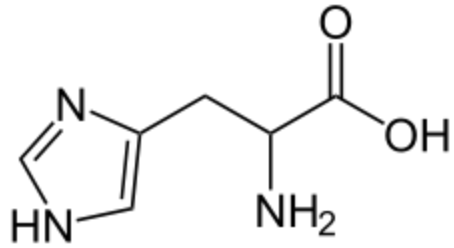
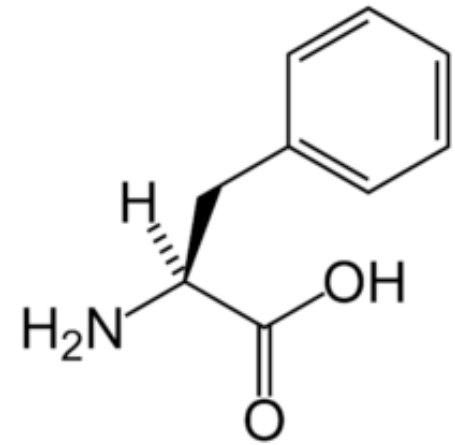


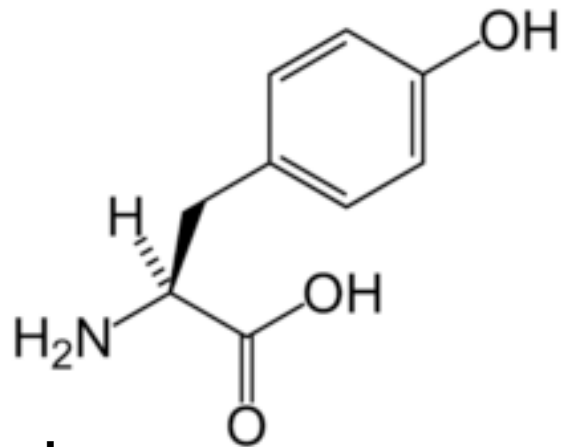
Aromatic amino acids



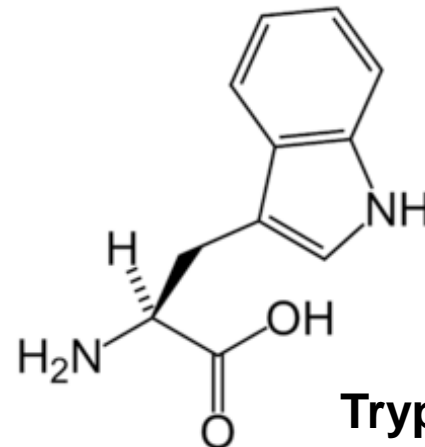
Histidine



Phenylalanine

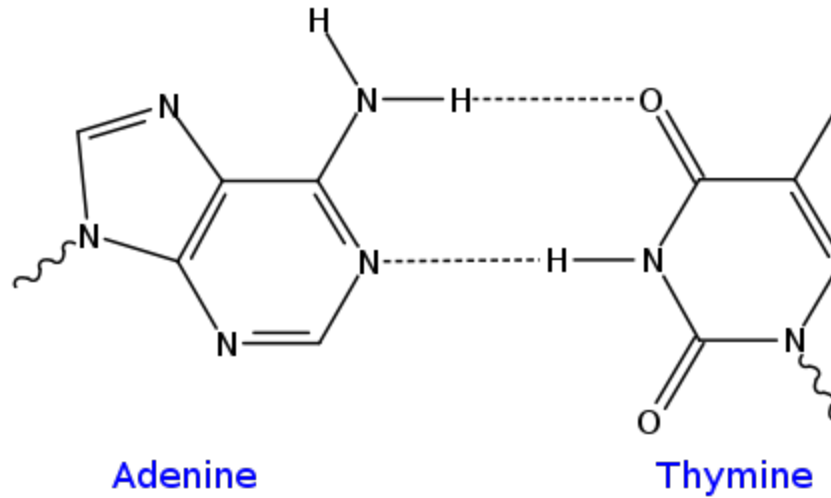
