

Package acide-amine.sty

This package provide commands who draw an amino acid. You will find below the list of amino acids available.

Molecules were initially drawn by Florian Hollandt, see :

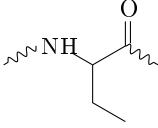
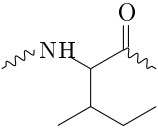
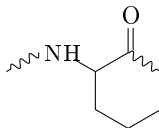
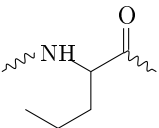
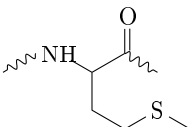
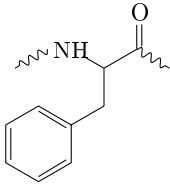
<http://www.texample.net/tikz/examples/author/florian-hollandt/>

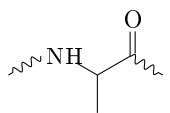
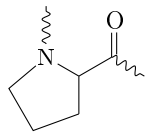
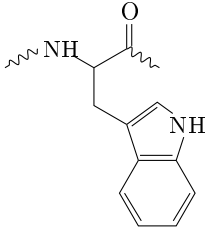
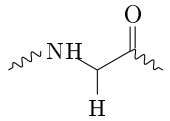
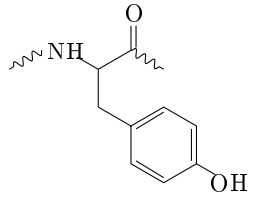
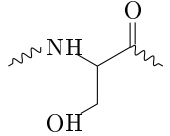
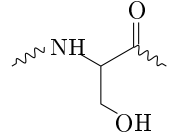
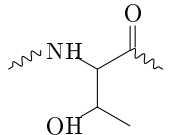
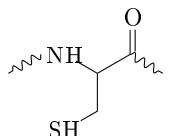
My contribution was only to do all commands. I give the standard three letters code for each commands who draw amino acid. For arginine, the three letters code is `arg` which has been ever defined in another command. Thus I gave to it the name `aarg`.

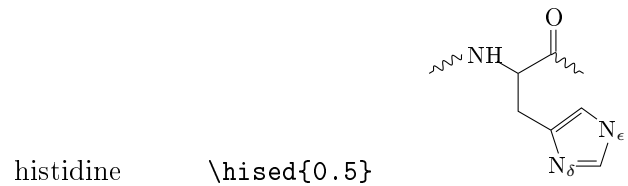
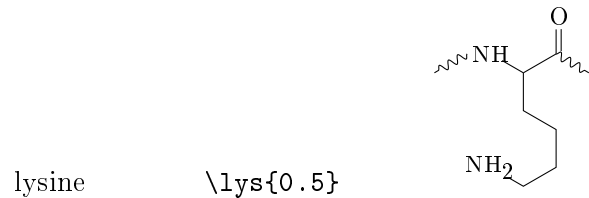
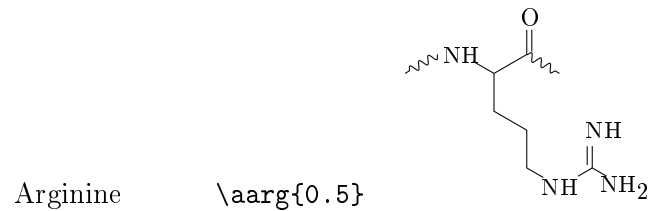
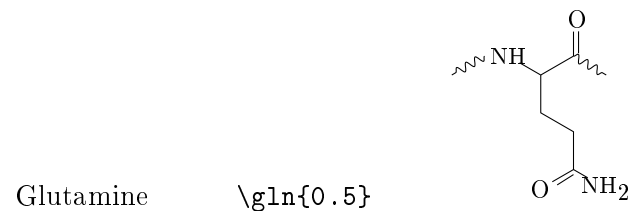
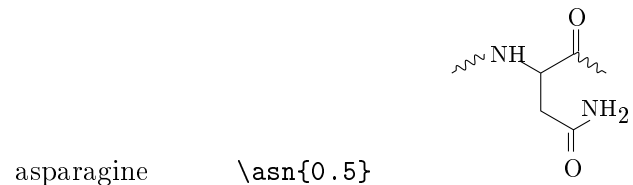
The general syntax for an amino acid with the name `aaa` is : `\aaa{ scale }`

`scale` is a number between 0 and 1 which control the size of the picture.

