

Exploring the differences and similarities between ionic and covalent bonds

Neha Mandle^{1*}

¹SSCPS, Bhlai, Chhattisgarh, India

*Corresponding Author E-mail: nehamandle1996@gmail.com

Abstract

The study seeks to explain the similarities between the ionic and covalent bonds. The study aims to explain the advantages and disadvantages of both ionic and covalent bonds. Secondary sources of data such as scholarly articles, online brochures are used as references.

Keywords: Ions, Covalent, Polar compounds, Electrons

I) Introduction

An ionic bond is defined as the formation of a bond after two or more atoms gain or losses an electron to form an ion. An ionic bond formed between metals when it loses electrons. The bond is found in non-metals when it gains electrons. Ionic bonds tend to form in between two or more atoms, after a transfer of one or more electrons happens between the atoms. A covalent bond formed after mutual sharing of electrons occurs between two atoms [7]. The electrons are constantly attracted by two nuclei of atoms.

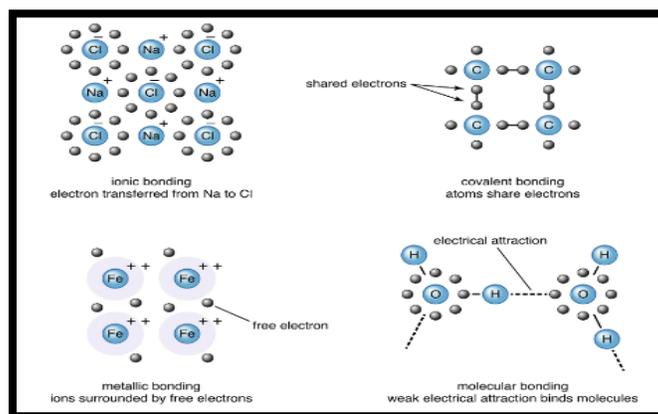


Figure1 Types of atomic bonds

Ionic and covalent bonds have certain similarities as well as dissimilarities in between them. Both ionic and covalent bonds use electrons between them. Both the covalent and ionic bonds have certain forces of attraction between them. However, certain dissimilarities between both the bonds can be noticed [6]. The main difference is that ionic bonds are formed between a metal and non-metal, while covalent bond is formed between two non-metals. An ionic compound has a high melting and boiling point, while covalent compound have low melting and boiling point.

II) Research Objectives

- The research seeks to accomplish the following objectives:
- To understand the similarities between ionic and covalent bonds
- To understand the differences between covalent bonds
- To state the advantages and disadvantages of ionic bonds
- To mention the advantages and disadvantages of covalent bonds

III) Research Methodology

The research methodology used to conduct the study is analysis of qualitative secondary data, derived from the secondary sources of data. The data has been extracted from online brochures, online articles, scholarly data, as well as online articles. The methodology will seek to explain the similarities as well as the differences between ionic and covalent bonds.

IV) Evaluating the similarities between ionic and covalent bonds

Ionic and covalent bonds have certain similarities in them. Despite their differences, both the bonds share certain aspects of similarities [10]. First, electrons are involved in the formation of both ionic and covalent bonds.

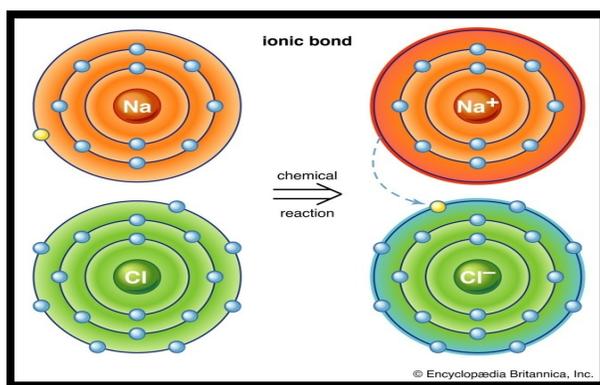


Figure 2: Ionic bonds

Without the involvement of electrons, formation of the bonds would not be possible. Secondly, both ionic and covalent bonded molecules have some forces of attraction within them. Thirdly, both ionic and covalent bonds follow the duplet and the octet rule. A duplet can be defined as the outermost shell of an atom, which contains two electrons [5]. An atom is referred to as an octet when it has a tendency to contain 8 electrons in their valence shell.

