THE METHODOLOGICAL ASPECTS OF TEACHING THERMODYNAMICS: FROM CIVIC EDUCATION TO NEW UNDERSTANDING OF CARBON FOOTPRINT

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Thermodynamics gives a numerical interpretation of environmental processes. We believe that the complete removing of this key section of chemistry from national school curriculum is inadmissible and unfounded.

Objectives: Our aim is to demonstrate the necessity of teaching Thermodynamics in Lyceums and Colleges and to propose its significant upgrade in accordance with modern requirements. We want to make Thermodynamics useful, modern, understandable, non-boring and scientifically for contemporary pupils and students.

Results: Traditional representation of the Thermodynamics as thermal effects actually is out of date. Modern educated person must own concepts of Enthalpy, Entropy, Gibbs free energy, and other basic laws and principles. The introduction of the concept of Entropy in the school curriculum contributes to education of civic attitude and responsibility. For the teacher, which pays attention to the environmental issues of chemistry, the concepts of Free Energy and of Equilibrium will be very useful. Free energy helps to determine the direction of the spontaneous process, to predict the (im) possibility of turning this process back, finding the equilibrium conditions. Le Chatelier's principle gives a clear explanation of many natural processes, for example, the effects of local cooling as a temporary result of global warming. It was observed, that the classic carbon footprint (the emitted mass of CO_2) does not always reflect the real impact of the chemical process on the environment. Pupils are invited to treat any chemical process as a thermodynamic generator or absorber of CO_2.

Conclusions: Understanding the energy storage, the spontaneity, the direction of reaction at a given temperature, required using of thermodynamic functions ΔH, ΔS and ΔG. We consider it necessary to enter into the teaching the concept of Thermodynamic Carbon Footprint, linking it not only with real CO_2 emissions, but also appreciating changes of free energy, ΔG, i.e., work of chemical process AGAINST the environment.