



# CHEMCOLLECTIVE

מעבדות וירטואליות בכימיה



The screenshot displays the ChemCollective website interface. At the top, there is a blue navigation bar with the ChemCollective logo on the left, the text "Online Resources for Teaching and Learning Chemistry" in the center, and logos for Carnegie Mellon University and NSDL on the right. Below the navigation bar, there are links for "Home", "About", "Teachers", "Help", and "Feedback", along with a search box. A dark blue banner below the navigation bar contains the text "See home page (click here) for information on coronavirus (Covid-19)".

The main content area has a breadcrumb trail: "You are here: Home > Virtual Labs > The Virtual Lab". Below this, the title "VIRTUAL LAB: Default Virtual Lab Stockroom" is displayed. A paragraph of text follows: "We are pleased to announce a new HTML5 based version of the virtual lab. Please use FireFox or Chrome web browser to access this page, errors have been reported when using Internet Explorer." Below the text is a link: "Introductory Video and Support Information".

The central part of the screenshot shows a preview of the Virtual Lab interface. It features a dark header with the "Virtual Lab" logo and a menu with "File", "Edit", "View", and "Help" options. On the right side of the header, there are icons for "EN" and "Default Lab Setup". The main workspace is divided into two panels: "Stockroom" on the left and "Workbench 1" on the right. The "Stockroom" panel contains icons for "Solutions", "Glassware", and "Tools". Below these icons, a list of items is shown, including "Distilled H<sub>2</sub>O", "Distilled Water", and "3.0 L".

כניסה באמצעות לינק:  
[HTTP://CHEMCOLLECTIVE.ORG/VLAB/VLAB.PHP](http://chemcollective.org/vlab/vlab.php)

## VIRTUAL LAB:VERSION HTML5 VIDEO WALKTHROUGH

We are pleased to announce a new HTML5 based version of the virtual lab. This beta release does not require the Java Plug-in and should run in most browsers. Please read the information below to help you get started.

**Windows and Macintosh users: Please use FireFox or Chrome web browser.**

The simulation will run on most laptops, desktops and touch-enabled devices such as tablets, iPads or phones. (Note: Touch enabled support is still under development, and may be a bit 'clunky').

If you have any technical trouble with the simulation initially loading on your page, often refreshing the page or restarting your browser will solve most issues. You can also [email us](#) for additional assistance.

To help you get started, please view a short video which introduces the virtual lab.

