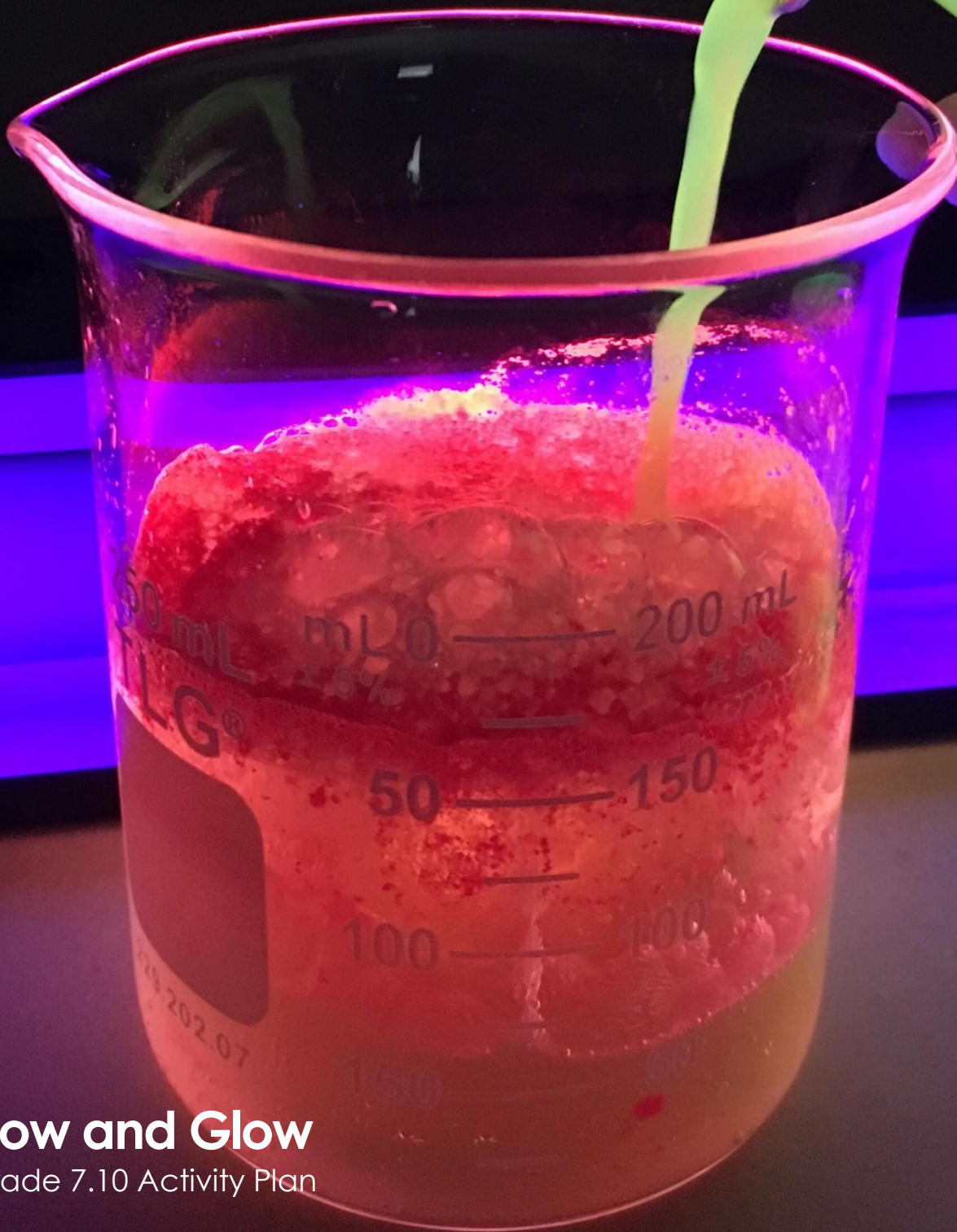

IMH TEP'S

LEGACY ACADEMY



Flow and Glow
Grade 7.10 Activity Plan

Reviews and Updates

REVIEWER	ACTIONS/COMMENTS	DATE
Esther Bonitto	First draft of activity	24/07/19

Flow and Glow

Objectives:

1. To understand what makes a solution unsaturated, saturated, or supersaturated
2. To be able to distinguish the difference between solutes and solvents
3. To learn about the process of crystallization

Keywords/concepts: chemistry, insoluble, oxidation, reaction, redox, reduction, saturated, soluble, solute, solution, solvent, supersaturated, unsaturated

