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Chemistry in Second Life. Part 2. A World of Education and Networking

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Chemistry in Second Life

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Part 2. A world of education and networking

Second Life visualisations can be scripted for immersive educational activities and real-life collaborative research. Social networking through Second Life is another spin-off for both chemists and chemistry students.

Molecular representations (see May issue page 28) made in Second Life can be applied to educational activities. Another aspect, social networking, sets this virtual platform apart.

Quizzes

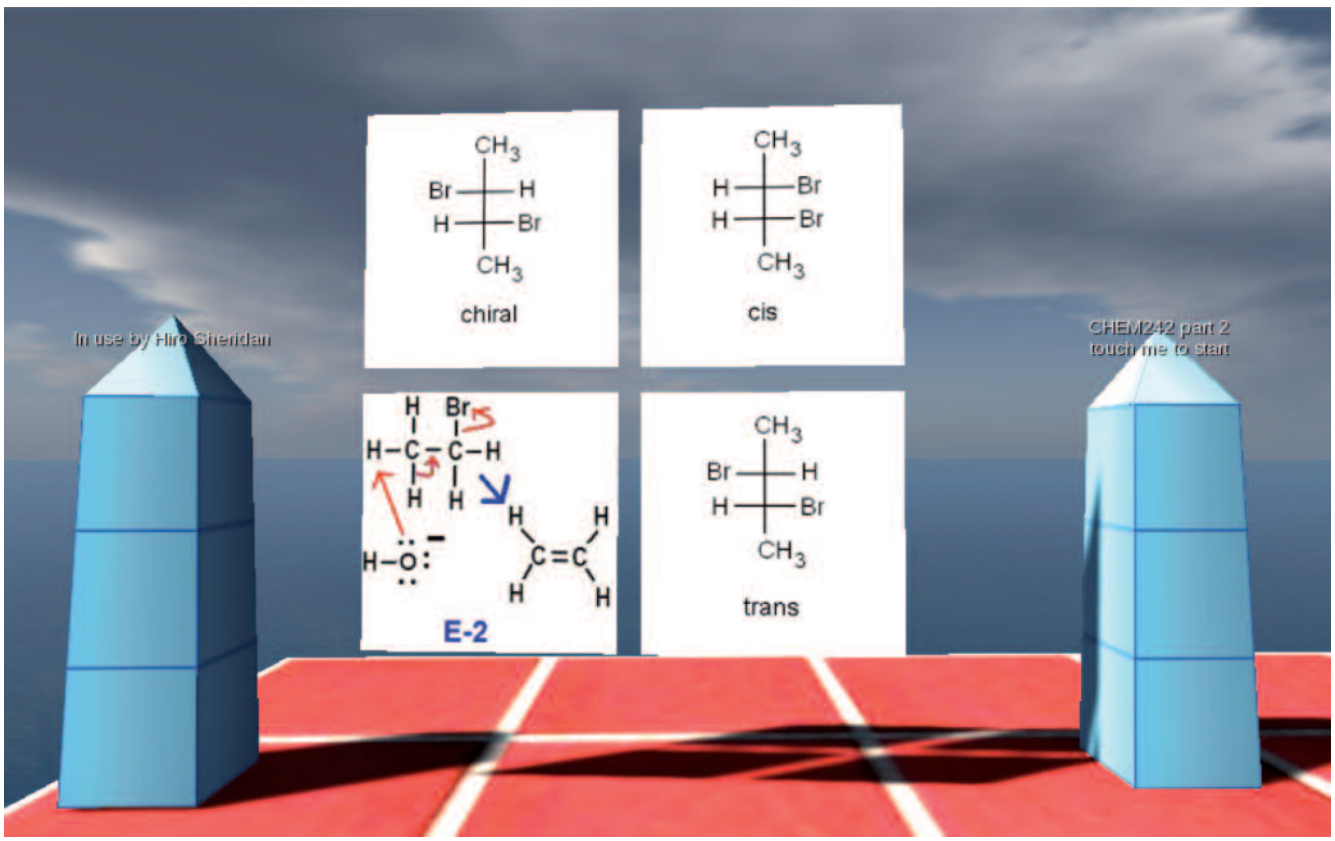
Using a collection of tiles (bitmap images) that are true or false in any context has proved to be a versatile means of creating chemistry quizzes on various platforms for undergraduate organic chemistry quizzes taught at Drexel University in the US. This collection was first used as part of the Edufrag project in the first person shooter game Unreal Tournament, in versions both with and without weapons (http://drexel-coas-elearning.blogspot.com/2006/04/update-ongames-and-vodcast-for-orgo.html). The images were used as doors to pass through. Correct images on the doors led further in the game maze or provided rewards (health, weapons, strategic positioning etc.), while incorrect doors led to negative outcomes such as losing a life or starting the maze again. In the non-weapons version of the game, such quizzes were often used in the form of races where the first student to complete the maze won a prize (typically a molecular model kit or a textbook) (http://drexel-coas-elearning.blogspot.com/2007/06/spring-07-post-mortem.html).

