

Section 1: Atomic Structure - Study guide

Summary

- The **atom** is the **smallest** part of an element.
- The **three** principal parts of an atom are the **proton**, the **electron** and the **neutron**.
- **Protons and neutrons** make up the **nucleus** of the atom, the **electron** which is 1000 times smaller than a proton **orbits** the nucleus.
- **Protons** have a **positive** charge.
- **Neutrons** have **no** charge.
- **Electrons** have a **negative** charge.
- Smallest part of
- **Valence electrons** are located in the **outer orbit** of an atom.
- Law of charges states that **like** charges **repel** and **unlike** charges **attract**.
- **Conductors** are materials that provide an **easy path** for electron flow.
- **Conductors** are made from materials that contain from **one to three** valence electrons.
- **Insulators** are materials that **do not provide an easy path** for the flow of electrons.
- **Insulators** are generally made from materials containing **seven or eight** valence electrons.
- **Semiconductors** contain **four** valence electrons.
- **Semiconductors** are used in the construction of all solid-state devices, such as **diodes**, **transistors** and **integrated circuits**.
- A **molecule** is the **smallest part** of **compound**.
- A **molecule** is the result of the joining of **two or more** different types of atoms.
- Neutrons and protons are made-up of subatomic particles called quarks
- A **gluon** is a **quark** that holds the nucleus together.
- **Electricity** is the **flow** of electrons.
- Six basic methods for **producing** electricity:
 - Magnetism
 - Chemical action
 - Light
 - Heat
 - Pressure
 - Friction
- Five basic effects that can be **caused** by electricity:
 - Magnetism
 - Chemical reactions
 - Light
 - Heat
 - Pressure
- A **photon** is a **massless** particle of pure energy.
- **Photons** can be produced when electrons move **from one energy level to another**.

Review Questions

1. What are the Three principal parts of an atom, and what charge does each carry?
2. How many times smaller is an electron than a proton?
3. How many times more does a proton weigh than an electron?
4. State the law of charges.
5. What is the maximum number of electrons in the outermost shell.
6. How many valence electrons are generally contained in materials used for conductors?
7. How many valence electrons are generally contained in materials used for insulators?
8. What is electricity?
9. What do we call the process by which an electron receives enough energy to move into a higher allowed orbit?
10. What is a gluon?
11. It is theorized that protons and neutrons are actually formed from a combination of smaller particles. What are these particles called?

Review Question - Answers

1. What are the Three principal parts of an atom, and what charge does each carry?
The three principal parts of an atom are, **Proton (positive charge)**, **Neutron (no charge)** and **electron (negative charge)**.
2. How many times smaller is an electron than a proton?
The electron is approximately **1000** times **smaller** than a proton.
3. How many times more does a proton weigh than an electron?
Protons weigh **1838** times **more** than electrons.
4. State the law of charges.
Like charges repel, unlike charges attract.
5. What is the maximum number of electrons in the outermost shell.
The maximum number of electrons in the outermost shell is **8 electrons**.
6. How many valence electrons are generally contained in materials used for conductors?
Between **1 - 3** valence electrons.
7. How many valence electrons are generally contained in materials used for insulators?
Between **7 - 8** valence electrons.
8. What do we call the process by which an electron receives enough energy to move into a higher allowed orbit?
The "**quantum jump**" is process by which an electron moves to a higher orbit when enough energy is obtained.
9. What is electricity?
Electricity is the **flow of electrons**.
10. What is a gluon?
A **gluon** is a **quark** that holds the nucleus together.
11. It is theorized that protons and neutrons are actually formed from a combination of smaller particles. What are these particles called?
Protons and Neutrons are made up of **quarks**.