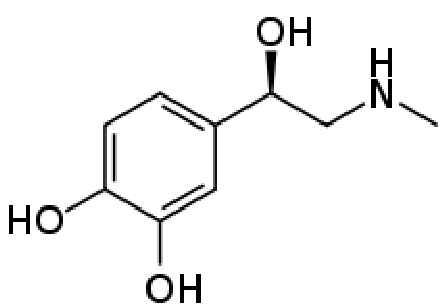
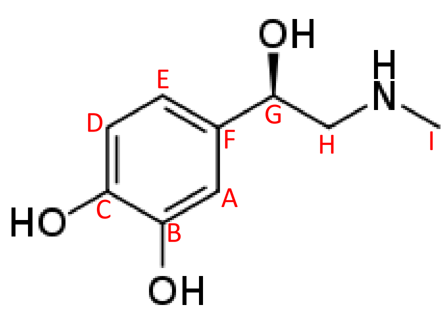
To figure out a compound's formula from its line structure, recall that all the line segments end in C atoms – unless something else is specified, like an N or an O. So the first thing to do is to count the C atoms. On the molecule below, that would be 9 – labelled A through I in the right hand diagram. Now for the H's. There are two ways to go on this.

Method 1: (slow and methodical) Some of the H's are shown (like those on the N's and O's), but the ones on the carbon atoms are all implied. So… go through each C atom and tally up how many H's are on each one. This can be done by remembering that each C atom has 4 bonding sites. So if a C is shown with only three bonds coming off of it, like C's(A, D, E & G) below, then there is just one H atom on it to make up that fourth bond. If a C is shown with two bonds coming off of it, like C(H) below, then there are two H atoms on that carbon. If a C is shown with only one bond coming off of it, like C(I) below, then there must be three H atoms on that carbon. And obviously if a C atom is shown with four bonds coming off of it, like C's (B, C & F) below, then there is not any room for any H atoms at all on those carbons. This would give a total count of A = 1, B = 0, C = 0, D = 1, E = 1, F = 0, G = 1, H = 2 & I = 3. Total = 9 C atoms implied… plus the three 4 atoms that are shown would make 13 H atoms.

Method 2: (faster, especially for really large molecules – say 20 C's or more). Remember that if the molecule were fully saturated with H's – having no rings or double or triple bonds it would have room for (2n + 2) H's – where n is the number of C atoms. So a molecule like the one below which has 9 C atoms could hold a maximum of 9 x 2 + 2 = 20 H's. Now count the rings (1): rings each get rid of two H's, so now we are down to 20-2 = 18 H's. Now count the double bonds* (3): double bonds each get rid of two H's so now we are down to 18 – 6 = 12 H's. If there were triple bonds we would subtract four H's for each of those, but triple bonds are fairly uncommon in these large organic molecules. Now… If there were any atoms with one bonding site like F, Br, or even Na or K on the other side of the table) you would subtract one H atom for each of those, since they are essentially taking up those bonding sites. Any atoms with two bonding sites (like O, S or Mg) have no impact on the number of H's, so the three O's below can be ignored. And if there are any atoms with three bonding sites (hopefully N should come to mind), then you must <u>add</u> one H for each of them. Since there is one N below, add one to our total 12 + 1 = 13. Voila! (This may not seem shorter but it is once you get the hang of it.

Anyway, then you just add in the other elements in this order C, H, N, O, the rest… so: **$C_9H_{13}NO_3$**





So what is this compound you wonder? Well, if you google "C9H13NO3" you may see lots of possible compounds, since indeed there are probably thousands of isomers of that formula, but many of these are for obscure compounds that no one has ever heard of. But the first hit on google is for epinephrine, which maybe you have heard of, and maybe you have even taken as a medication. It certainly is something that your adrenal glands have secreted and it serves as a neurotransmitter. It also goes by the nick name "adrenaline." And how appropriate, since these molecules are probably coursing through your veins right now as you get psyched to do this quia. Woo Hoo!