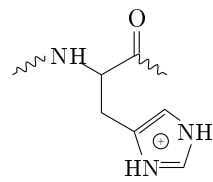
The following table gives all amino acids. Each molecule is drew by the command in the command column.

amino acid	command	result	command	result	command	result	command	result
valine								
isoleucine								
leucine	<code>\leu{0.5}</code>		<code>\leub{0.5}</code>					
methionine	<code>\met{0.5}</code>							
phénylalanine	<code>\phe{0.5}</code>							

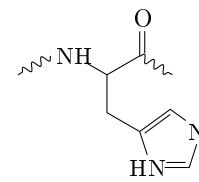
Alanine	<code>\ala{0.5}</code>		
Proline	<code>\pro{0.5}</code>		
Tryptophane	<code>\trp{0.5}</code>		
Glycine	<code>\gly{0.5}</code>		
tyrosine	<code>\tyr{0.5}</code>		
sérine	<code>\ser{0.5}</code>		<code>\serb{0.5}</code> 
thréonine	<code>\thr{0.5}</code>		
cystéine	<code>\cys{0.5}</code>		



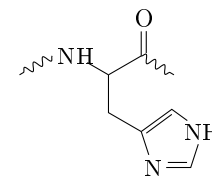
`\hip{0.5}`



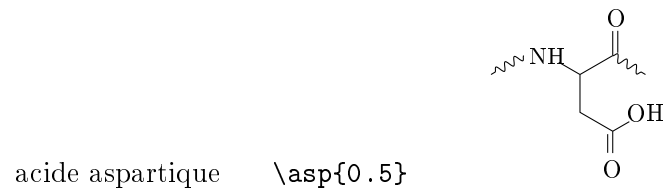
`\hid{0.5}`

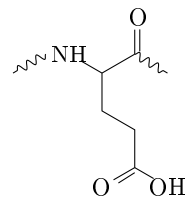


`\hie{0.5}`



note : commands hie and his give the same result.





acide glutamique \glu{0.5}

Here is the package source code : acide-amine.sty

```
% Package acide-amine.sty
% Germain Vallverdu - mai 2009
% germain_vallverdu@yahoo.fr
% http://germain.salvato-vallverdu.perso.sfr.fr

% All molecules were only slightly modified from the picture RNA codons
% Author: Florian Hollandt
% see : http://www.texample.net/tikz/examples/author/florian-hollandt/

% needs tikz package and the following library
\usepackage{tikz}
\usetikzlibrary{decorations.pathmorphing}

% to_x and from_x styles
% denote bonds terminating or starting in labeled nodes.
% x denotes the number of letters in the node label.
\tikzstyle{to_1}    =[shorten >=5pt]
\tikzstyle{to_1i}  =[shorten >=6pt]
\tikzstyle{to_2}    =[shorten >=7pt]
\tikzstyle{to_3}    =[shorten >=8pt]
\tikzstyle{from_1}  =[shorten <=5pt]
\tikzstyle{from_1i}=[shorten <=6pt]
\tikzstyle{from_2}  =[shorten <=8pt]
\tikzstyle{link}    =[decorate,decoration={snake,amplitude=1.5pt,segment length=4pt}]

% * * * * * Lysine
\newcommand{\lys}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
```

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\draw[to_3] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(270:1) node (Cd) {}
-- ++(210:1) node (Ce) {}
-- ++(150:1) node (Cf) {NH$_{\mbox{2}}$};

\end{tikzpicture}}
% * * * * *
% * * * * * Asparagine
\newcommand{\asn}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {0};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_2] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(30:1) node (Cd) {NH$_{\mbox{2}}$};
\draw[to_1i] (Cc.center) -- ++(270:1) node (O) {};
\draw[to_1] (Cc.210) -- (O.150);
\path (O.center) node {0};
\end{tikzpicture}}
% * * * * *
% * * * * * Arginine
\newcommand{\aarg}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {0};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_2] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(270:1) node (Cd) {}
-- ++(330:1) node (NH1) {NH};
\draw[from_2,to_3] (NH1.center) -- ++(30:1) node (Ce) {}
-- ++(330:1) node {NH$_{\mbox{2}}$};

```

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\draw[to_1i] (Ce.center)      -- ++(90:1) node (N2) {};
\draw[to_1]  (Ce.150)        -- (N2.210);
\path (N2) node[xshift=1.5mm] {NH};
\end{tikzpicture}}}
% * * * * *

% * * * * * Serine
\newcommand{\ser}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw      (zero.center)      -- ++(30:1) node (C0) {};
\draw[link] (C0.center)      -- ++(330:1);
\draw[to_1] (C0.center)      -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (C0.30)        -- +(90:1);
\draw[to_1] (zero.center)    -- ++(150:1) node (N) {NH};
\draw[link] (N.west)         -- ++(210:1);
\draw[to_2] (zero.center)    -- ++(270:1) node(Cb){}
-- ++(210:1) node (Cc) {OH};
\end{tikzpicture}}}
% * * * * *

% * * * * * Serine bis
\newcommand{\serb}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw      (zero.center)      -- ++(30:1) node (C0) {};
\draw[link] (C0.center)      -- ++(330:1);
\draw[to_1] (C0.center)      -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (C0.30)        -- +(90:1);
\draw[to_1] (zero.center)    -- ++(150:1) node (N) {NH};
\draw[link] (N.west)         -- ++(210:1);
\draw[to_2] (zero.center)    -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {OH};
\end{tikzpicture}}}
% * * * * *

% * * * * * Threonine
\newcommand{\thr}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw      (zero.center)      -- ++(30:1) node (C0) {};
\draw[link] (C0.center)      -- ++(330:1);

