

3D Periodic Table



Introduction

The Periodic Table of the Elements is one of the most recognized features of any science classroom. The Periodic Table organizes all of the elements—114 at last count—in a way that helps scientists summarize and visualize the properties of each element in a concise manner.

Concepts

- Periodic Table

Background

Dmitri Mendeleev (1834–1907), a Russian chemist, arranged the 63 known elements into the first accepted Periodic Table of Elements in 1869. Mendeleev wrote the properties of the elements out on cards, then arranged the element cards in order of increasing atomic mass. He then arranged them into rows called periods and found that the physical and chemical properties of the elements seemed to repeat themselves at specific intervals. He placed elements with similar properties into columns which he called families. Most amazing of all, Mendeleev recognized, based on these trends, that there must be gaps in the table where he felt the “undiscovered” elements belonged. Three of the elements that Mendeleev predicted were indeed discovered during his lifetime.

Although incredibly inventive and effective, Mendeleev’s table was not perfect. He thought that some of the atomic masses may have been measured incorrectly. This was not the case. The current Periodic Table of the Elements is arranged by increasing atomic number (number of protons) of the elements. This arrangement, coupled with electron arrangement, ensures that elements with similar chemical and physical properties fall into place without exception. The activity below uses paper cubes instead of note cards to visually display properties of elements. Look for trends in the Period Table of the Elements by examining all of the cubes that make up this 3D Periodic Table.

Materials

Cardstock paper, 10 colors	Periodic Table Cube Template
Craft paper, roll	Periodic Table of the Elements
Laminator (optional)	Scissors
Markers or colored pencils	Tape, cellophane

Safety Precautions

Although the materials in this activity are considered nonhazardous, please follow all normal laboratory safety precautions. Wash hands thoroughly with soap and water after performing laboratory activities.

Preparation

1. On a wall, use tape to mark off a grid of 13 cube-widths \times 35 cube-widths (this is approximately 0.75 m \times 20.3 m) or draw it on a sheet of craft paper using a pencil.
2. Assign each family of elements on the Periodic Table a different cardstock paper color.
3. Copy the Periodic Table Cube Template onto the colored cardstock paper. Make as many copies on each color as needed for each element in a family.

Procedure

1. Assign each student an element from the Periodic Table.
2. Each student should obtain a Periodic Table Cube template on the appropriate color of cardstock for each assigned element. The color represents the family of the assigned element.

3D Periodic Table *continued*

- Fill in all the information for the element on the Periodic Table Cube template using a Periodic Table, textbook, or the Internet for reference. *Note:* Students should use the most common form of the element when providing information. Standard state refers to the state of the element at standard temperature and pressure (STP) and classification differentiates metals, nonmetals, and metalloids.
- (*Optional*) Laminate the Periodic Table Cube.
- Cut the Periodic Table Cube out along the solid lines.
- Fold the Periodic Table cube along the dotted lines so that the printed faces are folded away from each other—the writing should be on the outside of the cube.
- Fold the tabs back, away from the printed faces.
- Position both tabs labeled “A” behind the printed sides of the cube as shown in Figure 1.
- Secure the tabs with cellophane tape.
- Repeat step 8 and 9 with the tabs labeled “B.”
- Fold the tabs labeled “C” over tabs “A” and “B” on the inside of the sides of the cube and secure them with cellophane tape.
- Make a tape loop with a piece of cellophane tape, adhesive side out, and attach to the cube face printed with an “X.”
- Attach each cube to the proper location on the grid created in *Preparation* step 1. Using a finger, press firmly on the inside surface of the cube to ensure that it will stick to the surface. *Note:* There should be one empty grid space around each cube.
- Tuck tab “D” down to complete the cube. Secure with cellophane tape.
- Display the 3D Periodic Table in a prominent place.

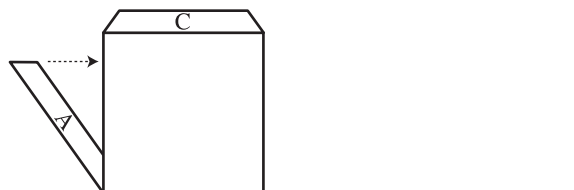


Figure 1.

Disposal

The materials in this activity may be disposed of according to Flinn Suggested Disposal Method #26a, in the regular trash.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Process: Grades K–12

Systems, order, and organization
Evidence, models, and exploration

Content Standards: Grades 5–8

Content Standard B: Physical Science, properties and changes of properties in matter.
Content Standard G: History and Nature of Science

Content Standards: Grades 9–12

Content Standard B: Physical Science, structure of atoms, structure and properties of matter.
Content Standard G: History and Nature of Science

Tips

- Instead of using a different color of construction paper for each family, use a different color to distinguish metals, nonmetals, and metalloids. Using a different color to distinguish naturally occurring from man-made or differentiating based on state (solid, liquid, or gas) at STP is also an option.
- Some informative websites include: www.webelements.com, <http://periodic.lanl.gov>, www.chemicalelements.com, and www.chemicool.com.
- Using lighter colored cardstock will increase the readability of the Periodic Table Cubes.
- Tacks or double-sided tape may also be used to secure the Periodic Table Cubes to the wall or to craft paper.

3D Periodic Table *continued*

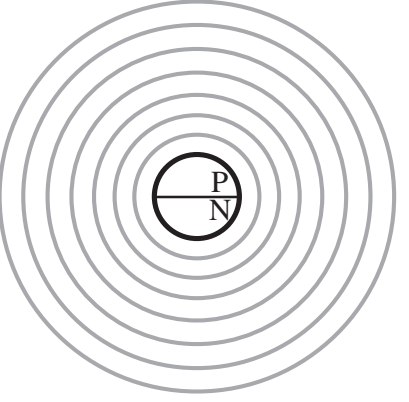
- Double-sided tape or glue could be used to secure the tabs behind the cube faces.

Materials for *3D Periodic Table* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP4240	Periodic Table, Notebook size, 50/pad

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.

A



A

C

Discovery _____

Date _____

Discoverer _____

Cost _____

Uses: _____

C

B

_____ Atomic Number

_____ Symbol

_____ Element Name

_____ Atomic Mass

B

D

_____ Protons*

_____ Electrons*

_____ Neutrons*

_____ Isotopes

*Most common isotope

D