The insertion of new content in the form of bitmap images was streamlined in another version by uploading all the tiles to a Flickr group (http://www.flickr.com/groups/orgogame) and tagging each image according to its category, such as Lewis structures and chirality. The tiles uploaded to Flickr automatically become part of the game. Hosting the tiles on a Flickr group allows for the crowd-sourcing of questions.

Spectral game

Since NMR spectroscopy is taught in CHEM242 (Organic Chemistry II) at Drexel, the Spectral Game was evaluated in this class during the winter 2009 term (http://drexel-coas-elearning.blogspot.com/2009/03/winter-09-term-post-mortem-spectralgame.html). In 2009, chemistry students at Drexel University were given the option of using the Spectral Game resource in Second Life to prepare for tests. The instructor used the game during workshops with individual students to teach them concepts as they appeared in the NMR spectra.

The presentation of molecules in 3D was especially helpful for bridged cyclic structures, which are difficult to imagine correctly using 2D representations. The chat interface with the spectral display board was easy to master to zoom into desired regions. With the implementation of



Quiz obelisk in Second Life showing four random quiz tiles that appear upon clicking.

A section of the Bradley research lab showing pictures of the lab equipment on the right and 3D reaction mechanisms of one of the research projects on the left.

the web version of the Spectral Game (http://www.jcheminf.com/content/1/1/9), most students migrated to that version since it did not require downloading software or learning a new interface. For students who are physically present in a workshop, the web version is probably more convenient, whereas teachers who have most students participate remotely may find significant advantage in using the Second Life version.

Lab research and conferences

Websites are now a ubiquitous platform for sharing information about research projects. Second Life can be used in a similar way by making use of 3D exhibits. For example, a project involving the synthesis of antimalarial compounds (http://dx.doi.org/10.1038/npre.2008.2216.1) displays one of the molecules synthesised in the group and the target protein. Posters give brief descriptions of the exhibit and load a web page with more information about each topic. Images of lab equipment and pictures of group members can be made available to provide more insight about a research group.

Given the ability to stream video into Second Life combined with the ease of converting PowerPoint presentations into a similar format in Second Life, many groups are exploiting the platform to host conferences, both fully virtual and mixed reality (with interaction between real life and second life venues). Hosting conferences in Second Life is more cost-effective for both hosts and attendees. It also alleviates the need to travel, which saves time and money, and is beneficial to people with disabilities who may not be able to travel and scientists in developing countries who may not be able to afford to travel. Second Life conferences consequently have much smaller carbon footprints than real-life conferences. While Second Life conferences cannot give the full experience of a real-life conference, they have been shown to continue some of the benefits of real-life conferences including effective teamworking, networking, collaboration, innovation and socialising (http://secondlifegrid.net.s3.amazonaws.com/docs/Second_Life_Case_IBM_EN.pdf).

Networking and collaborations

In addition to providing a rich environment for 3D exhibits, Second Life enjoys a vibrant community of scientists. Students can benefit from spending time in areas with scientific content simply for the people that they meet who happen to be interested in the same topics. In 2009, students at Drexel University taking introductory organic chemistry were asked to seek out and interview people on Second Life who are connected somehow to chemistry-related fields. Another part of this extra credit assignment

involved taking snapshots of areas in Second Life with chemistry content. A convenient way of identifying suitable people on Second Life involved identifying the creator of chemistry objects and contacting them by instant messaging. FriendFeed, another social networking site, was made the target of interviews for people involved with chemistry. The results of this assignment were aggregated on the class wiki (http://chem241.wikispaces.com/extracredi) and highlight the richness of projects and networks of people working in the field. Such networking, impossible not so long ago, could prove crucial for students to identify opportunities in the course of their education and career.

For educators and researchers, networking can turn out to be at least as valuable as leveraging the platform for the creation of 3D exhibits. By simply spending some time on Second Life to create content or assist students, one often accidentally meets people who may ultimately end up as collaborators at some point. They can be added to a friends list very easily by clicking on their avatar. Whenever someone logs on, in a list of their friends currently online is highlighted and any of these people can be contacted by instant messaging or teleported over to interact with a group. The ease with which this can happen in Second Life enables rapid growth of contacts via 'friend-of-a-friend' networks. The authors of this paper represent an excellent example of a collaboration originating from Second Life and evolving to include work in drug discovery, solubility and data visualisation, both in Second Life (http://drexel-coas-talks-mp3-podcast.blogspot.com/2008/08/chemistry-concept-in-second-life.html) and at the bench.

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The authors are experimenting with some Open Access alternatives to Second Life and replicating some of the chemistry there. Updates will be posted at http://drexelisland.wikispaces.com.