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## WHITE PAPERS & APPLICATION NOTES



### Meeting the RoHS Directive with Microwave Sample Preparation and the Avio 220 Max ICP-OES

With the increasing demand for electronics, manufacturers are continually developing new products with enhanced capabilities, and consequently, the lifetime of electronics is becoming shorter as consumers more frequently upgrade to newer, more advanced models. This leads to an increasing number of electronics being discarded, with a high likelihood that metals will enter the environment. To address this issue, the Restriction of Hazardous Substances (RoHS) directive implements limits for the levels of toxic metals of greatest concern, which can be present in electronic devices. This work demonstrates the ability of the the Titan MPS™ microwave digestion system along with the Avio® 220 Max hybrid simultaneous ICP-OES to rapidly and accurately measure elements in a variety of sample types which fall under the RoHS directive.

#### Meeting the RoHS Directive with Microwave Sample Preparation and the Avio 220 Max ICP-OES

**Introduction**  
With the increasing use of and reliance on electronic products, manufacturers are continually developing new products with enhanced capabilities.

As a result, the lifetime of electronics is becoming shorter as consumers more frequently upgrade to newer, more advanced models. The result is an increasing number of electronics being discarded. Although electronics recycling programs have been implemented and are growing, the number of electronic products being discarded continues to rise.

Since electronics contain many components, there is a high likelihood that metals will enter the environment after items are discarded. The toxic metals of greatest concern are cadmium (Cd), chromium (Cr), specifically hexavalent chromium (Cr(VI)), mercury (Hg), and lead (Pb). To address this issue, the Restriction of Hazardous Substances (RoHS) directive\* implements limits for the levels of Cd, Cr(VI), Hg, and Pb which can be present in electronic devices, as shown in Table 1.

Element	Limit
Cadmium	0.1%
Hexavalent Chromium	0.1%
Mercury	0.1%
Lead	0.1%



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