CHEMICAL BONDING 04 MARCH 2014

Lesson Description

In this lesson we:

- Consider valence electrons as those involved in bonding.
- Identify ionic, covalent and metallic bonding and how each is formed.
- Discuss the properties of substances according to the type of bonding.

Summary

Bonding

Bonds are formed when atoms are held together by attractive forces.

Occurs with the sharing of outermost or valence electrons or when valence electrons are exchanged between atoms.

This makes the atoms more stable as their outer energy levels are filled.

Covalent Bonding: Sharing of Valence Electrons

If an electron is shared, it means that it will spend its time moving in the electron orbitals around both atoms.

Occurs between non-metal and non-metal.

Example: H_2

Ionic Bonding: Exchange of Electrons – Forming Ions

One atom loses an electron while the other gains an electron. Positive and negative ions are formed.

Occurs between metal and non-metal.

Example: KF

Ions of opposite charge will be held together by strong forces of electrostatic attraction.

Metallic Bonding:

Metallic bonding is the electrostatic attraction between the positively charged atomic nuclei of metal atoms and the delocalised electrons in the metal.

Test Yourself

(Adapted from Study & Master Physical Science Grade 10, van Zyl et al, 2002)

Question 1

An elements chemical behaviour is determined by the number and arrangement of...

A. protons
B. neutrons
C. electrons
D. atoms

Question 2

The bonding in a molecule of hydrogen chloride is...

A. covalent as there is a sharing of electrons.
B. covalent as there is a transfer of electrons.
C. ionic as there is a sharing of electrons.
D. ionic as there is a transfer of electrons.

Question 3

What is the correct formula for magnesium oxide?

A. MgO
B. Mg_2O
C. MgO_2
D. Mg_2O_2

Question 4

Identify the type of bond found in lithium bromide.

A. metallic
B. simple covalent
C. giant covalent
D. ionic

Question 5

Which of the following statements regarding ionic crystals is false?

A. Electrons are transferred from metal atoms to non-metal atoms, forming ions.
B. They are good electrical conductors when in liquid state.
C. On the simplest level, they consist of atoms.
D. Solid crystals are hard and brittle.

Question 6

Covalent bonding...

A. forms compounds that are good electrical conductors.
B. forms between non-metals and non-metals.
C. forms as a result of electron transfer.
D. makes simple compounds which have high boiling points.

Improve your Skills

Question 1

Consider the bonding of ammonia, NH_3.

a.) Identify the type of bonding that will be found in ammonia.
b.) How many valence electrons does a nitrogen atom have?
c.) State the valency of nitrogen.
d.) Draw a Lewis diagram to illustrate the bonding of ammonia. Only valence electrons need to be shown.

Question 2

Consider the compound aluminium oxide.

a.) Identify the type of bonding that occurs in aluminium oxide.
b.) Draw Lewis diagrams indicating the bonding in aluminium oxide.
c.) Write the formula for aluminium oxide.

Links

- www.everythingscience.co.za