

Evaluation of Sampling Methods for Measurement of Elements Defined by the RoHS/WEEE Directives

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The European Union has defined a number of regulations governing the treatment of hazardous material in electronics components. The elements defined can be measured by XRF techniques, but the problem comes from how to sample the various electronics component since the directives themselves are very vague. A number of methods have been proposed using different XRF system and methods by various authors. This study is focused on the sampling problems associated with complying with the RoHS directive. A number of issues will be raised about what is the correct method to screen and confirm the analysis.

The experiment was to sample number of electronics components including circuit boards, harnesses and connectors. The circuit boards were not RoHS compliance and this exercise is to determine the type of data you would expect. The Sample was measured with a XRF system which would be a screening method to decide if further testing was needed. The samples were measured unprepared and then they were prepared using freezer mill technology and measured again. Sample harness and connectors were also measured in a similar process. The direct measure on the unprepared sample by a bench top ED XRF is used to mimic the direct reader hand held systems on the market. The prepared samples were measured by the same ED XRF system. The elements measured were Pb, Hg, Cd, and Cr. The Cr restriction is for hexavalent Cr, which cannot be determined by XRF. Only total Cr can be measured.

The action point for these elements is 1000 ppm for Pb, Hg, Cr VI and 100 ppm for Cd. Br levels reflect polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) at a level of 1000 ppm. Only the absence of Br would be acceptable if done by XRF.

The data is compared from all sample types, with direct measurements versus sample preparation. We will illustrate the complex sampling process that will need to be implemented in order to comply with the RoHS directive. We will also discuss some of the issues for analysis and the caution that manufacture of electronics equipment must use in order to comply with the RoHS directives.