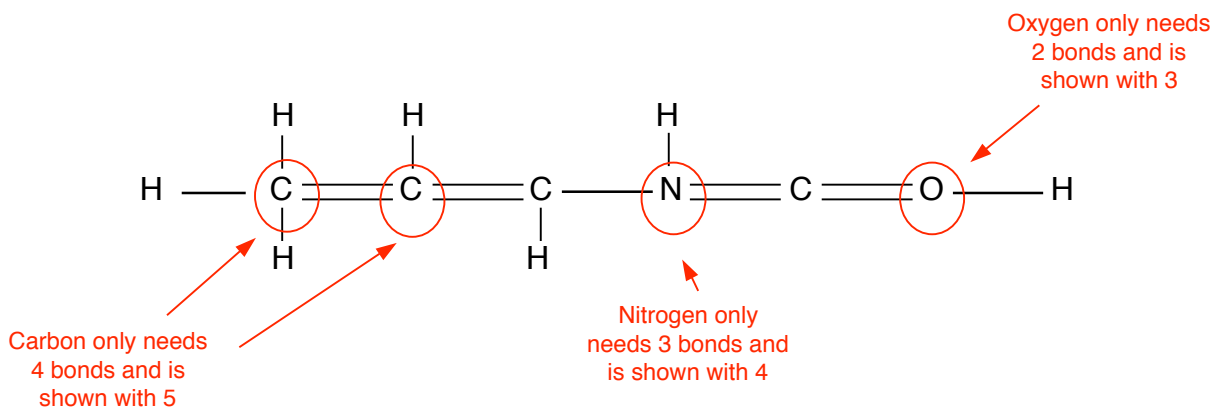


## STUDY GUIDE - ORGANIC MOLECULES

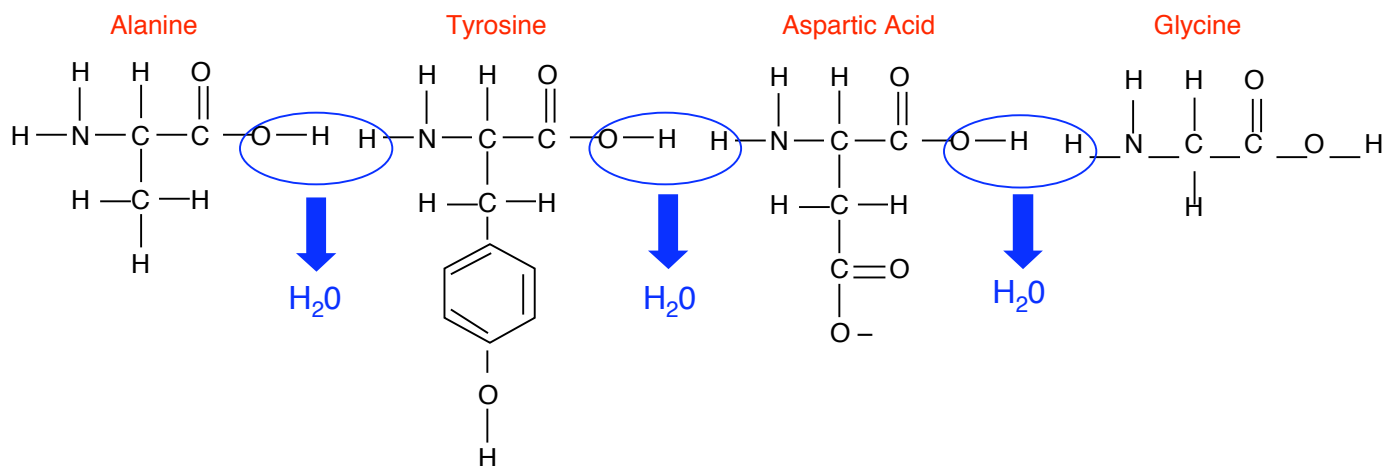
### Problems:

