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Reviews of organic-assisted dissolution method to enhance the quantitative Analysis for the determination of hexavalent chromium (Cr(VI)) in polymer

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An organic-assisted alkaline extraction method was developed for the determination of hexavalent chromium (Cr(VI)) in polymers. The stabilization of polymer as a pre-step of the alkaline extraction provided good extraction efficiency of Cr(VI) from the sample. The optimization of the experimental conditions affecting the extraction and UV-Vis spectrophotometric analysis was accomplished by the evaluation the recovery rate of Cr(VI) through the analysis of Cr(VI) in in-house polymer reference materials. Also, we developed THF (Tetrahydrofuran)-assisted alkaline extraction method to determine Cr(VI) in the presence of Sb(III). The developed method suppressed the reduction by the formation of Sb(III)-THF adduct which was indentified by XRD, NMR and MALDI-TOF-MS. When applied to the in-house prepared reference polymers containing Sb(III), the method significantly enhanced the recovery to nearly 95 % from <3 % of the conventional extraction method. Low recovery of Cr(VI) due to the reduction to Cr(III) by Sb(III) has been an issue in the implementation of Regulation of Hazardous Substances (RoHS) directive.

Biography

Kim begun his career with Samsung in 1989. He led the analysis team of Samsung Cheil synthetics from 1990 and 2000 and the analysis group of Samsung Cheil Industries from 2001 to 2015. Now, Dr. Kim served in Samsung SDI and in charge of DQC (Development Quality Control) part in automotive division. Dr. Kim work for IEC TC111 WG3 as experts related to develop new method to enhance recovery yield and extraction efficiency of IEC 62321 part.7-2 (hexavalent chromium) since 2009. Dr. Kim holds a doctoral degree in analytical chemistry from the University of Dankook in Korea.

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