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24-10-75

CRYSTAL STRUCTURE OF COPPER SOAPS

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A thesis submitted under special regulations
for the degree of Doctor of Philosophy

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May 1974

SYNOPSIS

The crystal and molecular structures of the metallic anhydrous soaps, copper caprate and copper caprylate, have been determined using the standard techniques of X-ray crystallography. A dimerized structure with two copper atoms at the centres of two opposite faces of a cube made by eight oxygen atoms at its corners was found in both structures and so is confirmed as common to many members of this series of soaps.

Both these compounds have space group $P\bar{1}$ and they both have two hydrocarbon chains per molecule. The two hydrocarbon chains pack nearly parallel to each other over a part of their lengths. The inter-atomic distance of metallic copper is only a little shorter than the separation of copper atoms in these two compounds.

Another form of copper caprate, with a monoclinic unit cell and space group $C_{2/c}$ was identified. This form of copper caprate, however, was a unit cell approximately eight times bigger in volume than the triclinic form.

Although the basic features of the triclinic forms of copper caprate and copper caprylate are similar, the orientations of the hydrocarbon chains with respect to their cell edges are different. The three compounds copper butyrate,

copper valerate and copper caprylate can be grouped together in every aspect of the crystallography of these three soaps. Crystallographically copper caprate, however, falls into the same category as other higher members of the series.

Some preliminary investigations into the possibility of obtaining single crystals of manganous caprate are also explained. Three different forms of this compound were identified using X-ray diffraction powder methods.

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