```

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\draw[to_1] (C0.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (C0.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_2] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {} (Cb.center)
-- +(210:1) node {OH};

\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Methionine
\newcommand{\met}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_1] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(30:1) node (Cd) {S};
\draw[from_1] (Cd.center) -- +(330:1);
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Isoleucine
\newcommand{\ile}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- +(30:1) node (Cd) {} (Cb.center)
-- +(210:1) node (Ce) {};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Glutamic acid
\newcommand{\glu}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_1i] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(270:1) node (Cd) {}
-- ++(330:1) node (NH) {OH};
\draw[to_1] (Cd.center) -- +(210:1) node (O) {};
\draw[to_1i] (Cd.270) -- (0.300);
\path (O.center) node {O};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Aspartic acid
\newcommand{\asp}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_2] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- +(30:1) node (Cd) {OH};
\draw[to_1i] (Cc.center) -- +(270:1) node (O) {};
\draw[to_1] (Cc.210) -- (0.150);
\path (O.center) node {O};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Glycine
\newcommand{\gly}[1]{\footnotesize

```



```

\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_1] (zero.center) -- ++(270:1) node {H};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Alanine
\newcommand{\ala}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Valine
\newcommand{\val}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Glutamine

```

```

\newcommand{\gln}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {0};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw[to_3] (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node (Cc) {}
-- ++(270:1) node (Cd) {}
-- ++(330:1) node (NH) {NH$_{\mbox{2}}$};
\draw[to_1] (Cd.center) -- +(210:1) node (O) {};
\draw[to_1i] (Cd.270) -- (0.300);
\path (O.center) node {0};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Histidine = HIE
\newcommand{\his}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {0};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node(Cc){};
\draw[to_2] (Cc.center) -- ++(108-1*72:1) node (Cd) {}
-- ++(108-2*72:1) node (Ce) {NH};
\draw[from_1,to_1] (Ce.center) -- ++(108-3*72:1) node (Cf) {}
-- ++(108-4*72:1) node (Cg) {};
\draw[from_1] (Cg.center) -- (Cc.center);
\draw (Cc.198+2*72) -- (Cd.198+1*72);
\draw[from_1] (Cg.72) -- (Cf.198+4*72);
\draw (Cg.center) node {N};
\end{tikzpicture}}
\newcommand{\hie}[1]{\his{#1}}
% * * * * *

```

```

% * * * * * Histidine = HID
\newcommand{\hid}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node(Cc){};
\draw[to_2] (Cc.center) -- ++(108-1*72:1) node (Cd) {}
-- ++(108-2*72:1) node (Ce) {} node[xshift=-0.5mm] {N};
\draw[from_1,to_1] (Ce.center) -- ++(108-3*72:1) node (Cf) {}
-- ++(108-4*72:1) node (Cg) {};
\draw[from_1] (Cg.center) -- (Cc.center);
\draw (Cc.198+2*72) -- (Cd.198+1*72);
\draw[from_1] (Cg.72) -- (Cf.198+4*72);
\draw (Cg.center) node[xshift=-0.5mm] {HN};
\end{tikzpicture}}
% * * * * *

```

```

% * * * * * Histidine = HIP
\newcommand{\hip}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node(Cc){};
\draw[to_2] (Cc.center) -- ++(108-1*72:1) node (Cd) {}
-- ++(108-2*72:1) node (Ce) {NH};
\draw[from_1,to_1] (Ce.center) -- ++(108-3*72:1) node (Cf) {}
-- ++(108-4*72:1) node (Cg) {};
\draw[from_1] (Cg.center) -- (Cc.center);
\draw (Cc.198+2*72) -- (Cd.198+1*72);
\draw[from_1] (Cg.72) -- (Cf.198+4*72);
\draw (Cg.center) node[xshift=-0.5mm] {HN};
\path (Cc.center) ++(340:0.75) node[draw,thin,scale=0.4] {\textbf \small $$$};

```

