HPS Atomic Models Discussion Questions

Using the timeline on pages 114-115, answer the following questions. Be familiar with the scientist(s) related to the model, as well as any experimentation supporting the model.

1. What was Dalton's evidence for atoms? (not proven) (1803) SOLID SPHERE

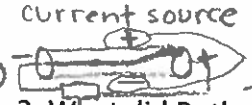
The ratio of the masses of elements in a compound is ALWAYS the same. Compounds have a fixed composition.

Ex: 100g Mg + 65.8g Oxygen and 10g of Mg + 6.58g oxygen

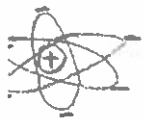
1897

2. How did Thomson come to the conclusion that there are subatomic particles?

PLUM PUDDING


His model was a tiny, indestructible, solid particle w/no internal structure. sealed tube of gas w/current - glowing beam was a stream of charged particles interacting w/air causing it to glow. (MASS EVENLY DISTRIBUTED THROUGHOUT) pos & neg plates added to (A) showed the particles were attracted to the pos. plate which means the part. were neg!

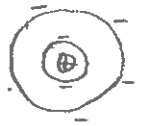


1911

3. What did Rutherford's Gold Leaf Experiment reveal to scientists?

+ charged, centrally located nucleus! Fired α part at thin gold leaf expecting most to travel in a straight path or be slightly deflected. BUT. More part. were deflected and by a lot! Very few even bounced straight back! CONCLUSION: ~~atom is mostly empty space~~ mass & charge is not uniform, it is a centrally located pos. nucleus. The closer the α part. came to nucleus, the more it deflected.

Atoms are neutral so.. if there is a neg part then there must be a pos. part as well.



1913

4. What was correct about Bohr's Model? What was incorrect?

Inspired by solar system, Bohr's Model had a nucleus surrounded by a large volume of space (like Rutherford) but added a description of the arrangement of e⁻. He said that e⁻ moved w/constant speed in orbit around nucleus in Energy Levels (floors). e⁻ jump between E levels when atom gains or loses E.

correct: e⁻ in E levels incorrect: cannot know speed & position at same time, only worked for smaller elem bec. atoms don't follow classical physics, e⁻ are not always at fixed dist. from nucleus. e⁻ don't move like planets in S.S.!

5. Describe the Electron Cloud Model that scientists accept today.

1926

Electron Cloud is a visual model of the most likely locations of e⁻ in an atom. Denser cloud = high prob. of e⁻

- Key contributors were Schrodinger & Heisenberg