

Introducing, The Amino Acids!

from chapter(s) _____ in the recommended text

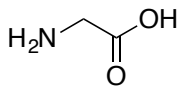
A. Introduction

B. Nomenclature And Conventions

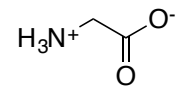
left,
right.

ammonium and a C-terminal *carboxylate*.

zwitterionic form.

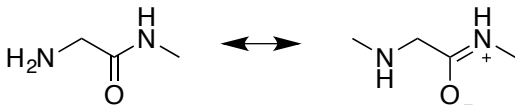


glycine, neutral form

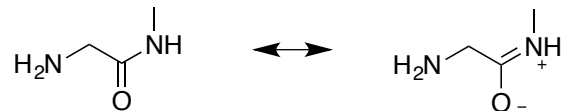


glycine, charged form

slow compared
resonance.



trans



cis

flat
sp²
alkenes.

trans
is not

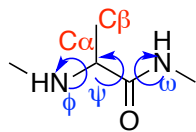
20 genetically

aliphatic

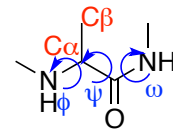
C_α and the
 labeled *C_β*.

C_β.

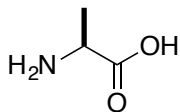
C. Amino Acids With Lypophilic Side Chains



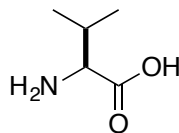
trans



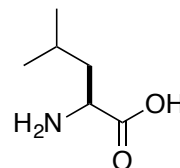
cis



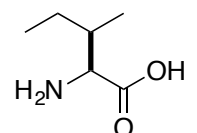
alanine, Ala, A



valine, Val, V



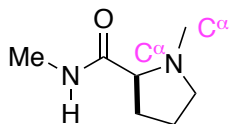
leucine, Leu, L



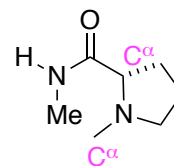
iso-leucine, Ile, I

L-configurations
the configuration of glyceraldehyde.

secondary amine.



trans

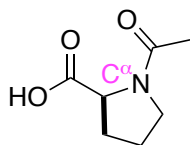


cis

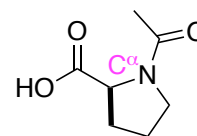
Really the question and answer were intended to be (and will be in the second print):

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

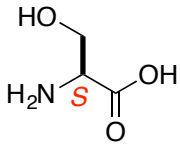
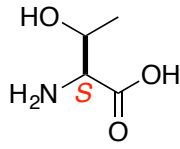
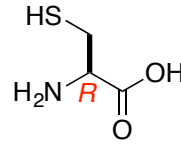
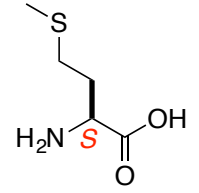
D. Alcohol And Thiol Amino Acids

Ser

Thr

Cys (CH₂SH)

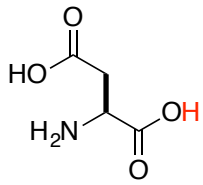
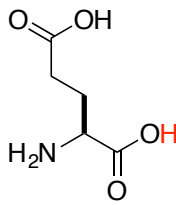
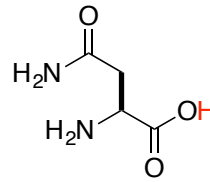
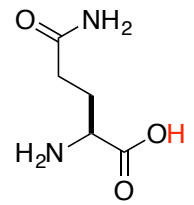
Met (CH₂CH₂SMe).

*serine**threonine**cysteine**methionine*

Cys,

sulfur atom connected to C β has higher priority than carbonyl group.

E. Acidic Amino Acids And Their Derivatives

*D**E**N**Q*

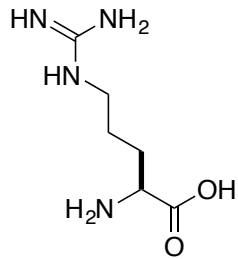
more acidic

F. Basic Amino Acids

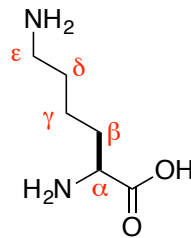
H

Lys

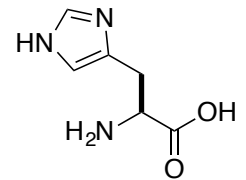
Arg ($\text{CH}_2\text{CH}_2\text{CH}_2\text{NHCNHNH}_2$)