Both the ionic and covalent bonds give a certain stability to their elements. Another similarity between both the bonds is that valence electrons take an active role in the bonding of the molecules. These are the similarities between ionic and covalent bonds.

V) Analyzing the dissimilarities between ionic and covalent bonds

Following are the dissimilarities between an ionic and covalent bonds:

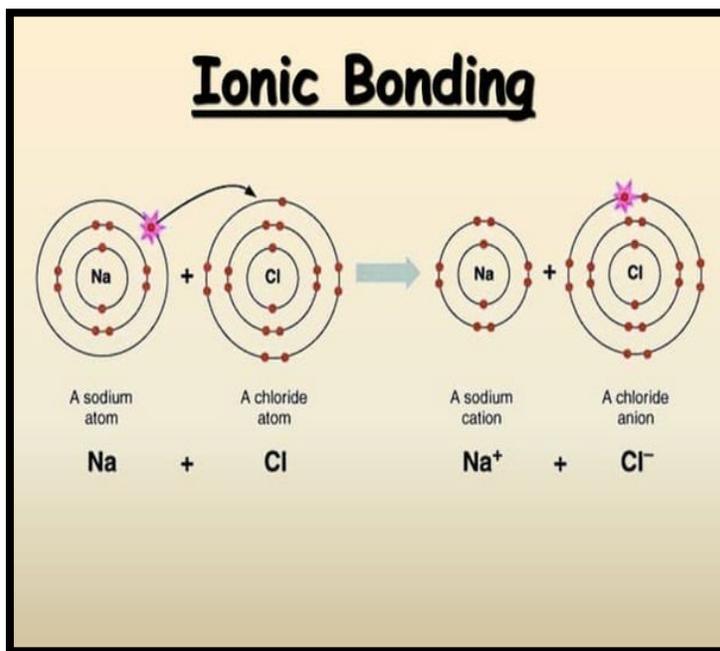


Figure 3: Formation of ionic bonds

Ionic	Covalent
The ionic atoms are formed after one atom donates an electron to another atom in order to stabilize it	The covalent bonds are formed when the atoms are bounded by sharing of electrons.

The atom, which takes part in the formation of ionic bond, differs in the electronegative values between each other.	In reference to a true covalent bond, the bond is said to be non-polar if the sharing of electrons is equal between the atoms, which are responsible for forming a covalent bond.
When oppositely charged ions attracted between each other, a polar bond is formed.	An electron tends to get attracted to one atom, then another possible electron. This results in forming the polar covalent bond.
An ionic bond is formed between a metal and a non-metal	A covalent bond is formed in between two non-metals. Metals do not form covalent bonds.

VI) Evaluating the advantages and disadvantages of ionic bond

There are certain advantages to ionic bond. The ionic bonds are important in nature as it stimulates the synthesis and formation of specific organic compounds. Scientists, thus forming products, which one would desire, can easily manipulate ionic properties of an ionic compound [3]. Ionic compounds have high melting and boiling points, as their ions are bonded well together.