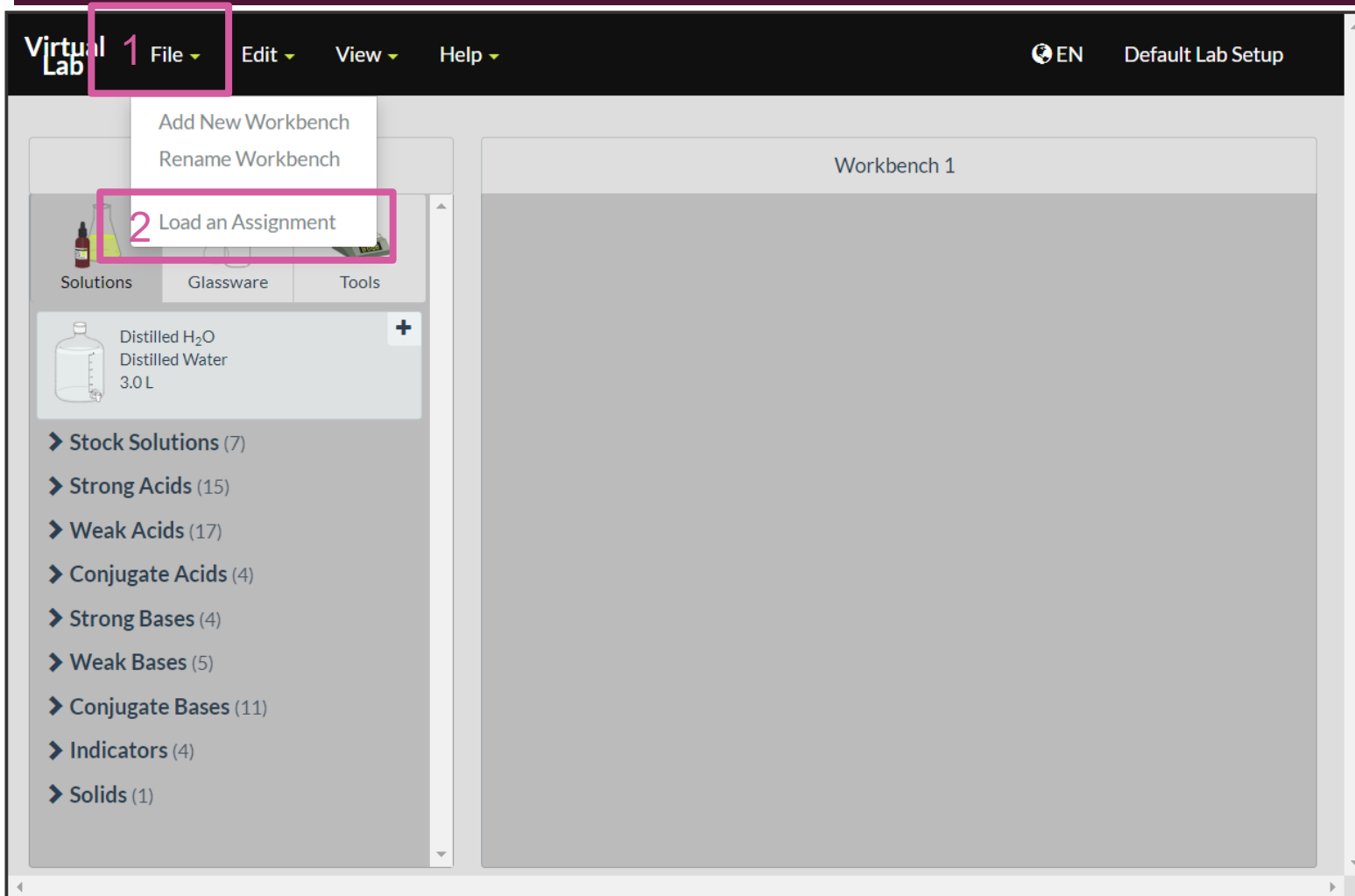


שימוש במעבדה

מומלץ לצפות בסרטון

[http://www.chemcollective.org/chem/common/vlab\\_walkthrough\\_html5.php](http://www.chemcollective.org/chem/common/vlab_walkthrough_html5.php)