```

\end{tikzpicture}}
% * * * * *

% * * * * * Histidine with delta epsilon
\newcommand{\hised}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node(Cc){};
\draw[to_2] (Cc.center) -- ++(108-1*72:1) node (Cd) {}
-- ++(108-2*72:1) node (Ce) {N$_{\epsilon}$};
\draw[from_1,to_1] (Ce.center) -- ++(108-3*72:1) node (Cf) {}
-- ++(108-4*72:1) node (Cg) {};
\draw[from_1] (Cg.center) -- (Cc.center);
\draw (Cc.198+2*72) -- (Cd.198+1*72);
\draw[from_1] (Cg.72) -- (Cf.198+4*72);
\draw (Cg.center) node {N$_{\delta}$};
\end{tikzpicture}}
% * * * * *

% * * * * * Proline
\newcommand{\pro}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (nh) {N};
\draw[link] (nh.north) -- ++(90:1);
\draw (zero.center) -- ++(270:1) node(Cb){};
\path (Cb.center) -- +(150:1) node (x) {};
\path (x.center) +(170:1) node (Cd) {};
\path (x.center) +(250:1) node (Cc) {};
\draw[to_1] (Cb.center) -- (Cc.center)
-- (Cd.center)
-- (nh.center);

```



```

\draw[link] (C0.center) -- ++(330:1);
\draw[to_1] (C0.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (C0.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){};
\draw (Cb.center) -- ++(330:1) node (Cc) {}
-- ++(30:1) node (Cd) {}
-- ++(330:1) node (Ce) {}
-- ++(270:1) node (Cf) {}
-- ++(210:1) node (Cg) {}
-- ++(150:1) node (Ch) {}
-- ++(90:1);
\draw (Cc.330) -- (Cd.270);
\draw (Ce.210) -- (Cf.150);
\draw (Cg.90) -- (Ch.30);
\draw[to_1i] (Cf.center) -- +(330:1) node (OH) {OH};
\end{tikzpicture}}}
% * * * * *

```

```

% * * * * * Tryptophane
\newcommand{\trp}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw (zero.center) -- ++(30:1) node (CO) {};
\draw[link] (CO.center) -- ++(330:1);
\draw[to_1] (CO.center) -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30) -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west) -- ++(210:1);
\draw (zero.center) -- ++(270:1) node(Cb){}
-- ++(330:1) node(Cc){};
\draw[to_2] (Cc.center) -- ++(108-1*72:1) node (Cd) {}
-- ++(108-2*72:1) node (Ce) {NH};
\draw[from_1](Ce.center) -- ++(108-3*72:1) node (Cf) {}
-- ++(108-4*72:1) node (Cg) {};
\draw (Cg.center) -- (Cc.center);
\draw (Cc.198+2*72) -- (Cd.198+1*72);
\draw (Cg.72) -- (Cf.198+4*72);
\draw (Cg.center) -- ++(240:1) node (Ch) {}
-- ++(300:1) node (Ci) {}
-- ++(0:1) node (Cj) {}
-- ++(60:1) node (Ck) {}
-- ++(120:1) node (Cl) {};

```

```

\draw      (Ch.0)          -- (Ci.60);
\draw      (Cj.120)       -- (Ck.180);
\end{tikzpicture}}
% * * * * *

% * * * * * Cysteine
\newcommand{\cys}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw      (zero.center)   -- ++(30:1) node (CO) {};
\draw[link] (CO.center)   -- ++(330:1);
\draw[to_1] (CO.center)   -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30)      -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west)      -- ++(210:1);
\draw[to_2] (zero.center) -- ++(270:1) node(Cb){}
-- ++(210:1) node (Cc) {SH};
\end{tikzpicture}}
% * * * * *

% * * * * * Phenylalanine
\newcommand{\phe}[1]{\footnotesize
\begin{tikzpicture}[scale=#1, every node/.style={inner sep=1.7pt,anchor=center}]
\node at (0,0) (zero) {};
\draw      (zero.center)   -- ++(30:1) node (CO) {};
\draw[link] (CO.center)   -- ++(330:1);
\draw[to_1] (CO.center)   -- +(90:1) node (Od) {} node[xshift=0.5mm] {O};
\draw[to_1i] (CO.30)      -- +(90:1);
\draw[to_1] (zero.center) -- ++(150:1) node (N) {NH};
\draw[link] (N.west)      -- ++(210:1);
\draw      (zero.center)   -- ++(270:1) node(Cb){};
\draw      (Cb.center)    -- ++(210:1) node (Cc) {}
-- ++(150:1) node (Cd) {}
-- ++(210:1) node (Ce) {}
-- ++(270:1) node (Cf) {}
-- ++(330:1) node (Cg) {}
-- ++(30:1) node (Ch) {}
-- ++(90:1);
\draw      (Cc.210)       -- (Cd.270);
\draw      (Ce.330)      -- (Cf.30);
\draw      (Cg.90)       -- (Ch.150);
\end{tikzpicture}}
% * * * * *

```