Uno sguardo alla letteratura internazionale

Per saperne di più

Foundations of Chemistry (2020) 22:15–29

The role of idealisations in describing an isolated molecule

Vanessa A. Seifert

Published online: 24 September 2019

ABSTRACT The investigation of the relation between chemistry and quantum mechanics includes examining how the two theories each describe an isolated molecule. This paper focuses on one particular characteristic of chemistry's and quantum mechanics' descriptions of an isolated molecule; namely on the assumptions made by each description that an isolated molecule is stable and has structure. The paper argues that these assumptions are an idealisation. First, this is because stability and structure are partially determined by factors that concern the context in which a molecule is considered (i.e. thermodynamic conditions, time-range of experiment, environment, etc.). Secondly, the stability and structure of a molecule can only be empirically identified with reference to those factors. This paper examines these assumptions in the context of the philosophical literature on idealisations. This examination is a novel contribution that raises interesting questions about the relation between the two theories, the nature of stability and structure, and the function of these assumptions in the two theories.

KEYWORDS Idealisations, Relation between chemistry and quantum mechanics, Stability, Molecular structure

Link: https://link.springer.com/article/10.1007/s10698-019-09342-7

Foundations of Chemistry (2019) 21:179–191

What is chemistry that I may teach it?

Peter G. Nelson

Published online: 7 May 2018

ABSTRACT This article presents a personal answer to the question "What is chemistry?", set out in terms of six propositions. These cover "pure" and "applied" chemistry, different levels of description, and the broader context of chemistry.

KEYWORDS "Pure", "Applied", Bulk, Macroscopic, Atomic, Electronic, Chemical instinct, Periodic Table, Acid, Base, Rational, Intuitive, Cerebral, Practical, Analytical.

The question "What is chemistry?" is not one that we, as chemists, are inclined to give much attention to. We tend to assume that we all know what chemistry is. Thus it is that, in his book, "The Concept of Law", Professor H.L.A. Hart is able to write (1961: p. 1): No vast literature is dedicated to answering the questions "What is chemistry" or "What is medicine?", as it is to the question "What is law?" A few lines in an elementary textbook is all the student of these sciences is asked to consider.

Link: https://doi.org/10.1007/s10698-018-9315-x1 3

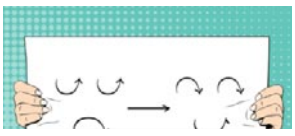
Una curiosità

Chemistry world

A century of curly arrows

By Philip Ball 14 February 2022

Celebrating the simple symbols that – along with their straight counterparts – encapsulate complex chemical behaviours



To chemists of a certain generation, Peter Sykes' classic *A Guidebook to Mechanism in Organic Chemistry* (first published in 1961, but still going strong in the 1980s at least) conjures up one enduring image: curly arrows. Page after page shows organic molecules reconfiguring themselves via this schematic relocation of electrons, giving the impression of chemical reactions as electronic gymnastics displays. As the student quickly learns, a curly arrow with just one barb at its head depicts the movement of a single electron, while twin barbs denote the relocation of an electron pair.

Link: https://www.chemistryworld.com/opinion/a-century-of-curly-arrows/4015168.article?utm_campaign=cw_shared&utm_medium=email&utm_source=website

Per una didattica non formale

Substantia (2019) 3(2): 39-47

Chemistry Beyond the Book: Open Learning and Activities in Non-Formal Environments to Inspire Passion and Curiosity

Sara Tortorella, Alberto Zanelli, Valentina Domenici

ABSTRACT Several scientific channels on TV, crowded scientific fairs, and many serious scientific board games on the market demonstrate that people are curious about science. However, when asked about the perception of scientific subjects, Chemistry in the first place, general public still shows rejection toward "too complicated", "abstract", and "far from everyday life" topics. Unarguably, every Chemist would not recognize Chemistry as neither "abstract" nor "far from everyday life": actually Chemistry, the so-called central science, is all around us. Where is the gap to fill, then? Why are not we able to convert that innate curiosity, which makes people stepping out from their houses to join public engagement activities, into genuine, time-persistent, passion about Chemistry? Such questions will be addressed herein, giving practical examples of possible approaches to address the problem. Special emphasis will be given to new learning means, generically referred as "Open Learning" ones, and interactive teaching approaches typical of non-formal environments, such as Science Festivals. Real examples of activities beyond the formal curricula of chemical study, some carried out by us in the framework of the "Diffusione della Cultura Chimica – Società Chimica Italiana" (Dissemination of Chemical Culture – Italian Chemical Society) mission and vision, will be discussed underlining their role in enhancing learning and inspiring confidence and passion toward Chemistry.

KEYWORDS Open Learning, Chemistry, Society, Gamification, Science Festival, Didactics, Interactive Teaching Approaches.

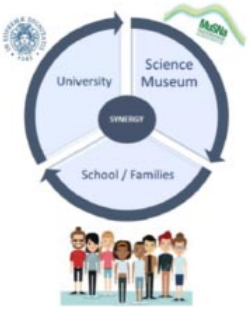
Link: https://doi.org/10.13128/Substantia-587

Education sciences (2022) 12: 30

STEAM Project-Based Learning Activities at the Science Museum as an Effective Training for Future Chemistry Teachers

Valentina Domenici

(This article belongs to the Section STEM Education)



ABSTRACT Non-formal learning environments, such as science museums, have a fundamental role in science education and high potentialities as ideal contexts for science teachers' training. These aspects have been analyzed and reported in several recent works mainly focused on students' perception of science and increased engagement towards scientific disciplines. In this work, a project-based learning methodology optimized and experimented in the frame of a pre-service chemistry teachers' course at the University of Pisa (Italy), during the last eight years, involving in total 171 participants, is presented. This educational project has several distinctive features related to the STEAM philosophy, with a high level of multi-disciplinarity and creativity. Most of the laboratories and chemistry-centered activities were conceived, planned and carried out by the future chemistry teachers in non-formal contexts, such as science museums. A case study based on a series of non-formal laboratories designed by a group of students during their training in the academic year 2018–2019 and performed in a science museum is reported and examined in details. In this paper, all steps of the STEAM project-based learning methodology are described underlining the main learning outcomes and cognitive levels involved in each step and the relevant methodologies proposed during the training course and adopted in the project. The effectiveness of this pre-service teachers' training methodology is finally discussed in terms of participants' motivation and interest towards the course's content, students' final judgment of their training experiences and, in particular, of the STEAM project-based learning activities. From the students' feedbacks and final assessment, the role of the non-formal context in teaching and learning chemistry and the efficacy of developing educational activities related to current and real-life chemistry-centered topics emerged as very positive aspects of the proposed approach.

KEYWORDS Chemistry education; STEM; STEAM; Non-formal environment; Science museum; PjBL; Interactive learning; Project-based learning; Teacher training

Link: https://doi.org/10.3390/educsci12010030