

Unit 8 – Solutions

- Solute, Solvent and Solution
- Solution process
- Concentration and Molarity

Competencies

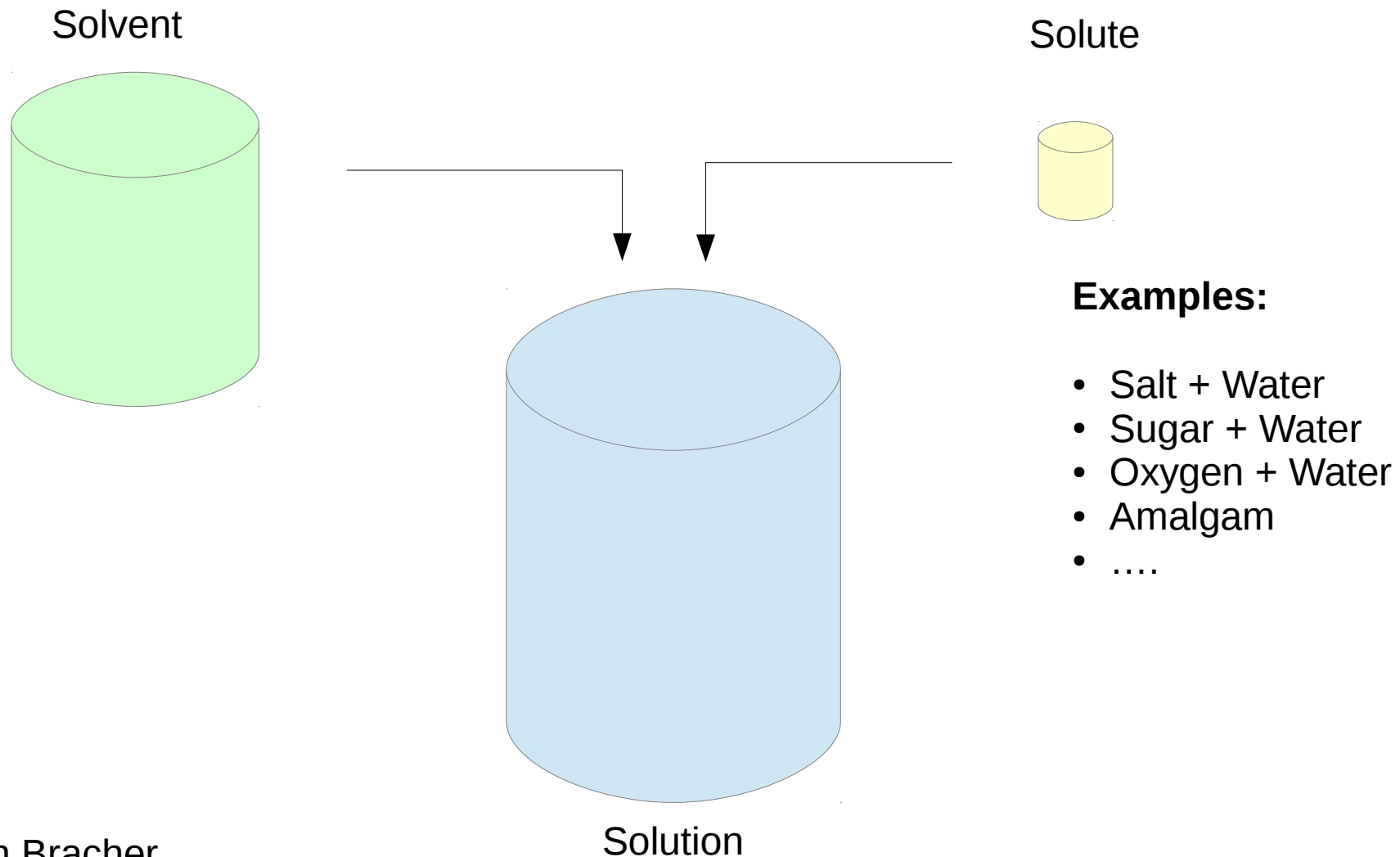
The student will be able to:

- define solute, solvent, and solution.
- define and distinguish between saturated and unsaturated solutions.
- describe the solution process for a soluble substance such as sodium chloride.
- define miscible and immiscible and give examples of each.
- calculate the concentration of a solution in units of percent by mass, and molarity, and solve problems involving concentration of solutions.

