

Prismarine - your partner in General Chemistry

🚀 Deployment Link: <https://deadbush225.github.io/Prismarine/>

⚙️ Technology Stack:

- TypeScript
 - SASS
 - WebPack
 - Git & GitHub
-

Leader: **Inso**, Eliazar N.

Members:

1. **Abrea**, Maureen I.
2. **Andrade**, Athena Jannelle S.
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GRADE/STRAND/ SECTION: **STEM 11-Y1-6**

PERFORMANCE TASK IN GENERAL CHEMISTRY 1

PERFORMANCE TASK: Website/Web page (Atomic Structure/Gas Behavior/Mass Relationships/Chemical Reactions) (Show-off Demonstration, Models, Representation Models)

TOPIC:

1. ATOMIC STRUCTURE (Explanation, Demonstration, Models, Representation, and Application)
2. CHEMICAL REACTION (Explanation, Demonstration, Models, Representation, and Application)

Attached here is the link of our website:

<https://deadbush225.github.io/Prismarine/>

UNIQUE FEATURES:

- **Live intractability** to the atoms with the **Interactive Periodic Table**
- **Mobile Friendly**, even the **Interactive Periodic Table**
- **Theme** switcher to **Dark Mode** and **Light Mode**
- **Fast** and **Efficient**, since it is not embedded which is noticeable to other platforms such as Adobe XD

DEVELOPER NOTES:

- When **hovering** over a picture in the **Teams** Tab will show the name of the member
- When **hovering** over **Electron|Neutron|Proton** in the Atomic Model will **highlight the sub-atomic particle**
- The **references** can be seen in the **bottom right section of the home page**

TO FUTURE DEVELOPER:

- Since this website will be open source, it will be fully replicatable and anyone can extend and add additional functionalities to this. The code used is **organized and sorted using a known programming conventions**, so others will save development time rebuilding from the start and focus on what functionality they deem to add.
- This will match the aim of the project which is to build a sustainable and functional learning material that will help the future generations of students to come in their academics, especially in chemistry.

Documentation:

OUTLINE OF THE WEBSITE:

By **clicking the link**, you will see our main topics which are atomic structure and chemical bonding and below them are their different topics.

The screenshot shows the homepage of the website. At the top, there is a navigation bar with three items: "STEM 11-6" (highlighted in orange), "Interactive Periodic Table", and "Team". Below the navigation bar, the title "Learn Chemistry with Prismarine!!" is displayed. The page features a dark background with a pattern of atomic models. Two large rectangular boxes are centered: "Atomic Structure" on the left and "Chemical Bonding" on the right. Each box contains a sub-section title and a brief description. Below these boxes are two more sections: "What are Atoms?" and "Organization of Atoms" on the left, and "What is Chemical Bonding?" and "Different Types of Chemical Bonding" on the right.

Section	Description
Atomic Structure	We'll take a deep dive on what atoms are and what they're made off Basic understanding of matter
Chemical Bonding	We'll focus on what chemical bonding is and the process behind them Basic understanding of matter and atoms
What are Atoms?	Fun facts and abstract definitions of atoms
Organization of Atoms	Elements? Compounds? what's the difference?
What is Chemical Bonding?	Learn the underlying process in chemical bonding
Different Types of Chemical Bonding	Polar? Non-polar? Covalent? Ionic??!

On the top of the website, three options will be visible to you: "STEM 11-6" (where our topics are situated), "Interactive Periodic Table" (where our interactive simulation of the periodic table is located), and "Team" (where the names of our group members who contributed to the creation of this website are listed).

This screenshot shows the same website layout as the previous one, but with a different color scheme. The main sections "Atomic Structure" and "Chemical Bonding" have green backgrounds. The sub-sections "What are Atoms?", "Organization of Atoms", "What is Chemical Bonding?", and "Different Types of Chemical Bonding" also have green backgrounds. The overall design is clean and modern, using a white background for the text and icons.

First, the Atomic Structure, we discussed different topics such as atoms, organization of atoms, and valency.

Atomic Structure

We'll take a deep dive on what atoms are and what they're made off
Basic understanding of matter

What are Atoms?

Fun facts and abstract definitions of atoms

Organization of Atoms

Elements? Compounds? what's the difference?

What is Valency?

What makes element/compound to be stable?

Chemical Bonding

We'll focus on what chemical bonding is and the process behind them
Basic understanding of matter and atoms

What is Chemical Bonding?

Learn the underlying process in chemical bonding

Different Types of Chemical Bonding

Polar? Non-polar? Covalent?! Ionic??!

Chemical Reactions

How chemical reactions obey the conservation of matter?

Different Types of Chemical Reactions

4 Types of chemical reactions

Second, when you click the "What are Atoms?", it will show the definition of atoms and the definition of the three parts of an atom. This will show if the charges are positive, negative, or even neutral, and if their size is small or not. Lastly, is the location, whether they are located inside or outside the nucleus.

What are atoms?

