Assessing the bioaccessibility of inhaled particles: Model parameterisation and application

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Whilst the oral ingestion pathway has been the focus of much research attention, the development of *in-vitro* inhalation models are far less advanced despite increasing epidemiological, animal toxicological and *in vitro* studies indicating that it is the chemical composition, as well as the physical presence, of inhaled particles that plays a major role in associated toxic, carcinogenic and other related health effects. Modelling the lung environment is highly complex. With respect to the inhalation exposure route, a particle may reside in one of at least two 'compartments'; the extracellular environment typified by lung fluid of neutral pH, and the more acidic environment within macrophages. In this paper we consider the range of parameters that require detailed consideration if we are to get anywhere near achieving adequate conservatism, robustness and applicability over a range of inhaled materials, whilst maintaining the same degree of physiological relevance as achieved by the unified BARGE protocol for oral bioaccessibility [1]. Here we report on a method for assessing the inhalation bioaccessibility of Pb in the PM_{10} size fraction using an *in vitro* simulated epithelial lung fluid to represent the extracellular environment of the lung [2], and its application to a range of urban soils and mining waste. A comparison is made with the results of a study modelling aqueous chemistry in these environments, allowing the main metal species and their concentrations to be predicted.

[1] Wragg et al. (2009). British Geol Survey open report, OR/07/027 [2] Boisa et al. (2014). *Env Int,* **70***, 132–142.*