1. What errors in chemical bonding are shown in this structural diagram.

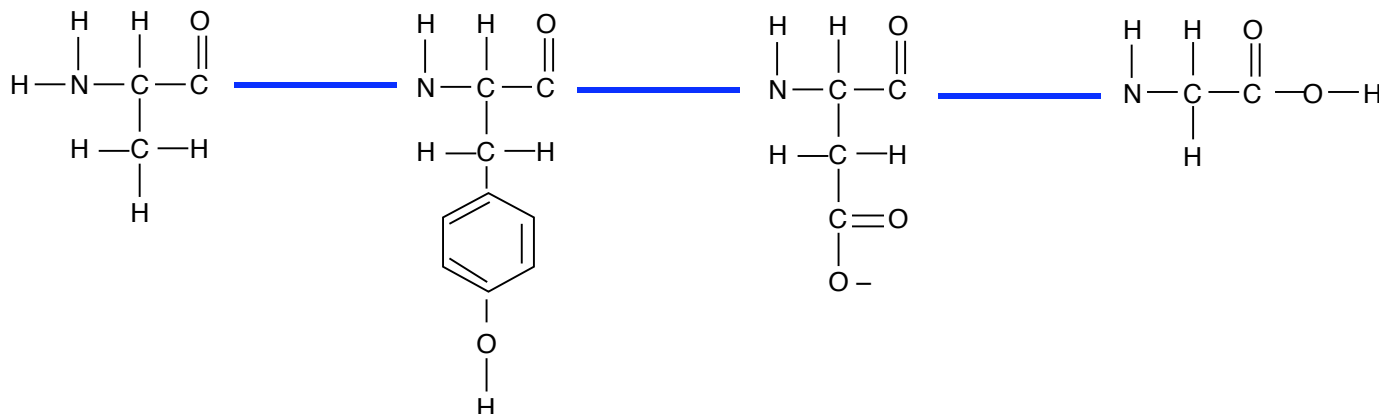


Remember “HONC-1234” to remind yourself of the bonding requirements of these very common elements in organic molecules.

2. Draw the polypeptide composed of alanine—tyrosine—aspartic acid—glycine. (Look in your handout to find the structural formula for each amino acid). Label the peptide bonds. How many molecules of water would be released in the synthesis of this polypeptide? **three** (see below)



**Polypeptide** formed after dehydration synthesis reaction. Blue lines show peptide bonds/linkages.



3. Would you expect the polypeptide valine—phenylalanine—tryptophan—leucine— isoleucine to be more soluble in oil or in water ? Why?  
 If you consult the table of amino acids, you will find that these are all nonpolar or hydrophobic amino acids. Therefore they are hydrophobic and would be more soluble in oil than in water. More realistically, a polypeptide would tend to fold in an aqueous environment such that this sequence is buried more on the interior of the protein than on its surface.
4. In which classes of organic molecules (proteins, lipids (triglycerides and phospholipids), nucleic acids, and/or carbohydrates) do you find carbon, phosphorus, sulfur, nitrogen, oxygen, and hydrogen (the various SPONCH elements)?

	S	P	O	N	C	H
proteins	X		X	X	X	X
triglycerides			X		X	X
phospholipids		X	X		X	X
nucleic acids		X	X	X	X	X
carbohydrates			X		X	X

Which element is found in proteins but not in nucleic acids? **sulfur** in nucleic acids but not in protein? **phosphorus**