Solution

Solution: A homogeneous mixture of two or more substances

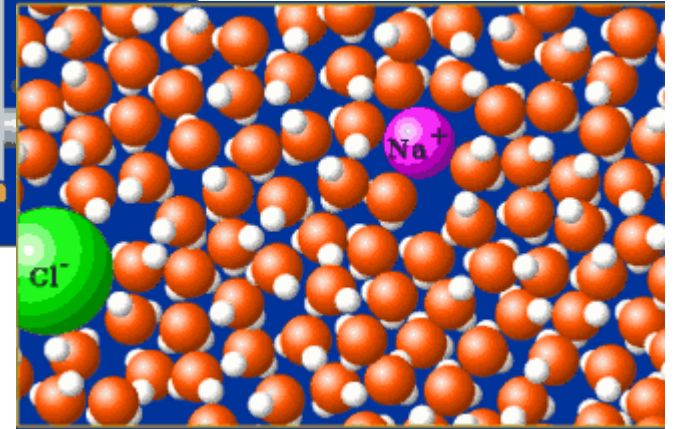
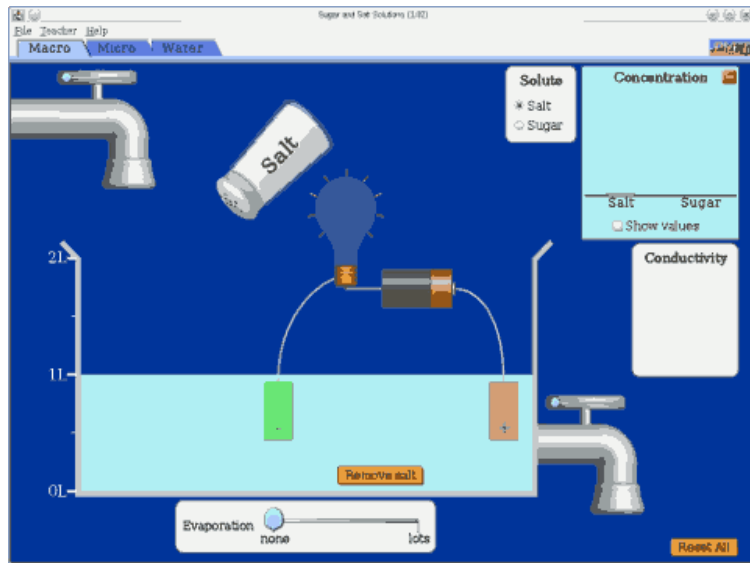
Saturated: The solution contains the maximal amount of solute that can be dissolved in the given amount of solvent.



Examples:

- Salt + Water
- Sugar + Water
- Oxygen + Water
- Amalgam
-

Solution process



Simulation: <http://phet.colorado.edu/en/simulation/sugar-and-salt-solutions>

Questions:

- 1) What happens when NaCl is dissolved in water
- 2) What happens when sugar is dissolved in water
- 3) What happens when the water is removed from the solution through evaporation?
- 4) What happens to the conductivity of water if salt or sugar are added?

Miscible and immiscible

Miscible: Two liquids mixed in all proportions (homogeneous)

