# Introducing, The Amino Acids!

from chapter(s) _____ in the recommended text

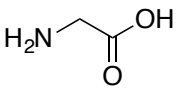
## A. Introduction

## B. Nomenclature And Conventions

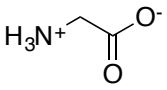
*left*,
*right*.

*ammonium* and a *C*-terminal *carboxylate*.

*zwitterionic* form.

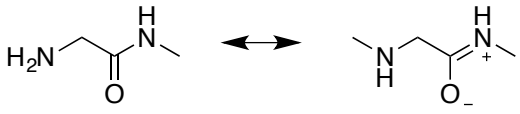


*glycine, neutral form*

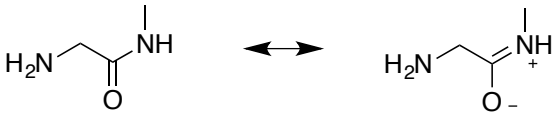


*glycine, charged form*

*slow* compared
*resonance*.



*trans*



*cis*

*flat*
*$sp^2$*
*alkenes*.

*trans*
*is not*

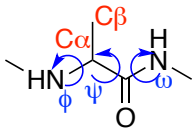
*20* genetically

*aliphatic*

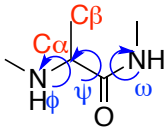
*Cα* and the
labeled *Cβ*.

*Cβ*.

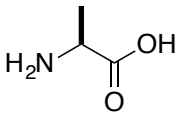
## C. Amino Acids With Lypophilic Side Chains



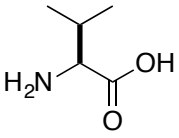

*trans*



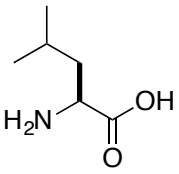

*cis*



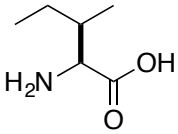

*alanine, Ala, A*




*valine, Val, V*



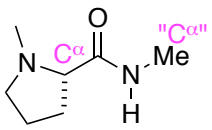

*leucine, Leu, L*



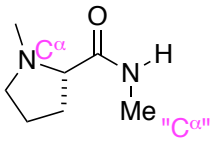

*iso-leucine, Ile, I*

*L*-configurations
*the configuration of glyceraldehyde*.

*secondary* amine.



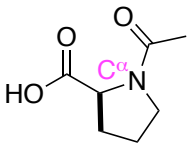

*trans*



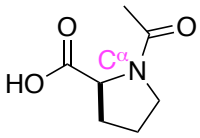

*cis*

Really the question and answer were intended to be (and will be in the second print):

Proline is an “odd-ball”: it is the only amino acid that is a *tertiary / secondary / primary* amine.
Draw the *cis* and *trans* isomers of MeCO-Pro-OH.




*trans*

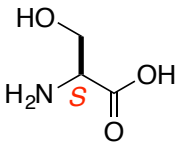



*cis*

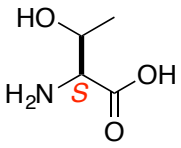
*more*

## D. Alcohol And Thiol Amino Acids

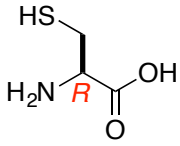
*Ser*
*Thr*
*Cys* ($CH_2SH$)
*Met* ($CH_2CH_2SMe$).



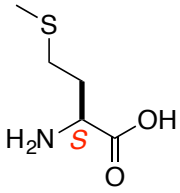

*serine*




*threonine*



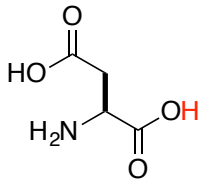

*cysteine*



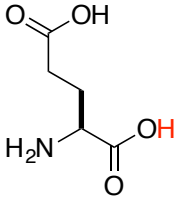

*methionine*

*Cys*,
sulfur atom connected to Cβ has higher priority than carbonyl group.

