

Solubility Measurements in the Context of Nanoregulation

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Abstract : From a risk assessment point of view, solubility is a property that has been identified as being important. If nanomaterial is completely soluble, then its disposal can be treated much in the same way as 'ordinary' chemicals, which subsequently will simplify testing and characterization regimes. The measurement of solubility has been highlighted as important in a pan-European project, Framework Programme (FP) 7 NANoREG. Some of the project outputs surrounding this topic will be presented here, in which there are two parts. First, a review on existing methods capable of measuring nanomaterial solubility will be discussed. Second, a case study will be presented based on using colorimetry methods to quantify dissolve zinc from ZnO nanomaterial upon exposure to digestive juices. The main findings are as follows: a) there is no universal method for nanomaterial solubility testing. The method chosen will be dependent on sample type and nano-specific application/scenario. b) The colorimetry results show a positive correlation between particle concentration and amount of $[Zn^{2+}]$ released; this was expected c) results indicate complete dissolution of the ZnO nanomaterial, as a result of the digestion protocol but only a fraction existing as free ions. Finally, what differentiates the F7 NANoREG project over other projects is the need for participating research laboratories to follow a set of defined protocols, necessary to establish quality control and assurance. The methods and results associated with mandatory testing that carried out by all partners in NANoREG will be discussed.

Keywords : nanomaterials, nanotoxicology, solubility, zinc oxide

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