The atom is the smallest unit of matter composed of three sub-atomic particles: the proton, the neutron, and the electron. The atom's nucleus, a dense, positively charged core of protons and neutrons, is surrounded by a negatively charged electron cloud.

Parts of an Atom

1. Electron

Electrons are one of three main types of particles that make up atoms. They are a type of fundamental particle called leptons. All leptons have an electric charge of -1 or 0. Electrons are very tiny particles. The mass of an electron is only about 1/2000 the mass of a proton or neutron, so electrons contribute virtually nothing to the total mass of an atom. The electric charge of an electron is -1, which is equal to but opposite from the charge of a proton(+). Since there are exactly as many electrons as protons in every atom, the positive and negative charges "cancel out," making the atom electrically neutral.

Unlike protons and neutrons, located inside the nucleus at the center of the atom, electrons are found outside the nucleus. Because opposite electric charges attract one another, negative electrons attract positive protons. This force of attraction keeps electrons constantly traveling across the otherwise vacant area around the nucleus.

2. Proton

Proton is one of the three primary components of an atom. Atoms contain protons in their nucleus. A tiny, dense area at the center of the atom. Protons have a mass of 1 atomic mass unit (amu), or around 1.671027 kilograms, and a positive electrical charge of 1 (+1), making them positively charged particles. Along with neutrons, they make up approximately all of the mass of an atom.

3. Neutrons

Third, under the atomic structure is the **Organization of Atoms**. This is where we discussed the definition of elements, the difference between elements and atoms, the definition of compounds, and the difference between compounds and elements.

Elements? Compounds? Atom vs Elements?

All matter is made up of elements, which are the building blocks of matter. Standard chemical methods cannot decompose any substance into simpler substances. A basic component of a whole is an element. When defining elements, any type of element has been considered an element in and of itself.

One type of particle, the Atom, contains protons, neutrons, and electrons and is the building block of all elements. An element's atoms all have the same number of protons. Examples of elements: Hydrogen, Carbon, Oxygen, Nitrogen, Gold, Silver, Iron, and Calcium. An element is a simple substance that cannot be divided into smaller components or transformed into another substance.

Element vs Atoms

Elements	Atom
Elements are the simplest form of substance.	Atoms are part of an element.
Elements are composed of only one type of atom.	Atom comprises subatomic particles called electrons, neutrons, and protons.
Elements can combine to form molecules.	Atoms can also combine to form a molecule, but if only all bound atoms are similar, the type of elements are formed.
Elements are heavier and bigger.	Atoms are tiny particles.
There are 118 elements.	There are 92 different kinds of atoms in nature.
The term element is often used in general chemistry and the periodic table.	The term atom is used more in physics, while in chemistry it is often used when the topic is about atomic number or mass.

Fourth, once you click **What is Valency?**, it will direct to the discussion of definition and examples of valence electrons. We also include the process in which you will find the valence electrons and how many valence electrons they have in a group of elements.

STEM 11-6 Interactive Periodic Table Team

Atomic Structure

- We'll take a deep dive on what atoms are and what they're made off
- Basic understanding of matter

What are Atoms?

- Fun facts and abstract definitions of atoms

Organization of Atoms

- Elements? Compounds? what's the difference?

What is Valency?

- What makes element/compound to be stable?

Discovery of Elements

- Fun facts about the timeline of discovery of elements

Chemical Bonding

- We'll focus on what chemical bonding is and the process behind them
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What is Chemical Bonding?

- Learn the underlying process in chemical bonding

Different Types of Chemical Bonding

- Polar? Non-polar? Covalent?? Ionic??!

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- How chemical reactions obey the conservation of matter?

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Valence Electrons

Valence electrons are the s and p electrons in the outermost shell. The electrons present in the inner shell are core electrons. When we study and observe the atom of an element, we come across tiny subatomic particles called valence electrons. Lewis structures help us to track the valence electrons and predict the types of bonds.

Valence electrons are all arranged in different orbitals or shells and are mostly negatively charged particles. Further, these electrons are responsible for the interaction between atoms and the formation of chemical bonds. However, not all electrons are associated with the atom. Only the electrons present in the outermost shell can participate in the formation of a chemical bond or a molecule. Such a type of electron is called a valence electron.

What are Valence Electrons?

Valence is the number of electrons an atom must lose or gain to attain the nearest noble gas or inert gas electron configuration. Electrons in the outer shells that are not filled are called valence electrons.

The valence electrons are part of the chemical reactions because they contain more energy compared to the electrons present in inner orbits. Meanwhile, the number of valence electrons also helps us determine a specific element's chemical properties, such as its valence or valency, and the formation of bonds with other elements. It also gives us an idea of how readily the atoms can form bonds, the number of unpaired electrons, and how many atoms can take part.

Characteristics of Valence Electron

Electrons are involved in the chemical bonding and reactions of the atom. It is said to occupy orbitals in an atom. The number of valence electrons of an atom can be obtained

Fifth, the Chemical Bonding, we discussed the different topics such as chemical bonding, different types of chemical bonding, chemical reaction, and different types of chemical reactions.

