

Metals in Plastics Analysis and RoHS Testing VHG has significant expertise in the determination of metals in a variety of plastics materials using XRF, ICP-AES, ICP-MS and other analytical methods. VHG is the preferred lab for Sony's Greenpeace program to determine cadmium, lead, and mercury levels in packaging materials.

The **Restriction of Hazardous Substances Directive (RoHS)** was adopted in February 2003 by the European Union to address the global issue of consumer electronics waste. The RoHS directive took effect on July 1, 2006, and is required to be enforced and become law in each EU member state. RoHS applies to these products in the EU whether made within the EU or imported. Other parts of the world have established similar restrictions, including China RoHS and California's Electronic Waste Recycling Act of 2003 (EWRA)

The RoHS directive restricts the use of six hazardous materials in the manufacture of various types of electronics and electrical equipment. RoHS is often referred to as the "lead-free directive," but it restricts the use of all the following six substances:

1. Lead (Pb)
2. Mercury (Hg)
3. Cadmium (Cd)
4. Hexavalent chromium (Cr⁺⁶)
5. Polybrominated biphenyls (PBB)
6. Polybrominated diphenyl ether (PBDE)

PBB and PBDE are flame retardants used in many plastics.

The maximum permitted concentrations are 0.1% or 1000 ppm (except for cadmium, which is limited to 0.01% or 100 ppm) by weight of *homogeneous material*. This means that the limits do not apply to the weight of the finished product, or even to a component, but to any single substance that could (theoretically) be separated mechanically—for example, the sheath on a cable or the tinning on a component lead.

VHG offers screening of samples for RoHS elements in accordance with ASTM F2617, "Test Method for Identification and Quantification of Chromium, Bromine, Cadmium, Mercury and Lead in Polymeric Material Using Energy Dispersive X-ray Spectrometry." We can also test polymers for various processing elements including antimony, arsenic, chlorine, sulfur, tin, zinc and others using XRF.

We have also developed very reproducible methods for digesting ABS, PVC, polyethylene and other plastics for the analysis of up to 70 different elements by ICP-AES or ICP-MS.

For additional information on the RoHS Directive, please visit <http://www.rohs.gov.uk/>

The **Waste Electrical and Electronic Equipment Directive (WEEE)** is the European Community directive 2002/96/EC on waste electrical and electronic equipment. Together with the RoHS Directive 2002/95/EC, WEEE became European law in February 2003 and set collection, recycling and recovery targets for all types of electrical

goods. This directive imposes the responsibility for the disposal of waste electrical and electronic equipment on the manufacturers of such equipment.