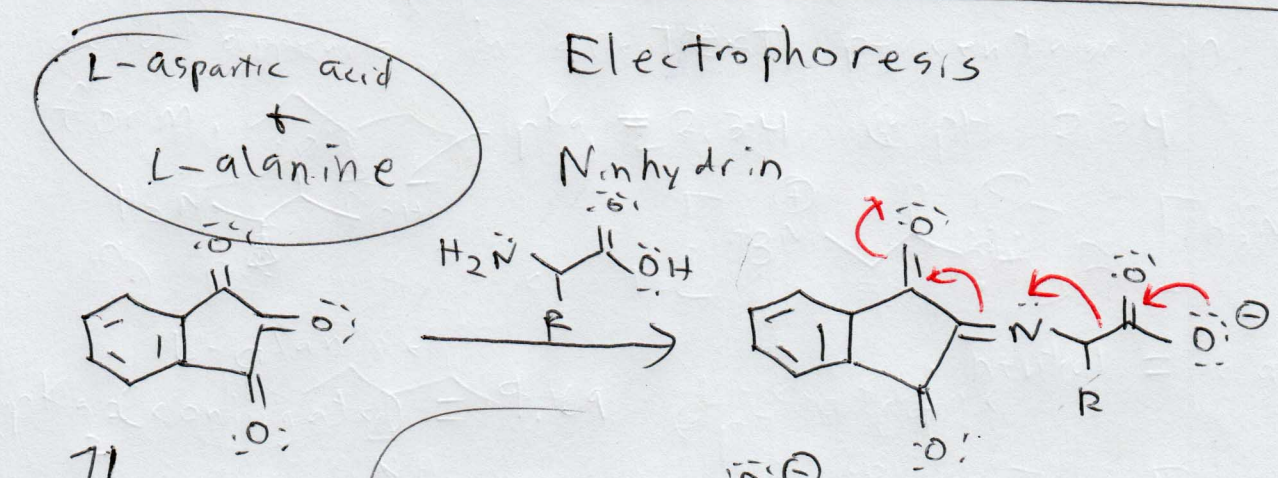
$= 2.98$



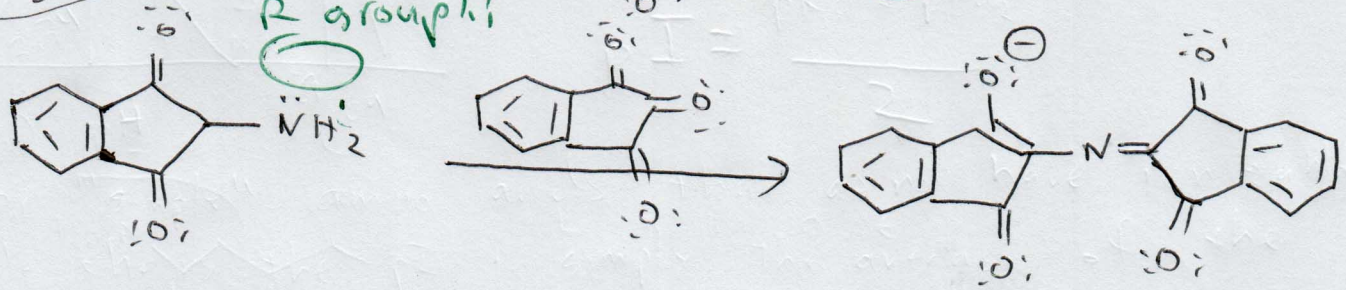
Electrophoresis

L-aspartic acid + L-alanine

Ninhydrin



no more R group!!



Ruheman's purple