

Green Corrosion with Rosin Flux?

In many applications where soldering is done with an excessive amount of rosin flux there appears on the copper surface a green residue similar to corrosion.

Chemical Reaction

Commercial water-white rosin consists of about 80% sylvic (or abietic) acid. The balance is other isomeric forms of diterpene organic acids which do not enter into the reaction of soldering. Abietic acid when heated combines directly with the oxide on the copper surface, yielding a copper abietate. This is the green, soapy-looking material which resembles corrosion products of copper. The formation of copper abietate is noticed readily on wire under clear Teflon for two reasons. First, simply because the clear Teflon can be seen through. Second, because the Teflon during soldering rapidly expands and contracts, thus trapping the rosin with some ionizing solvent under the insulation. The abietic acid does not attack the copper metal under any condition. This abietate formation is peculiar to copper surfaces since the only common abietate salt is of copper.

Activated Fluxes

Most soldering applications require a more active flux in order to clean the surface oxide. Activated rosin fluxes contain small quantities (0.2% to 5%) of organic activating agents. The purpose of these activators is to catalyze the rosin copper oxide reaction so that a better soldering job can be obtained. The catalytic agents do not enter into the reaction and do not cause subsequent corrosion. However, the presence of these activators does impel the rosin (abietic acid) to combine with the copper oxide to form the green copper abietate compound. Copper abietate is not conductive and forms a green insulating coating on copper. Usually the dark rosin residue conceals this normal formation of green copper abietate.

Solution to the Problem

Concern develops over the green residue because copper abietate cannot readily be distinguished from corrosion products of copper. The degree to which the flux is activated has little bearing on the problem. The activators are still present in sufficient quantity to trigger the copper abietate formation. The best way to minimize the green residue is to use copper with a minimal amount of oxidation. Reducing the amount of rosin flux used will also minimize the amount of residue.

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