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|  | **Model (Picture) with Description**  **Evolution of the Atom** |
| **Democritus**  Model of Atom | Democritus was a philosopher in 400 B.C. (not a scientist) that **stated** :  **Atoms are indivisible particles** |
| **Dalton**    Model of Atom | **1808 The First Atomic Theory (experimented & concluded)**   1. **All matter** is composed of extremely small particles called **atoms**. 2. Atoms **cannot** be **subdivided**, **created**, or **destroyed**. 3. Atoms of the **same** element are **identical**; whereas, **different** element’s atoms are **different** from each other in size, mass, & other properties. 4. Atoms of **different elements** **combine** in whole-number ratios to form **compounds**. 5. **Chemical reactions** are when atoms **combined**, **separated**, or **rearranged.** |
| **Cathode ray experiment:** | • The electric current (cathode rays) passed through gases in a glass tube.  • Cathode rays were repelled from the negative (– ) cathode and attracted to the positive (+) anode.  **Thomson** in 1897 concluded that:  1. That there was something smaller than an atom  2. C*athode rays* are composed of **identical negatively** charged **particles**, called **electrons** |
| **Millikan** | Millikan in 1909 measured the charge of an electron through the oil drop experiment. |
| **Thomson**  Model of the Atom | * Thomson called his model of the atom the plum pudding model. * The **negative** **electrons** were **spread** **randomly** throughout the positive charge of the rest of the atom. * Similar to seeds in a watermelon where the seeds are spread throughout.   ( Seeds = electrons flesh of fruit = positive mass) |
| **Gold Foil Experiment**  Performed in 1911 by:  Rutherford | • **Alpha** particles have a **positive** charge.  • **Positive** **Alpha** particles were expected to **pass** **through** the atom **without** being **deflected**, most did.  • **But** some alpha particles were **deflected,** this was unexpected. |
| **Rutherford’s**  Model of Atom | deflection  • A small number of **positive** alpha particles that were **deflected** proves that the **nucleus** is **tiny** and **positive**.  • Most of the particles passed through undisturbed proves the **atom** is **mostly empty space.**  Conclusion to the Goldfoil Experiment:  • Each atom contains a **small**, **dense**, **positively** charged **nucleus** surrounded by electrons |
| **Bohr**’s  Model of Atom ( 1913)  **Planetary Model** | • Electrons move around the nucleus in set **paths** called **orbits**.  • Electron in its **lowest energy** is when it **orbits** closet to the **nucleus.**  • **Energy** of the electron is **higher** when it **orbits farther** away.  • Electron orbit is also called the atomic **energy level**. |
| **Schrodinger’s**  **Quantum Mechanical**  Model of Atom | •Schrodinger in 1926 concluded through math that electrons move in waves of specific energy.  • Electrons exist in certain **regions** called **orbitals** or **electron cloud.**  • **Orbitals** indicate the **probable** location of an **electron** and have **different** **shapes** and sizes. |
| **Heisenberg’s**  **Uncertainty Principle** (1927) | It’s **impossible** to know **simultaneously** both the **location** and the **speed** of an **electron**. |