

Chemical Potential from the Beginning

The calculation of chemical reactions can begin *in medias res* with a definition of the chemical potential μ . The simplest way to introduce this quantity to first-year students and even pupils without frightening mathematical apparatus is by characterizing it by its typical and easily observable properties, i.e. by designing a kind of “wanted poster” for μ . This phenomenological description may be supported by a direct measuring procedure, a method normally used for the quantification of basic concepts such as length, time or mass. The proposed approach can be used in school starting already with the first chemistry lessons, and it immediately leads to practical results. To predict whether or not a considered reaction is possible is very simple if we use the chemical potential. Moreover, the chemical potential is key in dealing with physicochemical problems. Based on this central concept, it is possible to explore many other fields [1]. The dependence of the chemical potential upon temperature, pressure and concentration is the “gateway” to the deduction of the mass action law, the calculation of equilibrium constants, solubilities, and many other data, the construction of phase diagrams and so on. An expansion of the concept to colligative phenomena, diffusion processes, surface effects, electrochemical processes, etc., is easily possible. Furthermore, the same tools allow us to solve problems even at the atomic and molecular level, that are usually treated by quantum statistical methods.

Illustrative but nevertheless easily and safely realisable demonstration experiments contribute strongly to comprehension and forge links with everyday experience. In addition to the poster presentation, short video films of selected experiments will be shown. During the presentation the experiments will partly shown „live“ and partly in short video films.

[1] G. Job, R. Ruffler, Physical Chemistry – an Introduction with New Concept and Numerous Experiments, Vieweg+Teubner, Wiesbaden, 2010 (in German) (translation into English in preparation)