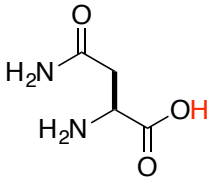
## E. Acidic Amino Acids And Their Derivatives



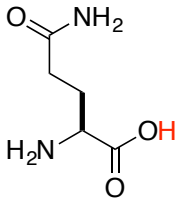

*D*




*E*




*N*




*Q*

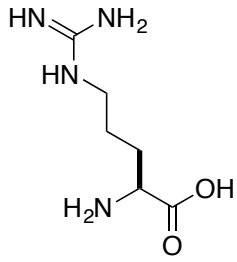
*more* acidic

## F. Basic Amino Acids

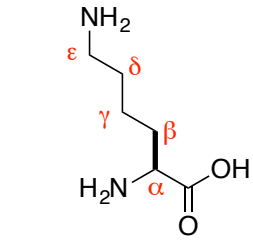
*H*

*Lys*

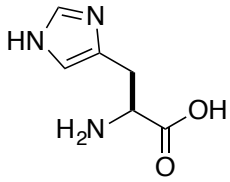
*Arg* ($CH_2CH_2CH_2NHCNHNH_2$



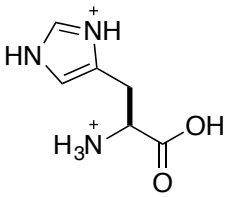

*most basic*



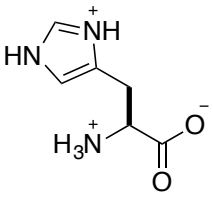

*intermediate*



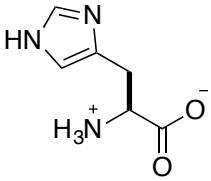

*least basic*



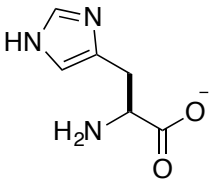

*pH = 0*
*di-cation*




*4*

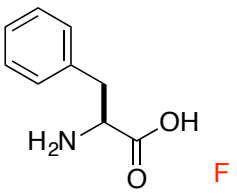



*8*



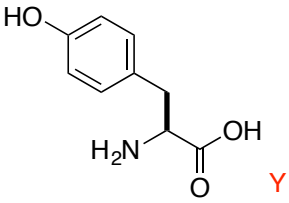

*12*
*monoanion*

## G. Aromatic Amino Acids



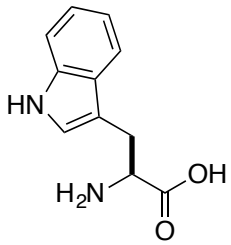

F

*phenylalanine*




Y

*tyrosine*

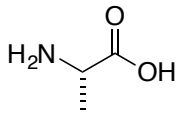



W

*tryptophan*

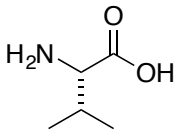
*weaker*
*indole*
*is not*

## H. Summary



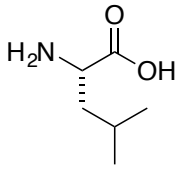
*hydrophobic 1*

name: *alanine, Ala, A*



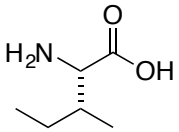
*hydrophobic 2*

*valine, Val, V*



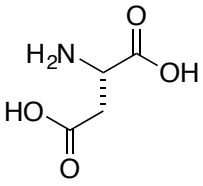
*hydrophobic 3*

*leucine, Leu, L*