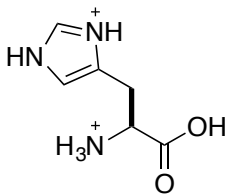
most basic



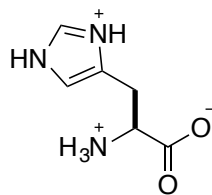
intermediate



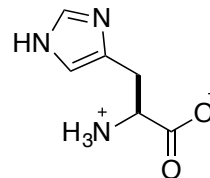
least basic



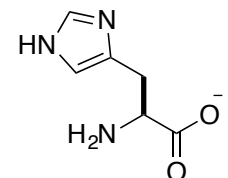
pH = 0
di-cation



4

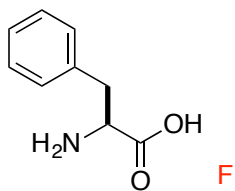


8

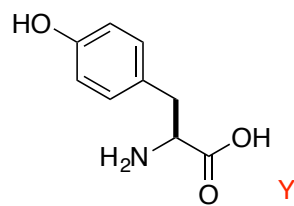


12
monoanion

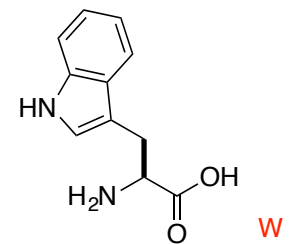
G. Aromatic Amino Acids



phenylalanine



tyrosine



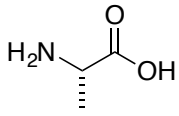
tryptophan

weaker

indole

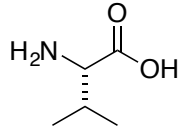
is not

H. Summary



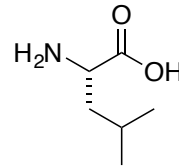
hydrophobic 1

name: alanine, Ala, A



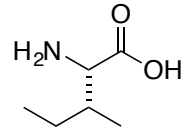
hydrophobic 2

valine, Val, V



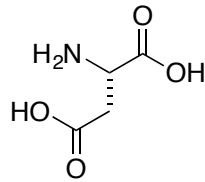
hydrophobic 3

leucine, Leu, L



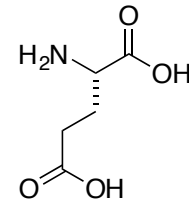
hydrophobic 4

iso-leucine, Ile, I



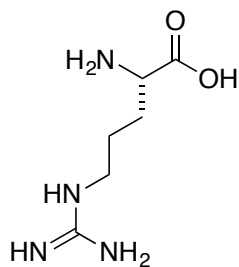
acidic 1

aspartic acid, Asp, D



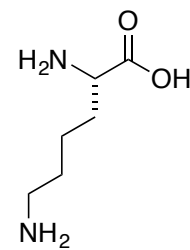
acidic 2

glutamic acid, Glu, E



basic 1

arginine, Arg, R

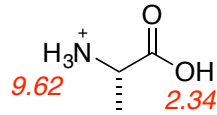


basic 2

lysine, Lys, K

I. Isoelectric Points

isoelectric point
midway between



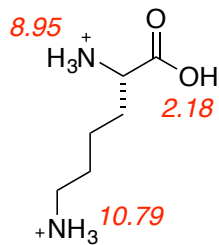
structure of alanine indicating pKa's

$$pI = \frac{pK_a(\alpha\text{-COOH}) + pK_a(\alpha\text{-NH}_3^+)}{2}$$

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

calculation

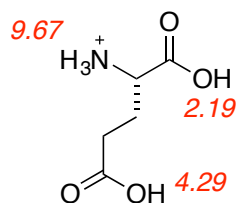
average



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*

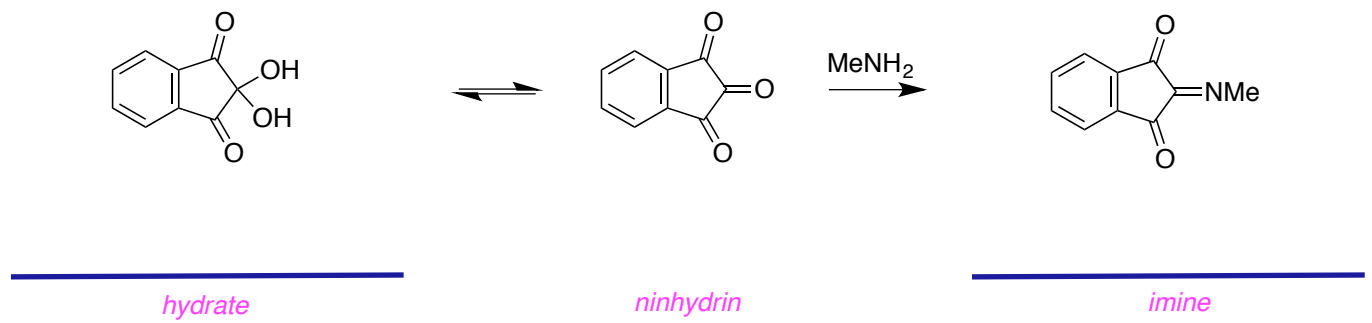
the *highest* pI value *Arg* the *lowest* pI value *Glu*
 most *negative* charge at pH 6 *Glu* most *positive* charge at pH 2 *Lys*