Examples:

miscible



Image: Wine and Kirsch by Stefan Bracher

Ethanol and water

immiscible



Image: Sunflower oil and water by Stefan Bracher

Oil and water

Concentration and Molarity

Concentration:

$$\frac{\text{amount of solute}}{\text{amount of solution}}$$

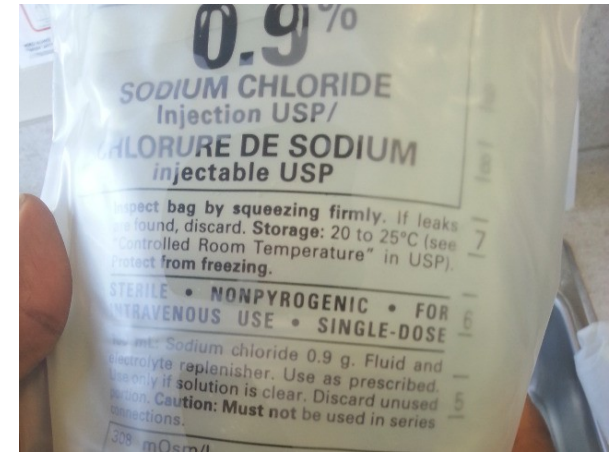


Image: IV solution by Kathleen de Asis

mass concentration

$$C = \frac{m_{\text{solute}}}{V_{\text{solution}}}$$

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mass percent

$$\% m/m = \frac{m_{\text{solute}}}{m_{\text{solution}}} 100\%$$