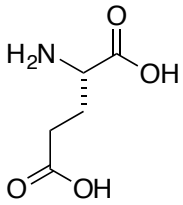
*hydrophobic 4*

*iso-leucine, Ile, I*



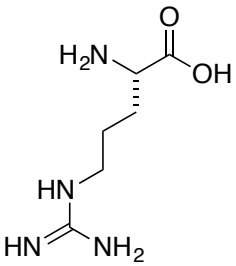
*acidic 1*

*aspartic acid, Asp, D*



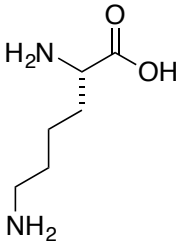
*acidic 2*

*glutamic acid, Glu, E*



*basic 1*

*arginine, Arg, R*



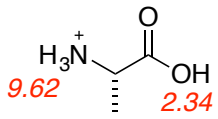
*basic 2*

*lysine, Lys, K*

# I. Isoelectric Points

*isoelectric* point

*midway between*



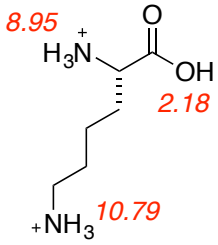

*structure of alanine indicating pKa's*

$$pI = \frac{pKa\ (\alpha\text{-}COOH) + pKa\ (\alpha\text{-}NH_3^+)}{2}$$

$pI = (2.34 + 9.62)/2 = 5.98$

*calculation*

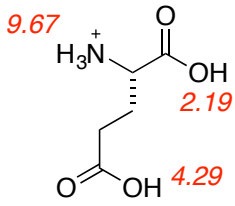
*average*




*structure of Lys indicating pKa's*

$pI = (8.95 + 10.79)/2 = 9.87$

*calculation*




*structure of glutamic acid indicating pKa's*

$pI = (2.19 + 4.29)/2 = 3.24$

*calculation*

Asp, *acid* Asn, *neutral* Arg, *basic*
Glu, *acid* Gln, *neutral*
Ser, *neutral* Thr, *neutral*

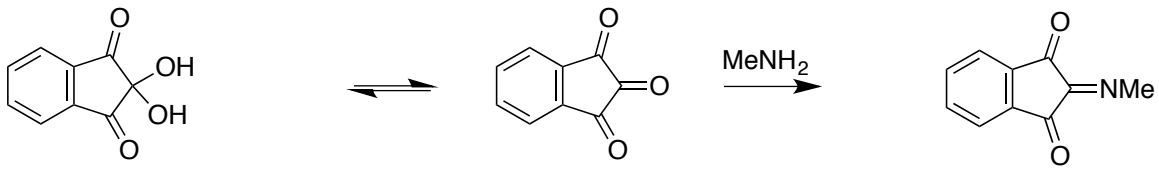
the *highest* pI value *Arg* | the *lowest* pI value *Glu*
most *negative* charge at pH 6 *Glu* | most *positive* charge at pH 2 *Lys*

*mass divided by charge*.

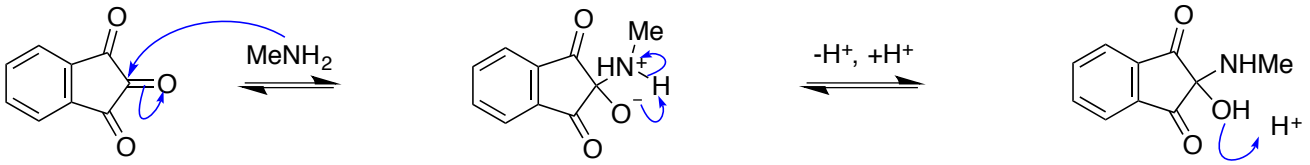
*Lys*
*not at all*
*migrate to the positive electrode*.

