

Teaching Thermodynamics: Chemical Potential from the Beginning

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The chemical potential, commonly described as the partial derivative of a quantity in which energy and entropy are involved, is often regarded as a difficult concept – not only by first-year students. On the other hand it is very useful for the accurate description of the chemical and physical behaviour of substances. For example, it is possible to predict by means of the chemical potential whether a considered reaction is possible or not, which yield can be expected, what can be done to improve this yield and so on. Furthermore, its temperature, pressure and concentration dependency allows to calculate equilibrium constants, solubilities, phase diagrams and many other data. In other words, the chemical potential takes a central position in the area of “chemical thermodynamics”. As a fast and easy way without the frightening mathematical apparatus the chemical potential can be introduced by phenomenological characterization and metrication. Starting from this central quantity, it is possible to explore many other fields up to quantum statistics [1].

Selected illustrative but nevertheless easy and safe realisable demonstration experiments contribute essentially to deepen the comprehension and forge links with everyday experiences. In 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 (in german), Wiesbaden: Verlag B.G. Teubner, 2006 (in preparation)