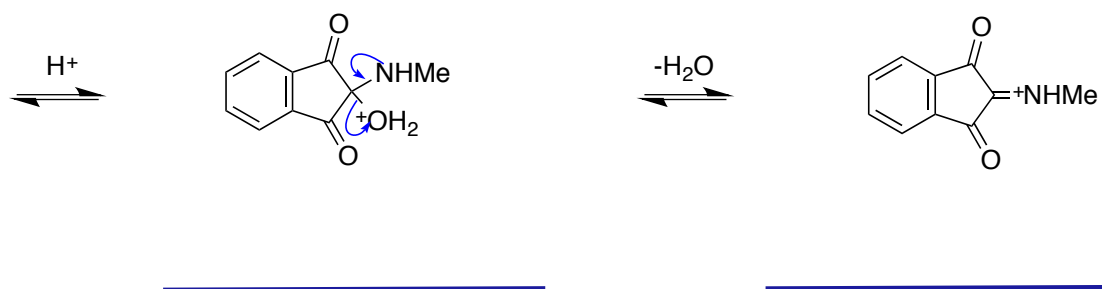
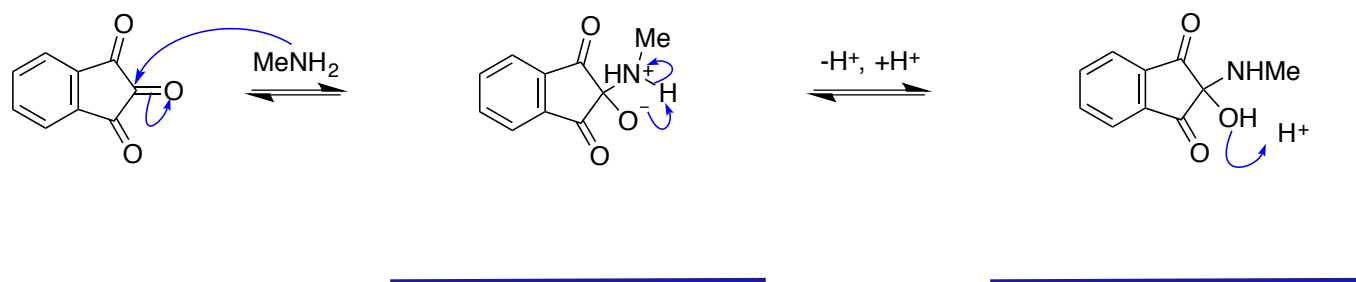
mass divided by charge.

Lys
not at all
migrate to the positive electrode.

J. The Ninhydrin Test

central

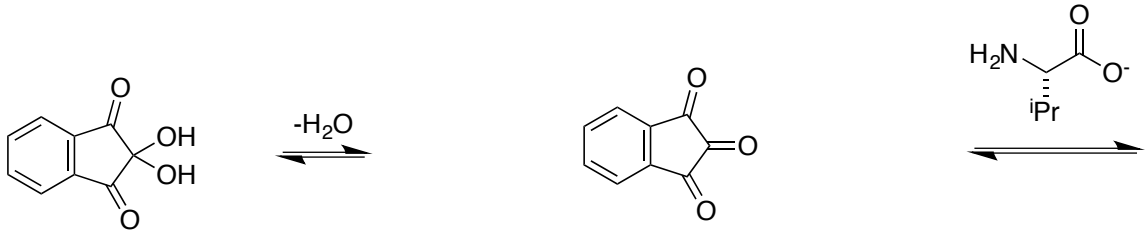




proline).

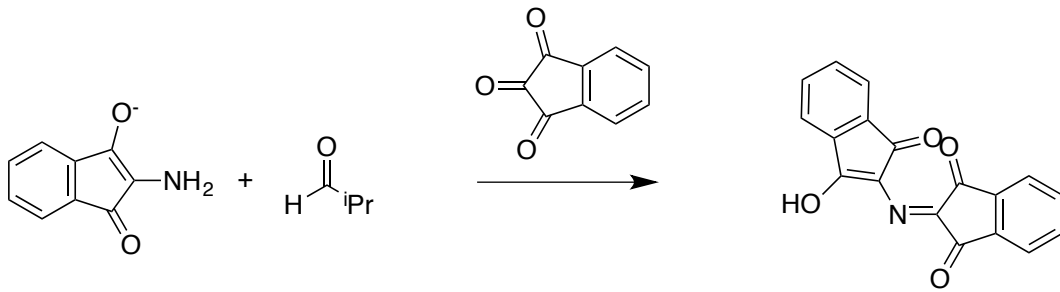
amine

Proline *does not*



imine

imine enolate



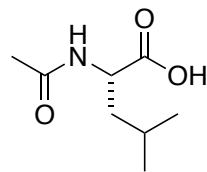
amine

purple

purple
can be quantified by UV.

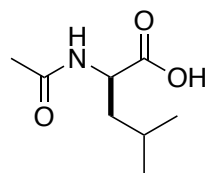
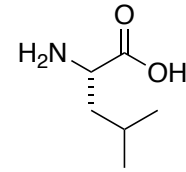
and to quantitate

perfect

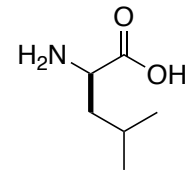


(S)-Ac-Leu

*pig kidney
aminoacylase*
→
fast



*pig kidney
aminoacylase*
→
slow



is *just under 50 %*.

is *just under 50 %*.

decreases with conversion, while that of the starting material *increases*.