Oral presentation

A Museum of Molecular Models

A. Bacchi

Museo di Cristallochimica, Università di Parma
Dipartimento di Scienze Chimiche, della Vita e della Sostenibilità Ambientale, Parco Area delle Scienze 17/A, 43124 Parma, Italy
alessia.bacchi@unipr.it

We all remember the sheer excitement of our first experience in seeing and being able to rotate molecules on a screen, the curiosity to explore molecular architectures, the beauty of the perfect planarity of aromatic rings and the sense of wonder and awe watching the fantastic variety of structures in scrolling through the CSD.
Two of my favourite quotes which reflect the rich experience of admiring chemistry's most beautiful buildings are form two of the greatest scientists in the field of structural chemistry:

"I became captivated by the edifices chemists had raised through experiment and imagination-but still I had a lurking question. Would it not be better if one could really 'see' whether molecules as complicated as the sterols, or strychnine were just as experiment suggested?" (Dorothy Hodgkin, Nobel Prize Lecture, December 11, 1964 [1])

"I think that the great ocean of truth is still in front of us and that we will continue to discover new aspects of this truth" (Olga Kennard, J. D. Bernal Lecture 1995, Birkbeck College)

I think that this an extremely powerful engagement point for young students, and their teachers as well.

We tried to leverage onto these concepts in tackling the problem of the scarce sense of three-dimensional spatiality that students reveal when they learn the concepts of chemical bonding. In fact in the last years, we have noticed that first year university students are somehow loosing skills related to the description of three-dimensional molecular structures: confounding the concepts of linear and planar, or not being able to assess angular values are examples.
When asked to build a 3D model of hybrid atomic orbitals with plasticine, in a sort of bricolage challenge during the lectures on chemical bonding, many students were unable to properly execute the task.

We can track back to, and share with, high school the problem of learning tools and methods, where the concept of structure in chemistry is often compressed in few hours, with no practicals attached to the enumeration of geometrical rules. Moreover, increasing use of electronic devices for teaching and representing models might pose problems in understanding 3D facts. At the University of Parma we have a Museum of Structural Chemistry [2, 3, 4] – (Museo di Cristallochimica) - to help students to metabolize 3D concepts, and we have developed practicals to engage the public in understanding molecular structures.

[1] https://www.nobelprize.org/uploads/2018/06/hodgkin-lecture-1.pdf.

[2] https://artsandculture.google.com/story/7QXxEnyN1gT5LA?hl=it

[3] https://www.youtube.com/channel/UC5dzhQ4EKEE-SVl4iFQpfiA

[4] https://www.sma.unipr.it/it/museo-di-cristallochimica/