

# [Analysis dr. curtis 01 24 2018 introduction: copper is a](https://assignbuster.com/analysis-dr-curtis-01242018-introduction-copper-is-a/)

Analysisof Copper in a Penny                                                                                     JessicaRodriguez  Dr.  Curtis                                                                                                                               01/24/2018          Introduction:               Copper is a metal that is red and orange in color andis the chemical element Cu which comes from the Latin word cuprum.

Copper has ahigh heat and electric conductivity, which is why it is used in a lot ofelectrical equipment. Copper is a very versatile metal that can be combinedwith a lot of other different metals to become something else, like when youmix copper and tin to make bronze.  It isalso used in the making of US currency, like the US penny. Pennies used to bemade of nearly pure copper before the year 1982; it was made of 95 percentcopper and only 5 percent zinc. After the year 1982 to the preset it waschanged to 97. 5 percent zinc and only 2.

5 percent copper. 1 To determine the mass percent of copper in a penny, twomethods are used. The first method being atomic absorption spectroscopy, thesecond is ultraviolet-visible spectroscopy. Atomic absorption is a technique inwhich the absorption of light by free gaseous atoms or ions in a flame, furnaceis used to measure concentration. 2 The sample needs to be a liquid that is sent through aplastic tube which is the hallow cathode then through a heat source. There aretwo different types of heat sources, flame and graphite furnace, which willreach 3000K these high temperatures are needed to turn the liquid into gaseousatoms. Then the gaseous atoms will go through the monochromator which is anoptical device that will separate the samples wavelengths depending on whatelement you are trying to measure and will remove the unwanted elements thatare in the sample.

Then the wavelengths will pass through the detector whichwill determine the mass percent of the element in the sample and it will showup on the data readout.  In order forthis to work the sample will need to be dilated so much that it will be at aparts per million level because at that level the precision of the instrumentwill be two percent. 3                               Figure1 . Box diagram of an atomic absorption spectrometerAtomic spectroscopy is very useful in measuring traceamounts all the way up to major amounts of metal elements. To get the sampleprepared you must make a dilution of 120 mL of 1 M Cu(H2O)62+in 1%HNO3.               Ultraviolet-Visible spectroscopyis the second method used to determine the mass percent of copper in a penny.  4Figure 2.

Box diagram ofUltraviolet-Visible spectroscopy “ Ultravioletand visible (UV-Vis) absorption spectroscopy is the measurement of theattenuation (weakening of strength) of a beam of light after it passes througha sample or after reflection from a sample surface.” 5 The light thatis used is allows the outer electrons to get excited enough to jump to a higherenergy sublevel. The instrument has six important steps to go through; itfirst goes through a light source which can be either tungsten lamp for visiblelight or deuterium for UV light. Then there is the filter which extracts out anyparticles, then it goes through the monochromator, which is an optical devicethat will separate the samples wavelengths depending on what element you aretrying to measure and will remove the unwanted elements that are in the sample. The wavelength that comes from the monochromator will go through the beamsplitter so that it can pass through the sample cuvette and the referencecuvette at the same time. Then it will go through the photo diode and it willthen start the data processing and finally it will go to the data readout. The sample must be in a liquid form and it has to befree form particles, even the solvents used needs to be pure because anyparticles that get into the instrument will cause the light to scatter and willgive failed results.

The atomic adsorptions spectroscopy will be able tocalculate the mass percent of copper in the penny better than the UV-visspectroscopy because it is more sensitive and that entails it being moreaccurate. Using both methods will allow data comparison between both methods tosee which is more accurate. Reference1.     What’s aPenny Made Of?, By Live Science Staff | June 21, 2016 03: 55pm ET, https://www. livescience.

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