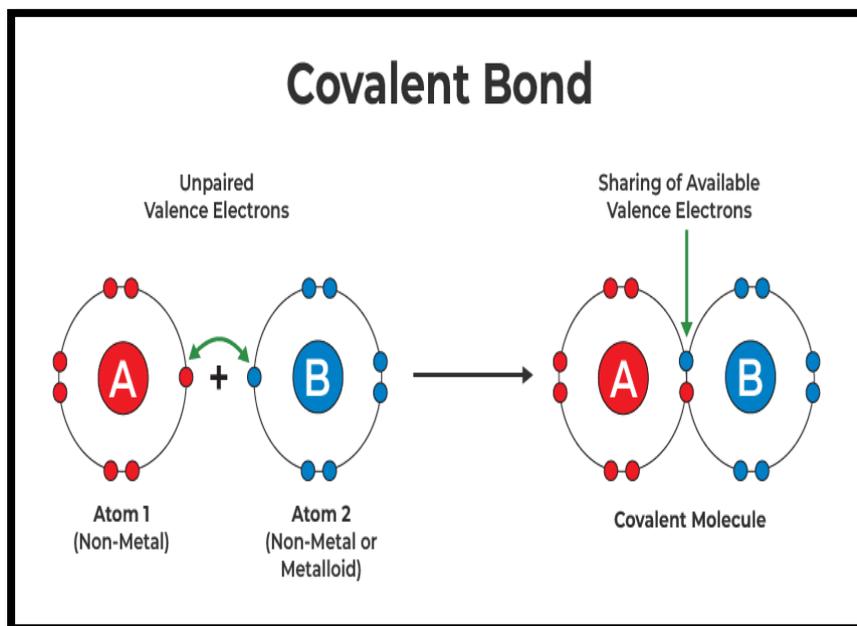


Figure 4: Covalent compounds

However, ionic compounds have certain disadvantages. Some solid ionic compounds are very brittle in nature and tend to break and shatter. Moreover, the ionic bonds forming ionic compounds have very low thermal conductivity and take a solid form when exposed to room temperature.

VII) Describing the advantages and disadvantages of covalent bond

The covalent bond forming a covalent compound has certain advantages as well as certain disadvantages. These are:

Advantages	Disadvantages
Covalent bonds are referred to as the strongest bond available in nature.	Covalent bond does not conduct electricity
The bonds of a covalent compound are rigid and directional	Intermolecular forces are weak
High strength	Low melting and boiling point

Covalent bonds forming covalent compounds have certain advantages^[2]. First, Covalent bonds are referred to as the strongest bonds available in planet earth, known to human being. The bonds of covalent bond tend to be rigid in nature as well as directional.

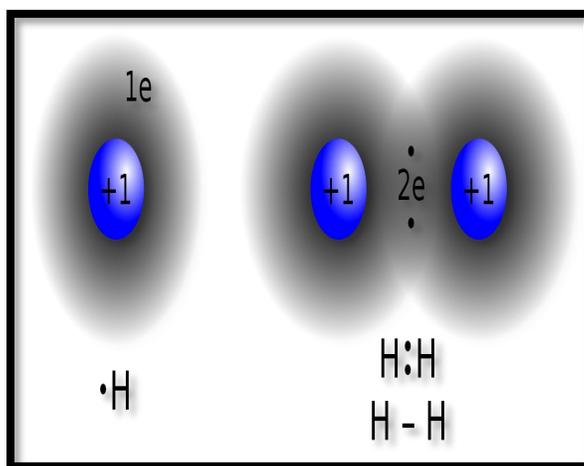


Figure 5: Formation of covalent bond

The bonds of a covalent bond usually have a higher strength as the shared pair of molecules between two atoms keeps them together. However, the bond has certain disadvantages^[1]. Covalent bonds are unable to conduct electricity because it does not have free ions. Covalent bond has a low boiling point and low melting point. This is because the intermolecular forces

present between the atoms are too weak. Moreover, covalent bonds are unable to dissolve in water, they are insoluble.

VIII) Problem statement

The study conducted based on the secondary research methodology. The research is based on the secondary sources of data. Secondary data does not always have the researcher's specific question. Secondary data are not always reliable, or up to date in nature. Moreover, the ownership of the data collected lies with the original researcher. Secondary data does not always answer the researcher's specific questions. Qualitative analysis can be full of biasness and is not timely in nature. Thus, these are the problems the researcher has faced while conducting the research.

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