

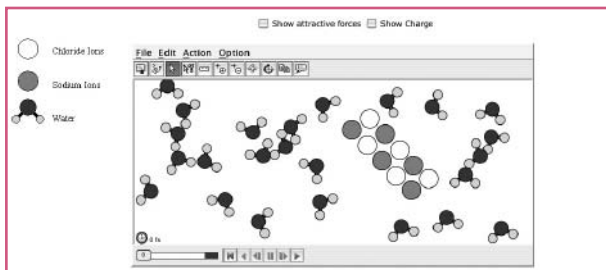
# TUESDAY'S LESSON

## Making Molecular Models Your Own

The Concord Consortium's Library of Models includes over one hundred models and activities to enhance students' understanding of molecular interactions. Created in the Molecular Workbench software, these models illustrate a variety of topics, including solutions, chemical reactions and protein folding.

But what if you have your own ideas about how students should experience these models? For instance, maybe you want to connect a model to a lab your students have done, or you want to assess student understanding with different questions. Perhaps you feel the pedagogical approach would not be familiar to your students. What if you are working with non-English speaking students and would like to use the models in your classroom?

In this lesson, we use the Molecular Workbench's authoring environment to transform a simple model of salt dissolving in water into a structured exploration of the dissolving process. We save pages, edit text, insert questions, and create and share student reports (Figure 1).



**Figure 1.** The Molecular Workbench model not only models particles, but allows an author to toggle on charges and other attractive forces, including van der Waals forces.

### Selecting the activity

First, download Molecular Workbench from:  
<http://xeon.concord.org:8080/modeler/index.html>

Go to the Library of Models. Select Water Molecules and Solution, then Dissolving Salt in Water.

### Saving pages to your computer

To edit existing Molecular Workbench activities, you must first save them onto your computer.

1. Create a new folder on your desktop and name it Dissolving. Any images or files we include in our activity must be saved in this folder.

## Database of Models

A database of Molecular Workbench models is available at <http://molo.concord.org/database>. Search by standards, textbook chapters, modules, concepts, or stepping stones. Look for models marked "Workbench Editable."

2. From the file menu in the top left of the Molecular Workbench screen, choose "Save" and save the file into the folder you just created.
3. The page now includes an "Editor" button in the toolbar. Click the Editor button to put the software in editor mode. Notice the options available to you, including fonts and formatting options similar to a word processing program, like bold and italics. And that's just the beginning!

### Adding and removing text

Let's add two pieces of text: a description of the model and instructions for students.

1. Remove the existing text around the model. Click your mouse to the right of the model, then tap the keyboard's left arrow once. This will move the cursor to the left of the model (and to the right of the text box). To remove the "Key Concepts" text box, press the backspace key (left arrow on Mac).
2. Remove or edit the text below the model by highlighting the text you want to edit or delete, and pressing the delete key on your keyboard. You can type new text here, if you like. Note: Be careful not to remove the model or the model controls. If you accidentally delete something, use the "Undo" option in the edit menu.
3. In this space below the model, type a description of the model. Use the options in the toolbar at the top of the page to change the font style and format.
4. Press the Enter (Return) key on your keyboard to move the cursor down. From the Insert menu, select Text Box. A popup box allows you to use HTML formatting. Or simply type over "Your text" in the main text field. Add instructions to your students on how to conduct an experiment with the model, and click OK when finished.

### Inserting images

Images or screenshots can be added to your activity. For instance, you might like to add a key to remind students what each atom represents. (Remember that your image must be saved in the Dissolving folder you created earlier.)

1. Click your cursor where you would like the image to appear.
2. From the Insert menu choose "Picture," then "From File."
3. Navigate to your saved image, and click "Select."

### Inserting questions

You can generate questions for your students to answer after they've experimented with the model. For this activity we are going to add a text field for students where they can type their response.

1. To insert an open-ended question, click the cursor in the desired location.

- From the Insert menu, chose "User Input Text Area." Set the size of the response box in terms of rows and columns (or leave the default settings).
- Type your question into the caption text area, overwriting the existing title there.
- Click "OK."

### Creating student reports

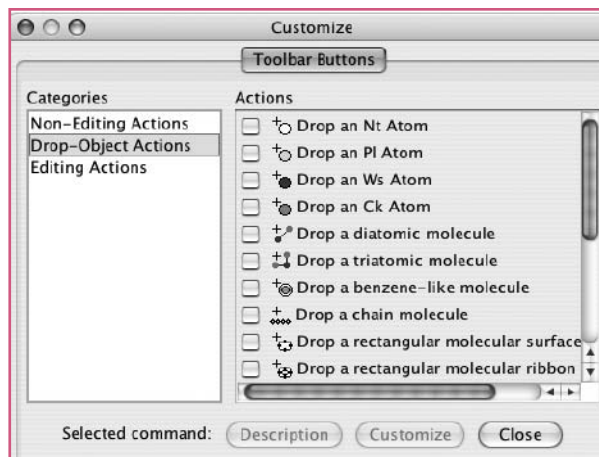
Molecular Workbench allows users to generate reports that include responses to questions as well as screenshots of the current state of the model (Figure 2).

- Select the location for this "activity button." When clicked, this button will open a new page that includes responses to activity questions. It will also display an option for the user to save a screenshot of the model.
- Place the cursor where you want the button to appear. From the Insert menu, choose "Activity Controller" then "Activity Button."
- A box appears that lets you set the button text. In the pop-up box under "Select an action," use the menu to choose "Create a report about this page in a new window." Give the button a short name in the Text field. Choose a background color and border, if you like.
- Click "OK."

**Figure 2.** A student report generated by Molecular Workbench includes the student's choice of screenshot of salt as it is being dissolved. Questions and the student's answers are appended beneath the screenshot.

## System Requirements

The Java Runtime Environment (JRE) of Java 2 Platform, Standard Edition (J2SE) v1.4.1 or higher version must be installed on your computer in order to run the Molecular Workbench model. Windows or Linux users can download it from [Java Sun Microsystems](http://www.java.com/en/download/manual.jsp). Mac OS X users can update to the latest Java through the Software Update pane of the System Preferences of their computers.



**Figure 3.** With the Molecular Workbench customization tool, an author can add objects and actions for students to use in their exploration of a model.

### Sharing what you have done with others

Upload your activity to a database of activities to share with other users, including your students.

- Save your page.
- From the Collaboration menu, choose "Upload Current Page." Click Yes on the disclaimer box that informs you that your activity will be saved to a public website.
- Enter information about the model, including your name, student level (e.g., elementary or high school), and a description of the model. Select "Model" for type.
- Click the Submit button.
- User-created activities can be found in the online database: <http://molo.concord.org/database>

### Advanced: changing or creating a model

Once you have mastered the editing system, you might be inspired to change a model or create a new model (Figure 3). With the Molecular Workbench software, the possibilities are endless. @

### ARTICLE LINKS & NOTES

Instructions for software installation can be found at: <http://molo.concord.org/software/>

[Java Sun Microsystems](http://www.java.com/en/download/manual.jsp) — <http://www.java.com/en/download/manual.jsp>

An online User's Guide for Molecular Workbench can be found in the Molecular Workbench software under the Help menu or by going to: <http://xeon.concord.org:8080/modeler1.3/tutorial/preface.cml>

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