

TABLE 1-2 Common Functional Groups and Linkages in Biochemistry

Compound Name	Structure ^a	Functional Group or Linkage
Amine ^b	RNH_2 or RNH_3^+ R_2NH or R_2NH_2^+ R_3N or R_3NH^+	$-\text{N}^+ \text{---}$ or $-\text{N}^+ \text{---}$ (amino group)
Alcohol	ROH	$-\text{OH}$ (hydroxyl group)
Thiol	RSH	$-\text{SH}$ (sulfhydryl group)
Ether	ROR	$-\text{O---}$ (ether linkage)
Aldehyde	R---C=O---H	$-\text{C=O---}$ (carbonyl group)
Ketone	R---C=O---R	$-\text{C=O---}$ (carbonyl group)
Carboxylic acid ^b	R---C=O---OH or R---C=O---O^-	$-\text{C=O---OH}$ (carboxyl group) or $-\text{C=O---O}^-$ (carboxylate group)
Ester	R---C=O---OR	$-\text{C=O---O---}$ (ester linkage) R---C=O--- (acyl group) ^c
Thioester	R---C=O---SR	$-\text{C=O---S---}$ (thioester linkage) R---C=O--- (acyl group) ^c
Amide	R---C=O---NH_2 R---C=O---NHR R---C=O---NR_2	$-\text{C=O---N}^+ \text{---}$ (amido group) R---C=O--- (acyl group) ^c
Imine (Schiff base) ^b	$\text{R}=\text{NH}$ or $\text{R}=\text{NH}_2^+$ $\text{R}=\text{NR}$ or $\text{R}=\text{NHR}^+$	$>\text{C}=\text{N---}$ or $>\text{C}=\text{N}^+ \text{---}$ (imino group)
Disulfide	R---S---S---R	$-\text{S---S---}$ (disulfide linkage)
Phosphate ester ^b	$\text{R---O---P}(\text{OH})\text{---O}^-$	$-\text{P}(\text{OH})\text{---O}^-$ (phosphoryl group)
Diphosphate ester ^b	$\text{R---O---P}(\text{O}^-)\text{---O---P}(\text{OH})\text{---O}^-$	$-\text{P}(\text{O}^-)\text{---O---P}(\text{OH})\text{---O}^-$ (phosphoanhydride group)
Phosphate diester ^b	$\text{R---O---P}(\text{O}^-)\text{---O---R}$	$-\text{O---P}(\text{O}^-)\text{---O---}$ (phosphodiester linkage)

^aR represents any carbon-containing group. In a molecule with more than one R group, the groups may be the same or different.

^bUnder physiological conditions, these groups are ionized and hence bear a positive or negative charge.

^cIf attached to an atom other than carbon.

?

Cover the Structure column and draw the structure for each compound listed on the left. Do the same for each functional group or linkage.