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Sixth, when you click the "What is Chemical Bonding", it will show the definition of chemical bonding that we have discussed.

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What is a Chemical Bond?

A chemical bond is the association of two or more atoms that occur when they are drawn to one another and combine to form a molecule. This bond acts to hold the atoms together and can be permanent, until it is broken by an outside force or energy. The chemical bond is formed when one atom has less energy than the other, and the attraction between them is strong enough to form a stable compound. The primary bonds include the covalent, ionic, and metallic bonds.

Different Types of Chemical Bonding

1. Ionic Bonding

Ionic bonding is a type of chemical bond that is created when electrons are transferred between a positively charged atom (the cation) and a negatively charged atom (the anion). Typically, this type of interaction occurs between metals and nonmetals. This electron transfer results in the formation of an electrostatic bond between the two ions, causing the cation to become positively charged and the anion to become negatively charged. The cation is formed from the original atom by losing one or more electrons, while the anion is formed from the original atom by gaining one or more electrons. The name of the anion is determined by changing the elemental name with an -ide suffix.

Examples:

- sodium chloride: NaCl, with Na⁺ and Cl⁻ ions
- lithium nitride: Li₃N, with Li⁺ and N³⁻ ions
- magnesium oxide: MgO, with Mg²⁺ and O²⁻ ions
- calcium phosphate: Ca₃(PO₄)₂, with Ca²⁺ and PO₄³⁻ ions

Properties of Ionic Bond:

- Ionic bonds possess a high lattice energy, which is the energy necessary to completely separate the ions in an orderly crystal. This is due to the considerable electrostatic forces between the ions.
- The strong attractions between the ions result in ionic compounds having high melting and boiling points. It takes a lot of energy to break the bonds and cause the compound to melt or boil.
- In its solid form, ionic compounds are not good conductors of electricity due to the ions being securely held in a lattice arrangement. However, they become good conductors when in an aqueous solution or molten state.
- The strong electrostatic attractions between the ions and the polar water molecules cause many ionic compounds to be soluble in water.

Seventh, we included the different types of chemical bonding such as Ionic Bonding, Covalent Bonding, and Metallic Bonding, together with their various properties and examples.

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2. Covalent Bonding

The sharing of electrons between atoms is known as covalent bonding. This bonding happens when two atoms of the same or closely related elements in the periodic table come

Eighth, under the chemical bonding is the chemical reactions in which we have discussed the definition of chemical reaction and its examples.

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What are Chemical Reaction?

Chemical reaction is the transformation of one or more substances, known reactants, into new substances, known as products. This transition typically entails atom rearrangement as well as the breaking and building of chemical bonds. Energy is either received from or discharged into the environment during a chemical process.

Some examples of chemical reactions:

- Photosynthesis: $6CO_2 + 6H_2O \rightarrow Light\ Energy \rightarrow C_6H_{12}O_6 + 6O_2$
- Combustion of Methane: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
- Burning of Coal: $C + O_2 \rightarrow CO_2$
- Rusting of Iron: $Fe + O_2 + H_2O \rightarrow Fe_2O_3 + H_2$
- Neutralization of an Acid and a Base: $HCl + NaOH \rightarrow NaCl + H_2O$

The Law of Conservation of Mass

The conservation of mass principle, which is fundamental in physics and chemistry, asserts that the mass of a closed system remains unchanged over the course of time. This indicates that mass can only be modified or restructured, not created or destroyed, by physical or chemical events.

Way back 1700s, Antoine Lavoisier conducted experiments in a sealed jar to estimate the mass of reactants and products in chemical processes. He discovered that the entire mass of matter and its contents remained constant before and after the reaction, proving that matter cannot be created or destroyed by chemical reactions. This fundamental concept has significant importance in chemistry, as it allows for the balancing of chemical equations and the prediction of the amount of product produced from a given quantity of reactants.

1. Synthesis Reaction/Direct Combination Reaction

Ninth, we included the different types of chemical reactions such as Synthesis Reactions/Direct Combination Reactions, Double-Replacement Reactions or Salt Metathesis Reactions, Chemical Decomposition/Analysis Reactions, and Single Replacement or Substitution Reactions together with their examples.

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The Periodic Table

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1. Synthesis Reaction/Direct Combination Reaction

On the bottom right of the website, you will see the references to acknowledge the rightful authors work and to avoid plagiarism.

Atomic Structure References:

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Once you click the Interactive Periodic Table, you will find the 118 elements. If you click on one element, it will show the graphics on the right side, which indicates the number of electrons, protons, and neutrons in each element. If you scroll down the website, it will show more information about the Interactive Periodic Table, such as its atomic mass, oxidation states, melting point, etc. And once you click the hyperlink at the bottom right of the website, it will lead you to another site for additional information.

STEM 11-6 Interactive Periodic Table Team

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Previews:

Attached here is the screenshot of our website/web page (Desktop):

Attached here is the screenshot of our website (Mobile):