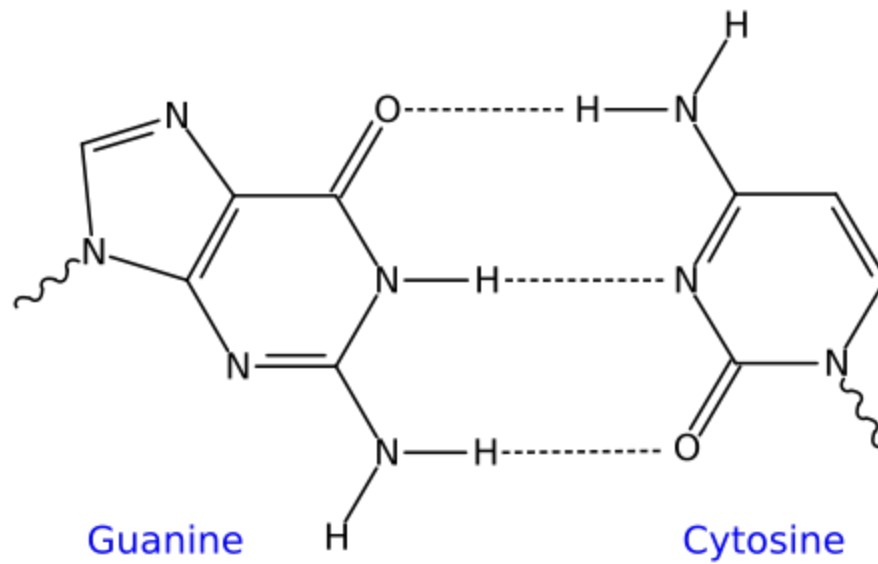


Tyrosine



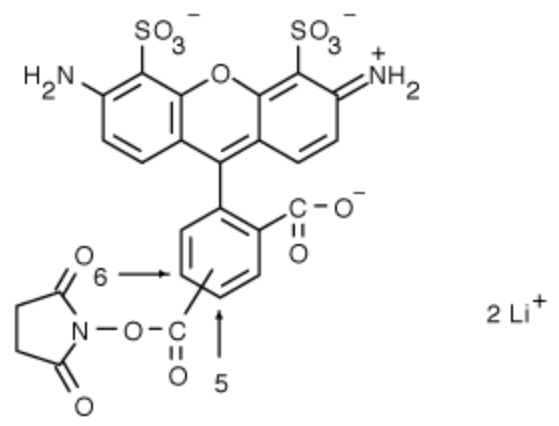
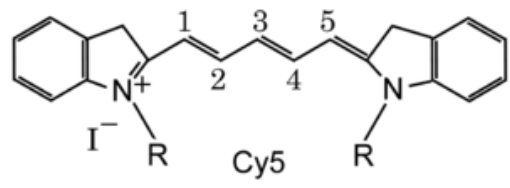
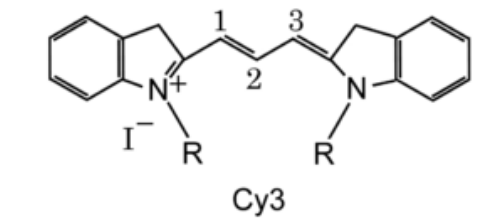
Tryptophan

nucleobases



Fluorescent Dyes (a few examples)

Most ATTO-labels are derivatives of:



Alexa Fluor® 488 carboxylic acid, succinimidyl ester

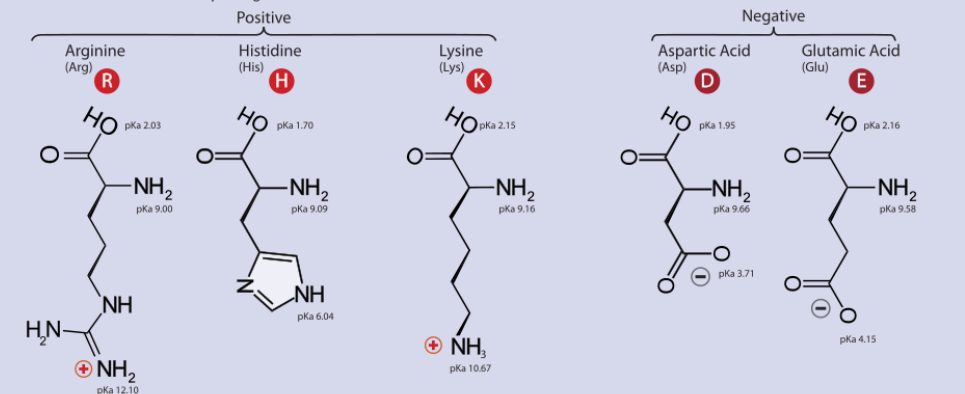
- **Coumarin**
- **Rhodamine**
- **Carbopyronin**
- **Oxazine**

<http://www.invitrogen.com/site/us/en/home/support/Product-Technical-Resources/Product-Structures.-20000.html>

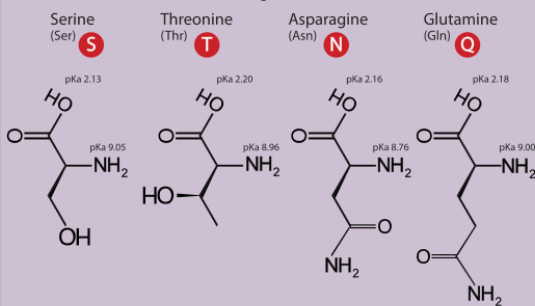
https://www.atto-tec.com/fileadmin/user_upload/Katalog_Flyer_Support/Catalogue_2009_2010.pdf

<http://en.wikipedia.org/wiki/Cyanine>

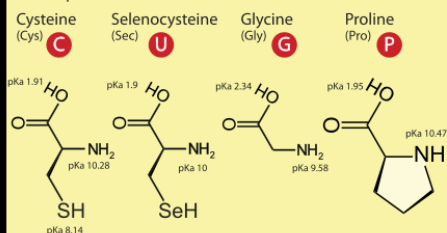
A. Amino Acids with Electrically Charged Side Chains



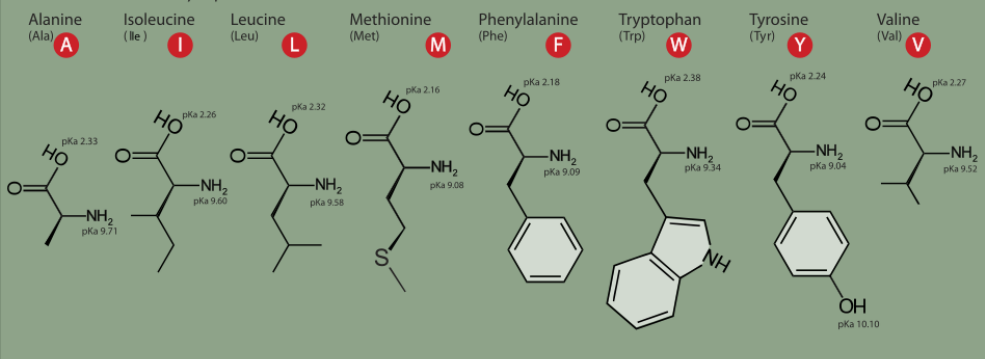
B. Amino Acids with Polar Uncharged Side Chains



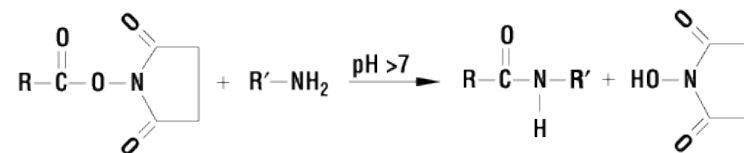
C. Special Cases



D. Amino Acids with Hydrophobic Side Chain



pKa Data: CRC Handbook of Chemistry, v2010



NHS ester reaction scheme for conjugation to a primary amine.

<http://www.piercenet.com/browse.cfm?fldID=CE4D6C5C-5946-4814-9904-C46E01232683#nhsester>

http://en.wikipedia.org/wiki/Amino_acid