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| **Date**: September 18, 2025 |
| **Subject**: Chemistry |
| **Grade**: 12 |
| **Duration**: 80 Minutes |
| **Topic**: Atomic Structure and the Periodic Table |
| **Subtopics:** Structure of the Atom, Isotopes and RAM |
| **Number of Students**: 12 [Girls: 10] [Boys: 2] |
| **General Objectives**:  *On Completion of this lesson, students will be able to*:   * Understand the theory of atoms as a useful construct that explains the structure and behaviour of matter.   **Specific Objectives**:  *By the end of the lesson, students will be able to:*   1. Describe the structure of the atom, including the relative masses, charges, and positions of protons, neutrons, and electrons, as well as their behaviour in electric and magnetic fields. 2. Define the following terms: mass number, isotopes, relative atomic and isotopic masses. 3. Calculate Relative Atomic mass based on isotopic masses and relative abundance. |
| **Key Scientific Attitudes:**  Critical thinking, communication, collaboration, cooperation, open-mindedness |
| **Content**   * ***Behaviour of particles in electric and magnetic fields*:**   + In an electric field, electrons and protons are attracted to oppositely charged plates and thus follow a parabolic pathway. Neutrons are not affected.   + Electrons follow a shorter pathway than protons because they have much less mass.   + In a magnetic field, electrons and protons move in a circular path and their initial deflection can be predicted using Fleming’s Left Hand Rule.   + Neutrons are not affected by a magnetic field. |
| **Instructional Sequence**  ***Engage:***   * **Demonstration/Prompt**: Show students images of a cathode ray tube experiment or a simple video/animation of charged particles being deflected in electric/magnetic fields. * **Question**: “*If atoms are neutral, why do their parts behave differently in electric and magnetic fields*?” * **Purpose**: Spark curiosity about subatomic particles and their properties.   ***Explore:***   * **Activity**: Jigsaw/ Group Sorting Task * Provide cards with properties (e.g., “charge = +1”, “mass = 1 amu”, “deflected strongly in electric fields,” “found in nucleus”, etc). * Students work in groups to match each property to proton, neutron, or electron. * Teacher circulates to guide discussion and correct misconceptions.   ***Explain:***   * Teacher lsummarizes findings with a table on the board:  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Particle** | **Relative mass** | **Relative charge** | **Location in Atom** | **Behaviour in Fields** | | Proton | 1 | +1 | Nucleus | Deflected in E & B fields | | Neutron | 1 | 0 | Nucleus | No deflection | | Electron | 1/1836 | -1 | Outside nucleus | Strongly deflected in opposite direction to proton |  * Introduce and define ***Mass number (A)***, ***Isotopes***, and ***Relative atomic and isotopic masses***. * Emphasize Carbon-12 standard: Relative atomic mass is measured by comparison with one-twelfth of the mass of a carbon-12 atom.   ***Elaborate:***   * **Application Activity**:   + Provide isotope data (e.g., chlorine-35 and chlorine-37).   + Ask students to calculate the relative atomic mass (Ar) given percentage abundance (including mass spectra data).   + Students explain why chlorine has a non-whole number Ar * **Discussion Prompt**:   + Why is the carbon-12 isotope chosen as the standard?   + What advantages does a universal standard bring to science?   ***Evaluate:***   * Quick Quiz/ Exit Ticket:   + State the charge, mass, and location of a neutron.   + Define isotope and give one example.   + Why is the relative atomic mass of chlorine about 35.5?   + What is the standard used in defining relative atomic mass? * Collect responses to check student understanding. |