

Modelling of Non-Ferrous Processes and the Importance of the Gas Phase

SANDER ARNOU, ELS NAGELS

InsPyro NV, Leuven, Belgium

ABSTRACT

Thermodynamic modelling provides a useful framework to understand and improve non-ferrous metallurgical processes. As problems are observed, e.g. in the off-gas system, the model enables to link the influence of process parameters and charge composition to the compounds expected to be present in the gas and dust at that exact position. This information is highly valuable, as it is first of all as good as impossible to take samples of e.g. a high temperature gas at these positions to understand the mechanisms at play. Furthermore, to remediate the situation, parameters can quickly be tested within the model without having to start a series of industrial tests in the dark, which would compromise production as well as safety.

For these situations, a robust description is not only needed for the oxide slags, liquid metals, and liquid matte phases (see e.g. our presentation in 2013). Indeed, the gas phase becomes more important, as well as the description of compounds between the more volatile elements, such as arsenic, antimony, lead, cadmium, and chlorine. Unfortunately, data work often focuses on other aspects or more trendy elements, or even old data may suddenly be added in the databases, compromising continuity in the calculations after an update. Nevertheless, with some caution, thermodynamic modelling allows to interpret the data from samples, production observations, and trials, in a common framework.

To maximize its impact, the model finally needs to be translated into concepts which are understandable to all involved. Also, the model itself can become a tool for process planning and steering. As such, models are part of a long term vision on knowledge management. Good people with lots of experience, knowledge, and gut feeling, are crucial in metallurgy for daily operations and innovation. However, the knowledge in their heads is not accessible to all and may be more volatile. Taking additional steps to secure knowledge into models, concepts, and schemes, guarantees a build-up of more explicit knowledge in the company.