The Periodic Table of Glucose (Abbreviated)

Estimated Time: 60 minutes

SUMMARY
Many scientists helped make the periodic table. When they did this, they had no understanding of subatomic particles like protons, neutrons, and electrons. Even so, scientists made incredible predictions of the periodic table we use today. In this activity, students will think like Newlands, Mendeleev, and others as they sort “elements” in a periodic fashion.

WHAT YOU’LL LEARN

- Early periodic table development, including the work of Dmitri Mendeleev
- The concept of *periodicity*
- Methods for sorting unknown materials
- An introductory understanding of the periodic table (18/118 elements!)

Materials Used
● 18 Dixie cups or small dishes ● 2 different small candies (i.e. Skittles, M&Ms, Reese’s Pieces, jellybeans) ● Clean hands! (to eat the subatomic particles) ● 1 large piece of construction paper ● Scratch paper ● Writing utensil ● Straight edge (optional) ● Guide to simulate elements (see below)
Resources Used
● **Ted-Ed on Mendeleev:** https://www.youtube.com/watch?v=fPnwBITSmgU ● **Crash Course on Early Periodic Table:** https://www.youtube.com/watch?v=0RRVV4Diomg

WHAT TO DO

1. Before beginning the experiment, prepare 18 Dixie cups with two types of small candy (one for protons, one for neutrons). Refer to the chart below when filling the cups for the number of protons and neutrons, respectively.
2. Create a small table, 9 squares by 2 squares, on the piece of construction paper. A straight edge may be useful for creating equally sized boxes.
3. Discuss the way Dmitri Mendeleev organized the first periodic table. Did he organize the atoms based on the collective number of protons and neutrons? Just neutrons? Just protons? Based on how they looked? Refer to the TED-Ed video in the Resources Used section to stimulate a conversation.
4. Record the number of each candy type in each Dixie cup, or element, at a time. Begin brainstorming ways to sort the cups.
5. Once a plan to organize the elements has been established, use the 18 square periodic table to sort them!

6. Compare and contrast the student's method of organization to that of Mendeleev. Consider researching other early periodic tables (such as John Newlands' idea) to compare as well! See tips below to better understand the early periodic table's development.
7. Feel free to enjoy the (safe!) protons and neutrons after the activity is complete. Don't forget to keep everyone's hands clean before eating anything handled in the activity.

TIPS

- Encourage the student to choose their own organization method for their periodic table. If they don't create a "periodic table" quite like Mendeleev's, that's alright! It is most important that the student can justify their method of organization. Perhaps if they chose a different route than Mendeleev, assist the student in rearranging the table in a *periodic* manner. Review the **Resources Used**; there's a chance your student chose an organizational method similar to earlier periodic tables! Regardless of how the student first organized their elements, end the activity with a discussion of periodicity.
- Recall that Mendeleev's table introduced the *periodicity* of elements and thus the name of the periodic table. Periodicity refers to the repeating nature of the elements. All of the elements within a column, or group, have similar characteristics. In this activity, students explored the first two rows of 1A-8A (the Representative Elements), or Hydrogen through Argon. Every eighth element repeats similar characteristics, such as reactivity, natural forms, ionic activity, appearance, and more. While this activity and Mendeleev only organized elements based on the number of protons (atomic number), scientists later understood that periodicity was the result of valence electrons: those that interact with other matter. Depending on the understanding of the student, feel free to discuss how Mendeleev created a realistic periodic table without even understanding the reason for periodicity.

ABBREVIATED PERIODIC TABLE OF ELEMENTS

Establish one candy as protons (p_+) and the other as neutrons (n_0). Fill each Dixie cup accordingly.

Hydrogen 1 p_+ 0 n_0							**Helium** 2 p_+ 2 n_0
Lithium 3 p_+ 4 n_0	**Beryllium** 4 p_+ 5 n_0	**Boron** 5 p_+ 6 n_0	**Carbon** 6 p_+ 6 n_0	**Nitrogen** 7 p_+ 7 n_0	**Oxygen** 8 p_+ 8 n_0	**Fluorine** 9 p_+ 10 n_0	**Neon** 10 p_+ 10 n_0
Sodium 11 p_+ 12 n_0	**Magnesium** 12 p_+ 12 n_0	**Aluminum** 13 p_+ 14 n_0	**Silicon** 14 p_+ 14 n_0	**Phosphorous** 15 p_+ 16 n_0	**Sulfur** 16 p_+ 16 n_0	**Chlorine** 17 p_+ 18 n_0	**Argon** 18 p_+ 22 n_0