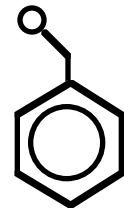
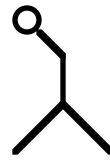
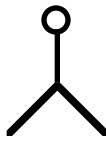


# Aliphatic (Non-Polar, Hydrophobic) Amino Acids

Less Hydrophobic

More Hydrophobic



Glycine  
Gly  
G

Alanine  
Ala  
A

Proline  
Pro  
P

Valine  
Val  
V

Leucine  
Leu  
L

Isoleucine  
Ile  
I

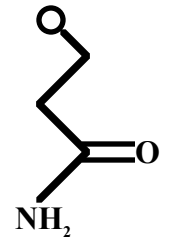
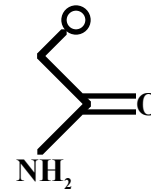
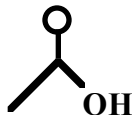
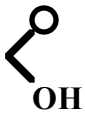
Methionine  
Met  
M

Phenylalanine  
Phe  
F

## Polar, Non-Charged Amino Acids

Alcohols

Amides



Serine  
Ser  
S

Threonine  
Thr  
T

Tyrosine  
Tyr  
Y

Cysteine  
Cys  
C

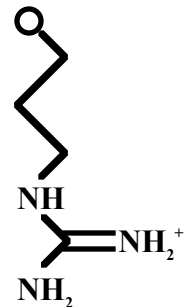
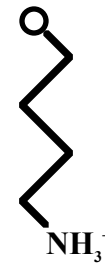
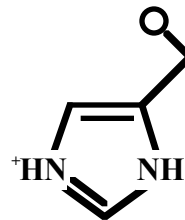
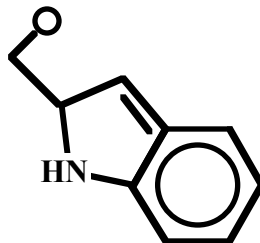
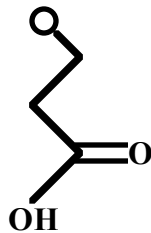
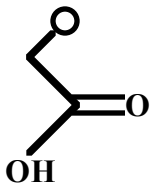
Asparagine  
Asn  
N

Glutamine  
Gln  
Q

## Polar, Charged Amino Acids

Acidic

Basic



Aspartic Acid  
Asp  
D

Glutamic Acid  
Glu  
E

Tryptophan  
Trp  
W

Histidine  
His  
H

Lysine  
Lys  
K

Arginine  
Arg  
R

In these structures, the top circle represents the amino acid backbone ( $H_2N-CH-COOH$ ), with the R group depicted.

In the case of proline, which is an alpha imino acid, rather than an amino acid, the circle represents the  $-CH-COOH$  group, the imino nitrogen being depicted as an element in the proline ring. (Imino hydrogen(s) are not depicted.)

These are the amino acids in the order in which I memorized them in undergrad. Assuming you can figure out the three-letter abbreviations (since they're all self-explanatory), I did come up with some nonsense mnemonics on the one-letter abbreviations which helped me to be able to reconstruct the chart: (No, they make no sense. They're not supposed to. If they made sense, they wouldn't be mnemonics, eh?)

The top row: GAPVLIMF, or Gap V. Lymph

The second row: STYCNQ, or Stick Nick

The third row: DEWHKR, or Doohicker (kinda like "Doohicky")

To reconstruct the chart from the phrases, write the one-letter abbreviations in chart form, aided by the mnemonic phrases. Then fill in the amino acid names. After you have the names and one-letter abbreviations down, you should, if you've studied the chart a bit, be able to start dropping some of the structures into place.

### **Some hints (they help me, but I don't know if they'll help you):**

The top (aliphatic) row, since it goes from less hydrophobic to more hydrophobic, also goes in order of complexity, from glycine, whose R group is only a hydrogen, to phenylalanine, whose R group contains a bulky phenyl group.

Methionine and asparagine are (visually, only!) similar in structure: replace the sulfur with a carbonyl and tack an amino onto the end, and you've got asparagine from methionine.

Glutamine is asparagine with one more carbon in its chain.

Aspartic acid and glutamic acid (aspartate and glutamate) are formed by replacing the amino group of the asparagine and glutamine amides with a hydroxyl, creating a carboxylate group.

### **Difficult One-Letter Abbreviations**

Phenylalanine (F) = Fenyllalanine

Tyrosine (Y) = tYrosine

Asparagine (N) = asparag"b>N"

Glutamine (Q) = CUTEamine

Aspartic acid (D) = asparDic acid

Glutamic acid (glutamate) (E) = glutaMEET

Tryptophan (W) = tWryptophan (say it like Elmer Fudd)

Lysine (K) = "K" comes right before "L"

Arginine (R) = "b>R"ginine

### **How to Use the Chart**

Last year I had to know all the amino acids, including the pKs of any side chains that had one. What I did was write the entire chart out several times (like, eight or nine), until I could draw the structures in my sleep. I then had the structures memorized in the order of my mnemonic phrases, so I could put the whole chart together in a couple of minutes on a blank sheet of paper. I'd recommend sketching it on the back of the test so you have it to refer to throughout the exam.