Take-home product: Secret message/drawing and rock candy, (may need **Liability Form** for the creation of rock candy, as it is edible)

Curriculum Outcomes:

Grade 7: (307-1, 208-10, 307-3, 307-4, 208-6, 209-1, 210-7)

Grade 9: (307-13)

Segment	Details
African Proverb & Cultural Relevance (5 min)	“Patience can cook a stone.” ~Benin Proverb
Activity 1: Iodine Clock Reaction (15 min)	Observe a classical, entertaining color change reaction, while learning the basic concepts behind a redox reaction.
Activity 2: Glowing Bubbles (15 min)	Observe how the mixing of solutions can lead to the combining of physical properties.
Activity 3: Rock Candy (30 min)	Use sugar and water to create a supersaturated solution that forms edible crystals when cooled to room temperature.
Post-test (10 min)	Aid students in the completion of a Word Search, encouraging them to finish it quickly, as the first student to finish will get to pick out a prize from the *Chemist Chest*

Suggested Interpretation of the Proverb: If you have enough patience, you can make it through the toughest of situations. Even though it would take an extremely long time to crack open a stone in a boiling pot of water and turn it into pieces small enough to make a rocky solution, with enough patience, you can achieve your goals and find solutions for your problems in life. <https://www.pinterest.ca/pin/289497082273023596/>
<https://www.afriprov.org/african-proverb-of-the-month/31-2005proverbs/220-patience-can-cook-a-stoneq-fulfulde-benin-burkina-faso-cameroon-central-african-republic-chad-mali-niger-nigeria-sudan-and-togo-.html>



Cultural Relevance:

Viola Desmond (1914-1965) was an African Canadian beautician who owned her own beauty salon and created hair and skin products for black women. Although she created these great, useful solutions, she is best known for her stand against segregation, when she refused to leave the “whites only” section in a theater in New Glasgow in 1946. She is essentially Canada’s version of Rosa Parks, as her stand for what is right helped to change the laws so that white and black people can go anywhere together. You may have noticed her on your \$10 bills recently. She was one awesome woman!

https://en.wikipedia.org/wiki/Viola_Desmond

BACKGROUND INFORMATION

Solutions are an everyday part of our world. Whenever a gas, liquid, or solid are added into another liquid and mixed in uniformly, a solution is formed. Everything from pop to bleach to Kool-Aid is a solution. Solutions often react together and change color, or if a supersaturated solution is formed, a cool process called crystallization can occur. Sometimes, chemicals inside of solutions exchange electrons in what we call a redox reaction. Let's go have some fun observing solutions at their finest!

Solute: The component of a solution that is present in a smaller amount. The solute is usually added into the solvent.

Solvent: The component of a solution that is present in a greater amount. The solvent usually "accepts" the solute.

Solution: A liquid that has a uniform, evenly mixed look, and has two or more components.

Unsaturated: A solution that has the capacity to dissolve more solute.

Saturated: A solution that has reached its maximum dissolving capacity, and can therefore dissolve no more solute. The solute will often be visibly undissolved in the solution.

Supersaturated: A saturated solution that has been heated about room temperature, and has dissolved extra solute since it was a saturated solution.

Oxidation: When a chemical compound has lost electrons.

Reduction: When a chemical compound has gained electrons.

Redox: A chemical reaction involving a reduction and oxidation reaction.

Activity 1: Iodine Clock Reaction

Source:

- https://www.youtube.com/watch?v=xLCDJ0m_qrk

Purpose: *to observe a redox reaction at work*

Item	Quantity (10 students)
Distilled water	5 L
Vitamin C tablets	10
10% iodine	100 mL
Boiled water	400 mL
Corn starch	2 g
3% hydrogen peroxide	1 L
Glasses	20
Spoons	20

Procedure:

1. Pour 128 mL of warm distilled water into the first glass.
2. Add one crushed, 0.5 g Vitamin C tablet to the glass and stir well, until most of the tablet is dissolved.
3. Add 12 mL of 10% iodine into the glass and stir.
4. In the second glass, pour 40 mL of boiling water into it.
5. Add and dissolve 0.2 g of cornstarch to this glass, stirring it in with the second spoon that was not used in the first solution.
6. Add 100 mL of 3% hydrogen peroxide.
7. Now you can pour the first solution into the second solution, and then pour the newly combined solution back and forth between the two glasses. You'll be amazed when you see the color change to a dark blue! Why does this happen? Explain the basic concepts behind a redox reaction to the students.

