Kjeldahl Method

The Kjeldahl method is a procedure for determining the nitrogen content in a sample of organic compounds. First, the nitrogen in the organic compound is completely oxidized into ammonium sulfate under titanium dioxide catalysis and strong heating. Then, it is distilled with sodium hydroxide, which releases ammonia that boils off. The ammonia is bubbled into a solution of hydrochloric acid. Then, it is indirectly back-titrated by adding an excess of NaOH followed by titration with a strong acid.

1.0000g of an unknown solid compound containing C, H and N is analyzed with the Kjeldahl method. An excess of sulfuric acid is added to the compound and the ammonia produced is bubbled into a solution of 124.641 mL 0.853 M HCl. Then, 12.345 mL of 6.000 M NaOH is added. The solution was then titrated to a methyl red endpoint with 49.018 mL 0.3125 M HCl.

1. Calculate the % by mass of nitrogen in the compound.

2. The compound in question is known to be a highly symmetric trimer of a simpler compound. The number of atoms in the compound does not exceed 20. Draw a reasonable structure for the compound.