5. What functional group is commonly found in amino acids but not in other types of organic monomers? **sulfhydryl**

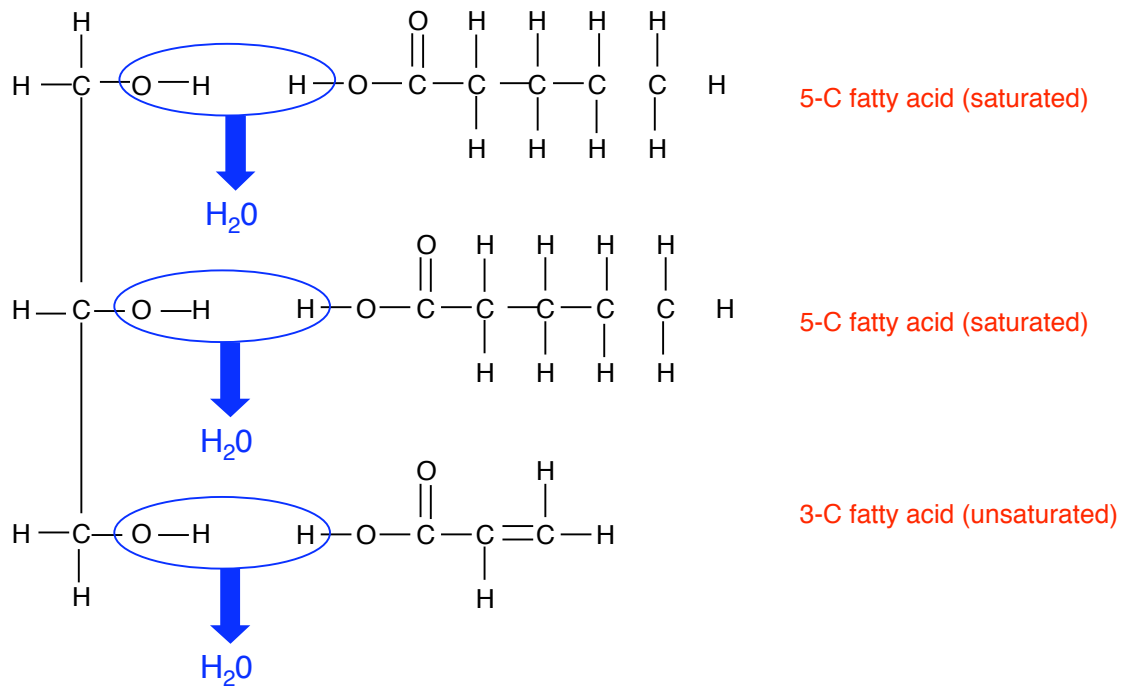
What functional group do phospholipids and nucleotides share in common?  
**phosphate**

What functional group do amino acids and fatty acids share in common?  
**carboxyl (sometimes methyl)**

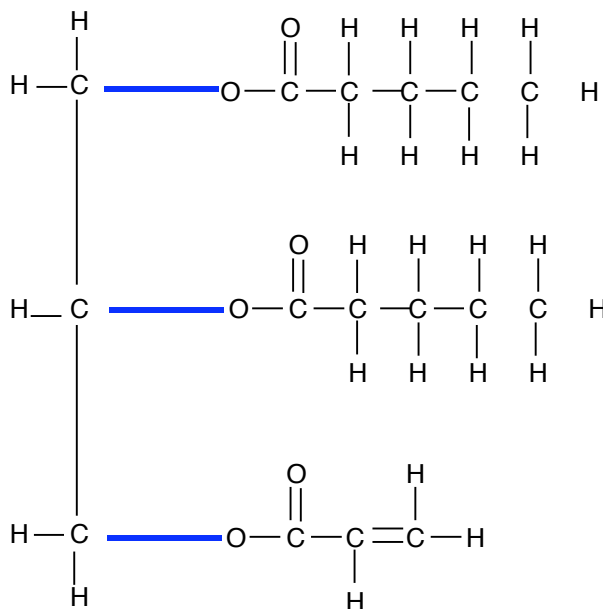
What functional group do glycerol and monosaccharides share in common?  
**hydroxyl**

6. Draw a triglyceride containing two 5-carbon saturated fatty acids and a 3-carbon unsaturated fatty acid. How many molecules of water would be released in the synthesis of this molecule from its subunits? **Three (see figure below)**

**Glycerol**



**Triglyceride:** produced after dehydration synthesis reaction.  
Ester linkages are shown by blue lines.



7. Shown below is one strand of a DNA molecule. Diagram the complementary strand.

5' T A C C G T A T A C A G A T G C T T A A A T C 3'  
3' A T G G C A T A T G T C T A C G A A T T T A G 5'

**Campbell, et al, p. 48-49 — Testing Your Knowledge — Multiple Choice – All  
Describing, Comparing and Explaining – All  
Thinking as a Scientist: #3**