Activity 2: Glowing Bubbles

Source:

- <https://www.youtube.com/watch?v=hplgYb5Z5ls>

Purpose: *to observe that solutions can take on new properties when mixed together*

Item	Quantity (10 students)
Bubbles	1 bottle
Highlighter	1
Blacklight	1
Tonic water (optional)	50 mL
Cup	1
Spoon	1

Procedure:

1. Open a highlighter and pry out the highlighter lead using the pliers.
2. Place the highlighter lead into a cup. (Alternatively, pour 50 mL of tonic water into the cup).
3. Pour the whole bottle of bubbles into the same cup. Stir using the spoon.
4. If highlighter lead was used, allow the ink to soak into the bubble liquid for 1-2 minutes. If tonic water was used, you can use the solution right away! Dip your bubble wand into the solution, turn on the blacklight and blow some awesome, glow-in-the-dark bubbles!
5. Is this an example of a homogenous or heterogenous mixture?

Activity 3: Rock Candy

Source:

- <https://learning-center.homesciencetools.com/article/crystal-growing-science/>

Purpose: *to observe how cooling a supersaturated solution allows excess particles to crystallize out*

Item	Quantity (10 students)
White sugar	384 g
Water	1.065 L
Small plates	10
Spoons	10
Glass cups	10
Wax paper	10 sheets
Saucepans	10
Hot plates	10
Small jars	10
Wooden skewers	20
Food coloring (multiple colors)	8

Procedure (each student will do this individually, with help from the mentor when necessary):

1. **To be prepared by mentor before students arrive:** Fill a glass with water, and pour some sugar onto the small plate. Lay a sheet of wax paper and a wooden skewer beside each plate.
2. Dip 2 sticks into the glass of water, and roll them around in the plate of sugar. Gently tap the sticks to remove excess sugar. Lay the sticks on the wax paper to dry.
3. Pour 710 mL of water into your saucepan and add 64 g sugar. Stir the sugar until it dissolves. Continue adding sugar and stirring until you have added 576 g of sugar in total. At this point, you may notice that some sugar will not dissolve in the water. Why won't it dissolve? What type of solution is this? If all the sugar has dissolved, add a little more until you see undissolved excess.
4. Heat the big pot until it reaches boiling point, stirring the whole time. Turn the heat to medium-low and continue stirring. What is happening to the sugar? What type of solution is this? Ask the students to pick out what color they want their rock candy to be while you cook the solution.

5. **Do not cook the solution for more than 5 minutes.** Continue stirring until you see a clear color and **turn the hot plate off as soon as you see it start to become clear.**
6. Remove the pan from the hot plate and cool it, allowing it to remain slightly warm.
7. **To be done by the MENTOR:** Slowly pour the solution into 10 jars, until they are approximately 2/3 full.
8. Allow the students to add 5-6 drops of food coloring to their own jar if they wish to have colored rock candy.
9. Once the solution is cool and the sugar-coated sticks are dry, place 2 sticks into each jar.
10. Place the jars in a place where they will not be disturbed.
11. **To be done by the MENTOR:** Check the sticks every day or so and gently stir the sticks in the solution to break up larger crystals forming on the surface.
12. When the students come back the following week, they will have super awesome rock candy to enjoy!

Name: _____

I Have all the Solutions

Complete the crossword puzzle below! Whoever finishes first will get to pick out a prize from the *Chemist Chest* :)

K K A U P C U B H Y Q K T F S
Y L X B N R P S L O A L D X A
S U P E R S A T U R A T E D T
A N W Z F C A S L A H H E G U
L U C N E Y O T K A W M O H R
E V R Q T L L G U Y T R D F A
J S G K U L Q G G R P S M E T
N X H T L V O A J M A J Y N E
M Q I G O A V E L J M T O R D
G O B Y S O I X I Y C G E Y C
N R N P J D D V M U M D V D Z
H R J Z O E G K J X A Q F V Z
T N E V L O S V Q D X V R Y T
Q H E B Y H W B V B N P B E W
T I N U F R P N M O V E R W P

Find:

CRYSTAL
SATURATED
SOLUTE
SOLUTION
SOLVENT
SUPERSATURATED
UNSATURATED

Item	Price	Source (in-store)
Distilled water		Walmart
Vitamin C tablets		Walmart
10% iodine	\$	
Corn starch	\$	
3% hydrogen peroxide	\$	
Glasses		Dollarama
Spoons		Dollarama
Bubbles		Dollarama
Tonic water		Walmart
Wax paper		Dollarama
White sugar		Dollarama
Small plates		Dollarama
Saucepans		Walmart
Hot plates		Dollarama
Small jars		Dollarama
Wooden skewers		Dollarama