INNOVATION IN EXPOSURE MODELING: THE INTEGRA 2.0 PLATFORM AND TIER 1 OCCUPATIONAL ASSESSMENT

F. Nikiforou[1, 2], A. Karakoltzidis[1, 2] , S. Karakitsios[1, 2], D. A. Sarigiannis[1, 2, 3, 4*]

[1]Department of Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece

[2] HERACLES Research Center – CIRI, Aristotle University of Thessaloniki, Greece

[3] Environmental Health Engineering, School for Advanced Study IUSS, Pavia, Italy

[4] National Hellenic Research Foundation, Athens, Greece

(*_sarigiannis@auth.gr_)

ABSTRACT

Occupational exposure assessment plays a significant role in the overall chemical risk assessment, estimating the potential risks of exposure to chemicals in a workplace environment. INTEGRA 2.0, the updated version of INTEGRA[1, 2], is an online computational platform that offers a streamlined calculation approach from environmental release to internal dose, including four modelling components: a multimedia model, a microenvironment model, a PBPB/TK model and 3D QSAR models. In this study, we present a new modeling component of the INTEGRA 2.0 platform, which is a model for occupational exposure assessment. It has been developed as an R code pipeline that will be linked with the current INTEGRA 2.0 platform via an Application Programming Interface (API). Our model is intended to serve as a lower-tier (tier 1) modeling tool aligned with the ECHA guidance under REACH (Chapter R.14)[3], with the aim of providing screening quantitative exposure estimates while remaining simple to use. Its modeling framework incorporates the definition of specific worker exposure scenarios, including the identification of the substance used, the process categories (PROCs) involved, the respective operational conditions (OCs) (e.g activity duration) and the use of risk management measures (RMMs) (e.g. eye protection), taking into account the source receptor model of ECETOC TRA v3[4]. More specifically, our model can offer estimates of inhalation and dermal exposure to substances (solids or liquids) occurring in a workplace environment, encompassing both acute and chronic exposure predictions. By entering the respective toxicological thresholds, such as Derived No-Effect Levels (DNELs) and Predicted No-Effect Concentrations (PNECs), the model can also provide quantitative risk characterizations for each exposure pathway. Therefore, the INTEGRA occupational exposure modeling component can be a valuable tool for the preliminary and simple assessment of worker exposure to hazardous substances. With this inclusion, the modeling framework of the INTEGRA 2.0 platform will be enhanced, thereby encompassing the entire spectrum of chemical risk assessment and serving as a comprehensive tool for both industrial and regulatory needs.

KEYWORDS: Occupational exposure assessment, Exposure modelling , Chemicals exposure, REACH

REFERENCES

[1] Sarigiannis, D., Gotti, A., Karakitsios, S., Kontoroupis, P., & Nikolaki, S. (2012). *Epidemiology*, 23(5S)
[2] Sarigiannis, D., Karakitsios, S., Gotti, A., Loizou, G., Cherrie, J., Smolders, R., De Brouwere, K., Galea, K., Jones, K., Handakas, E., Papadaki, K., & Sleeuwenhoek, A. (2014). *Int. Environ. Model Softw.*
[3] ECHA. (2016). *European Chemicals Agency.*
[4] ECETOC. (2012).