volume percent

$$\% V/V = \frac{V_{\text{solute}}}{V_{\text{solution}}} 100\%$$

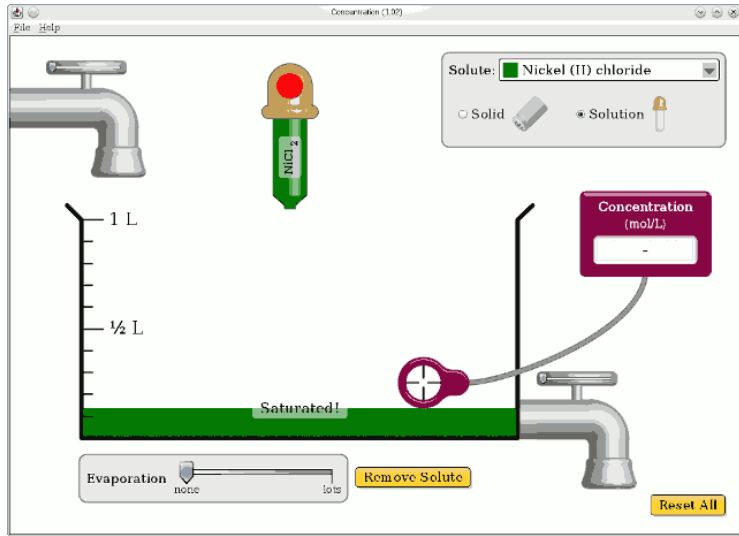
Molarity

$$M = \frac{n_{\text{solute}}}{V_{\text{solution}}}$$

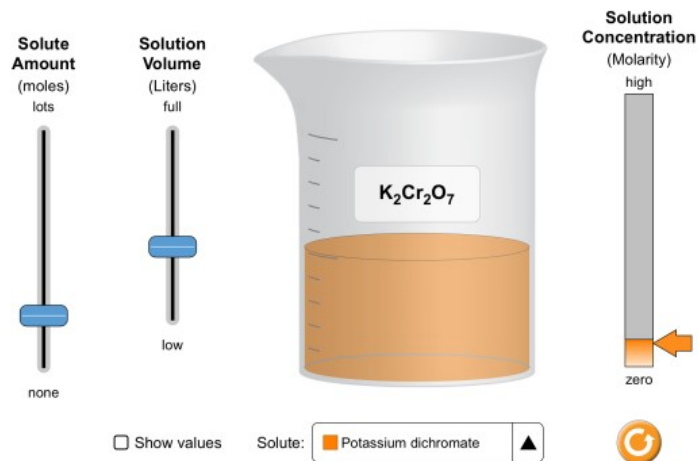
n: mol of solute

V: Volume in L

Concentration and Molarity



Simulation: <http://phet.colorado.edu/en/simulation/concentration>



Molarity

PhET

Simulation: <http://phet.colorado.edu/en/simulation/molarity>

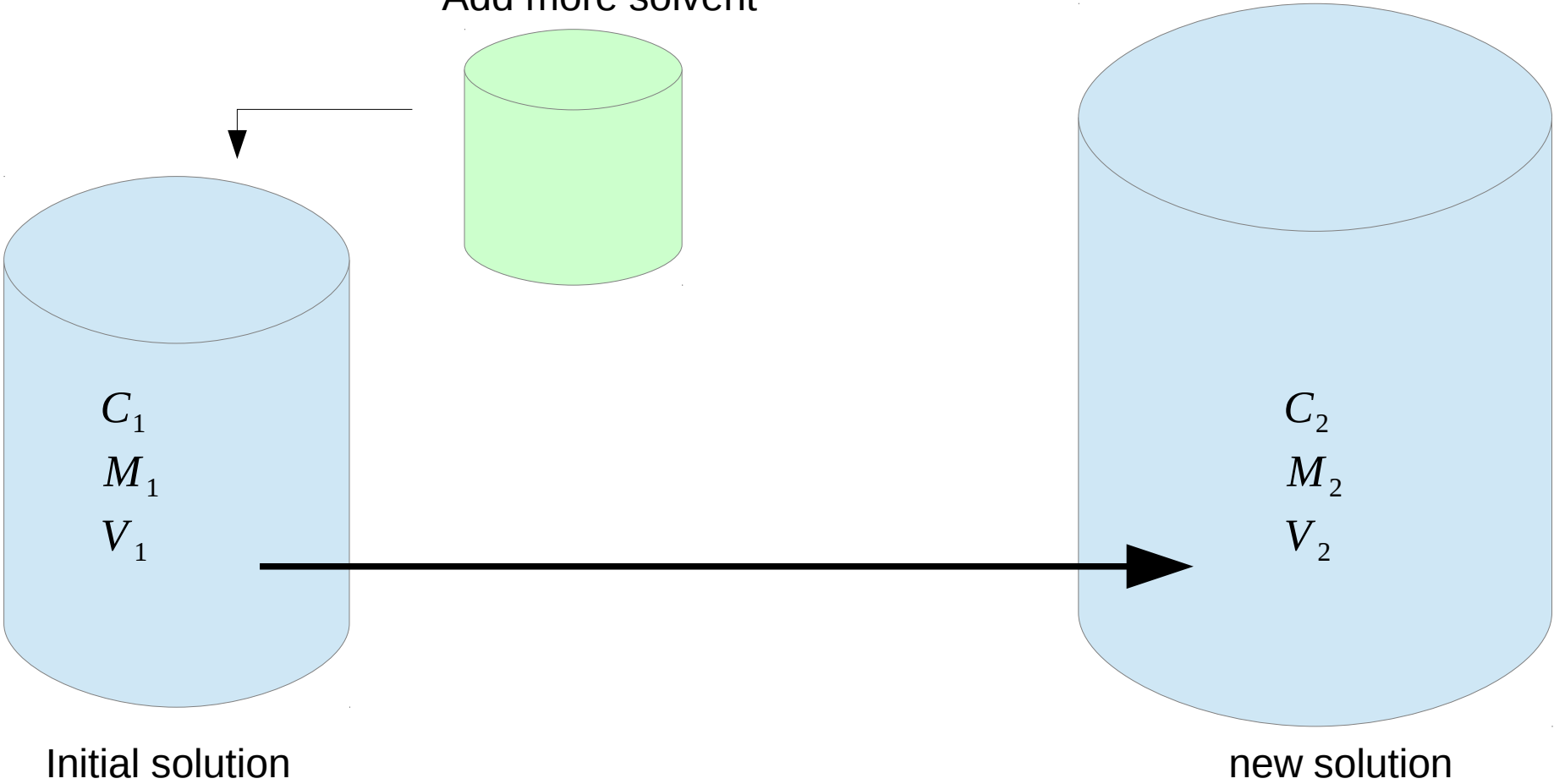
Dilution

Dilution:

$$C_1 V_1 = C_2 V_2$$

$$M_1 V_1 = M_2 V_2$$

Add more solvent

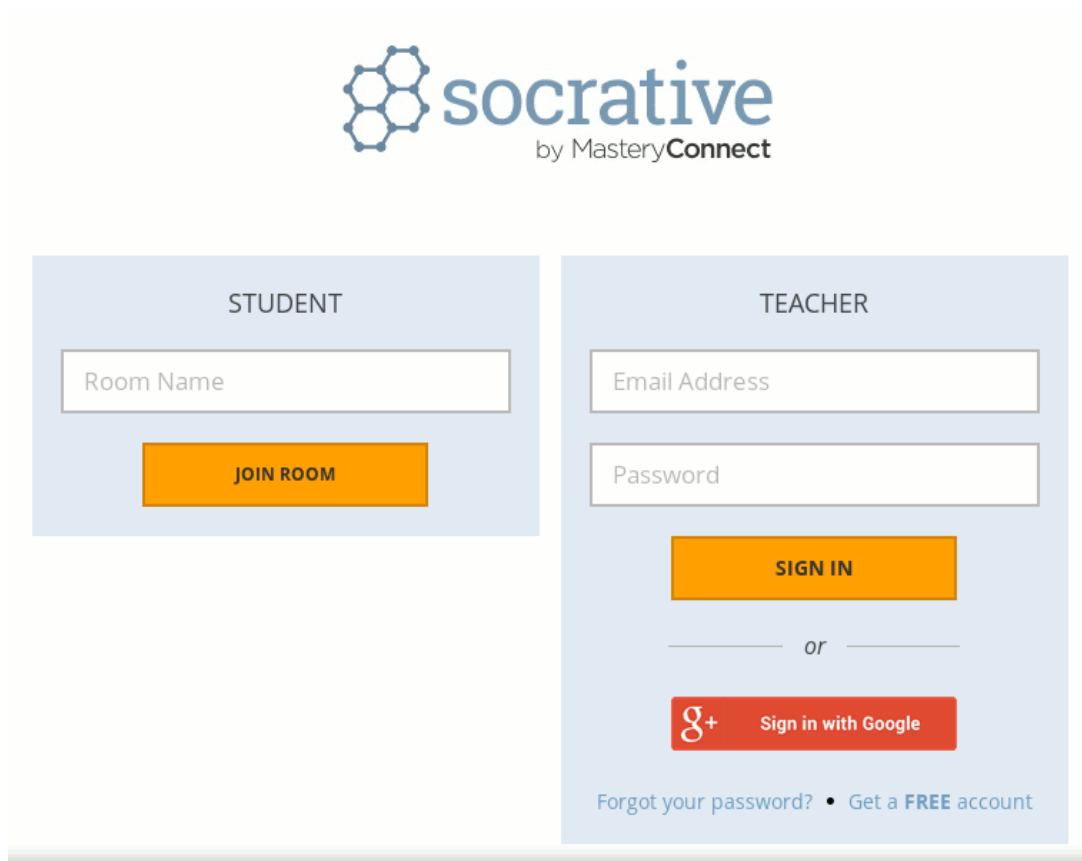


→ Do Unit VIII Problems 5-13

Review

Clicker Review Activity : Sec 4 – Solutions

<http://b.socrative.com>



The image shows the Socrative login interface. At the top center is the Socrative logo, which consists of a cluster of blue hexagons followed by the text "socrative" in a blue sans-serif font, with "by MasteryConnect" in a smaller, grey font below it. Below the logo are two main sections: "STUDENT" and "TEACHER".

The "STUDENT" section is a light blue box containing a white input field labeled "Room Name" and an orange button labeled "JOIN ROOM".

The "TEACHER" section is a light blue box containing a white input field labeled "Email Address", another white input field labeled "Password", and an orange button labeled "SIGN IN". Below the "SIGN IN" button is the text "or" flanked by horizontal lines. Underneath is a red button with the Google+ logo and the text "Sign in with Google". At the bottom of the "TEACHER" section are two links: "Forgot your password?" and "Get a FREE account".

Additional Resources

- Solutions and Colloids, OpenStax „College Chemistry“
<http://cnx.org/contents/havxkyvS@9.165:EH4NtBEq@4/Introduction>