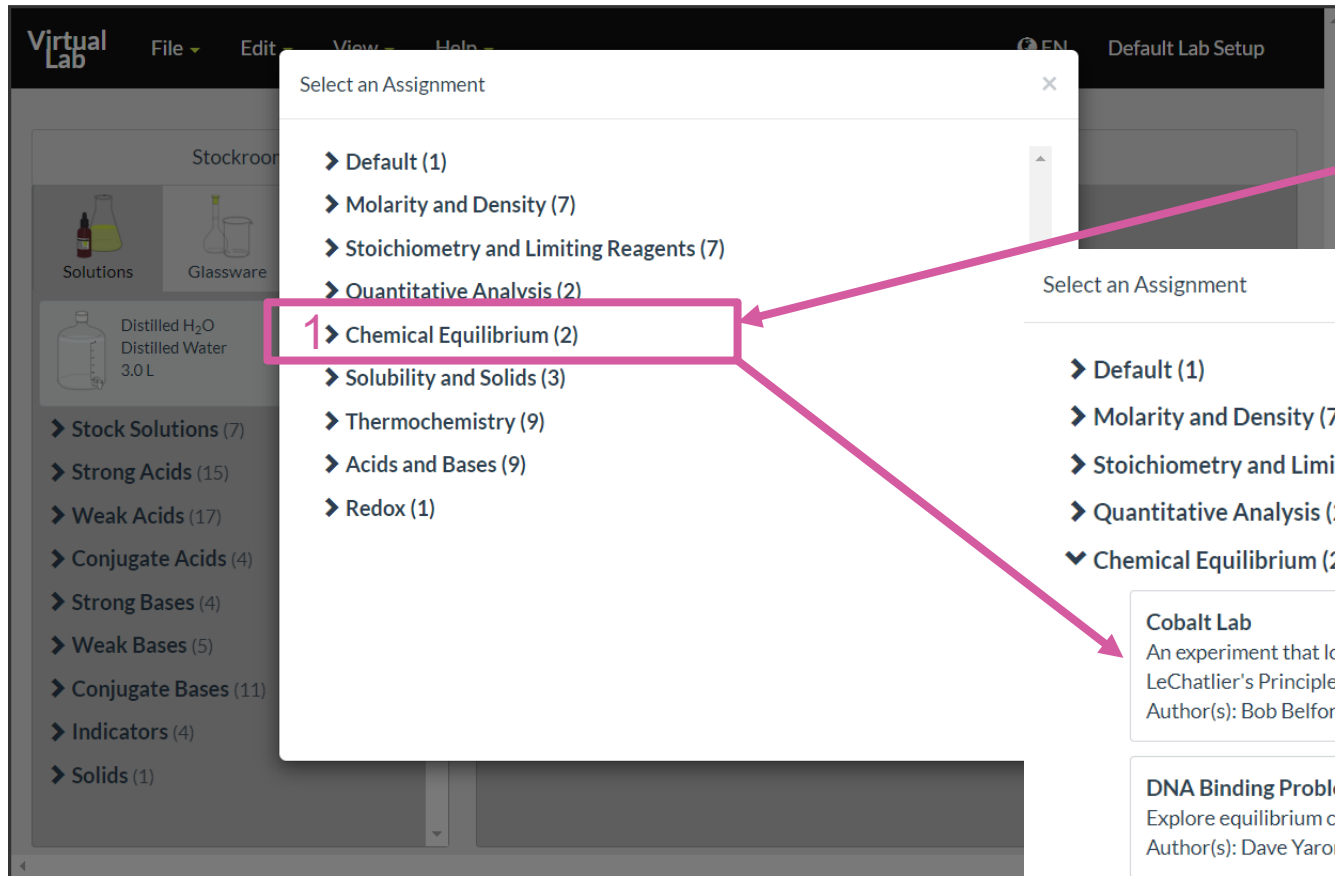
# שימוש במשימות מוגדרות מראש



יש לבחור

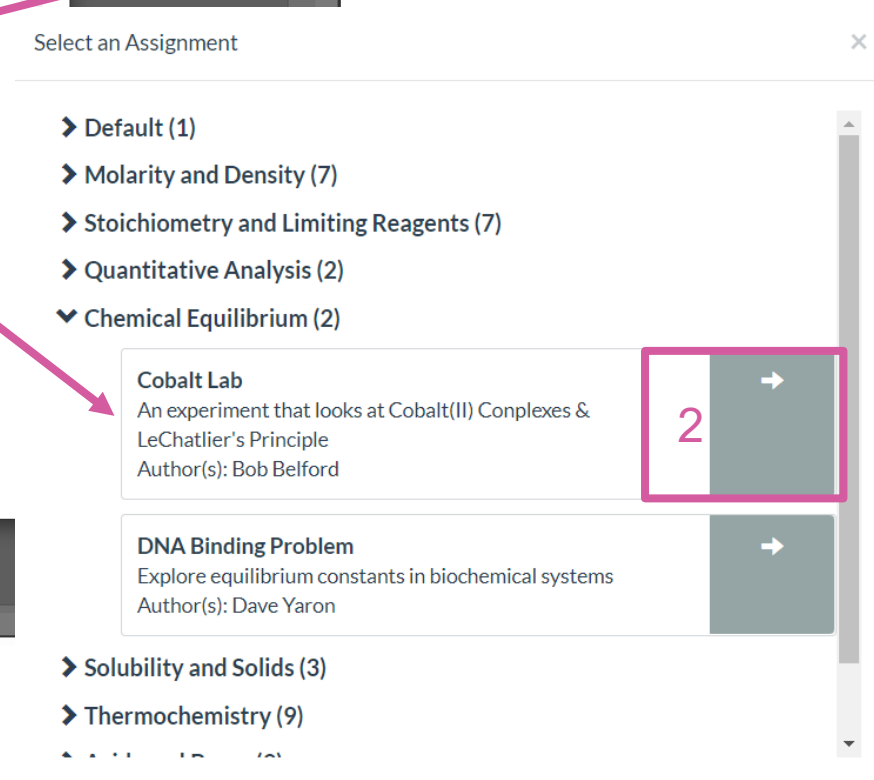
File-> Load assignment

# שימוש במשימות מוגדרות מראש



■ נבחר את הנושא

■ ונלחץ על החץ ליד המשימה  
בה אנו מעוניינים



# שימוש במשימות מוגדרות מראש

על מנת לראות את פרטי המשימה, נלחץ על שם המשימה מימין למעלה

**Virtual Lab** File Edit View Help EN 1 Cobalt Lab

Stockroom

Solutions Glassware Tools

H<sub>2</sub>O Distilled Water .1L

➤ Cobalt(II) Chloride Exp Solutions (3)

Workbench 1

**Virtual Lab** File Edit View Help EN Cobalt Lab

Cobalt Lab

**Objective:** To gain an understanding of LeChatlier's principle through the observation of the effect of induced perturbations on the equilibrium distribution of various cobalt(II) complexes.

**Background:** Cobalt(II) does not exist in aqueous solution as a free ion, but forms a complex ion where 6 water molecules, acting as a Lewis bases (electron pair donors), donate electrons into the vacant orbitals of the cobalt (II). This results in the pink complex ion:  $\text{Co}(\text{H}_2\text{O})_6^{+2}$

In the presence of chloride ions, a different complex forms, the blue  $\text{CoCl}_4^{-2}$  complex ion. We use their different colors to indicate the equilibrium concentrations for the following reaction:

$$\text{Co}(\text{H}_2\text{O})_6^{+2} + 4\text{Cl}^- \rightleftharpoons \text{CoCl}_4^{-2} + 6\text{H}_2\text{O}$$

In this simulation you not only observe the equilibrium concentrations through their colors, but also directly read their concentrations. Note how the stock solutions exist as their ions ( $\text{Co}(\text{NO}_3)_2(\text{aq})$  exist as  $\text{Co}(\text{H}_2\text{O})_6^{+2}$  and  $\text{NO}_3^{-2}$ ).

**Assignment:** Use the equilibrium concentrations after each step to determine the K for the above equation. Be sure to include appropriate dilution factors (as they will not cancel).

1. Add 25 mL of  $[\text{Co}(\text{H}_2\text{O})_6]^{+2}$  to an empty Erlenmeyer flask. Now add 12 M HCl in 1mL increments until the equilibrium color has changed. (Hint: Type in 1 for the volume to be transferred, and then keep clicking *pour* until you see a change, counting clicks to determine total volume added.)