## J. The Ninhydrin Test

*central*

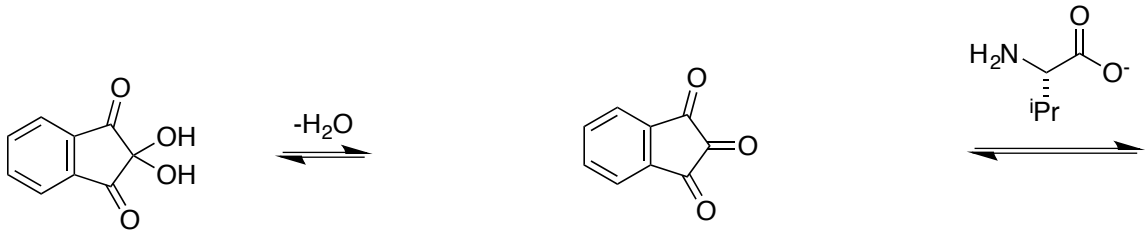



*hydrate* *ninhydrin* *imine*

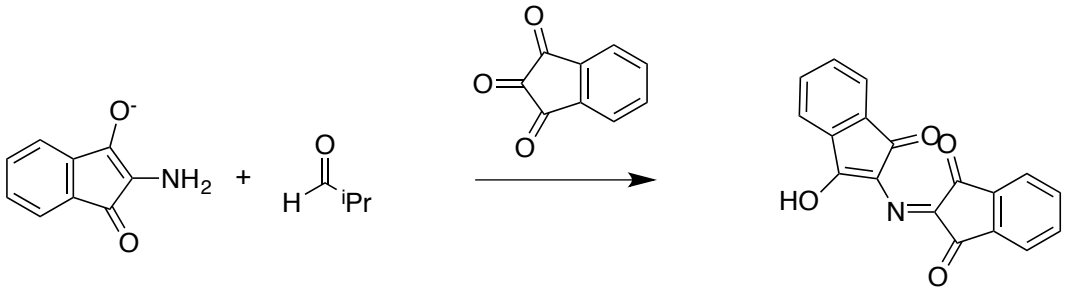




*proline*).
*amine*
Proline *does not*



*imine* *imine enolate*

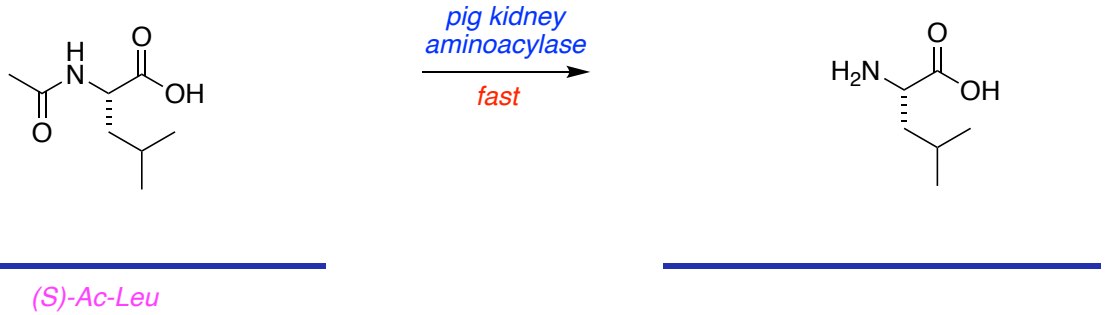


*amine* *purple*

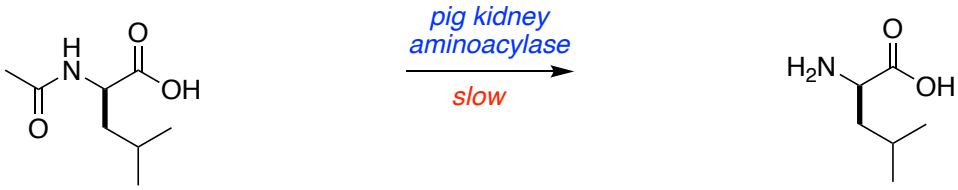
*purple*
*can* be quantified by UV.

*and* to quantitate

*perfect*




*(S)-Ac-Leu*




is *just under 50 %*.
is *just under 50 %*.
*decreases* with conversion, while that of the starting material *increases*.