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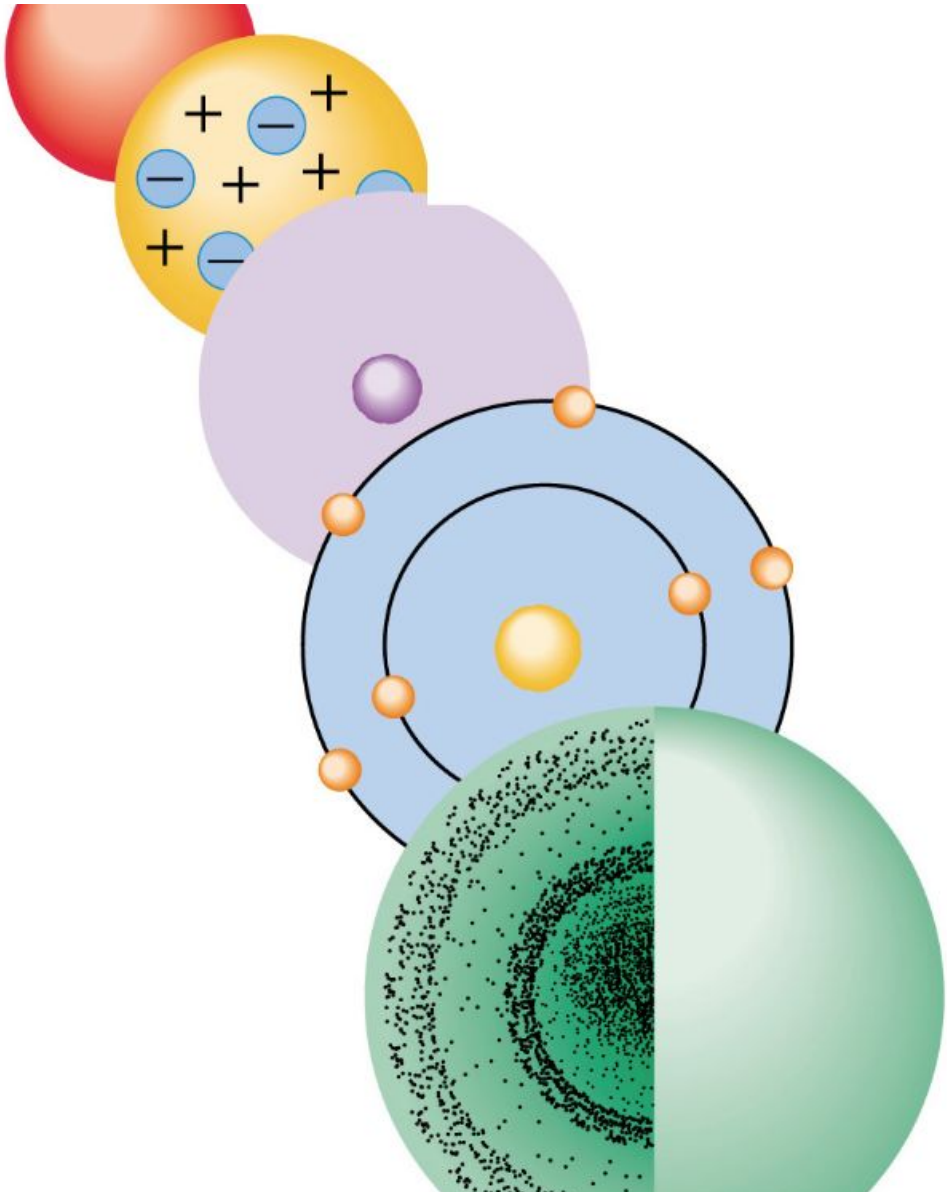
Atomic Model Quiz Study Guide

Chapters 4.1 and 4.2

Philosophers / Scientists

- before philosophers:
    - elements: earth, water, air, and fire
    - Aristotle: Democritus was wrong, not in correlation with his ideas on nature; and, “empty space” did not truly exist
- Democritus (Greek philosophers)
    - matter is composed of tiny particles called *atomos*
    - atoms could not be created, destroyed, nor divided
    - matter is empty space and (moving) atoms
    - atoms are homogenous, solid, indestructible, and indivisible
    - different kinds of atoms have different sizes and shapes, which accounts for the differences in physical properties of matter
    - apparent changes in matter change from *groupings* of atoms
- John Dalton (17-1800s)
    - schoolteacher in England
    - all atoms of the same element are identical (same size, mass, chemical properties); every different element has different atoms
    - atoms cannot be destroyed, created, or divided
    - different atoms “combine in simple whole-number ratios to form compounds”
    - in a chemical reaction, atoms are separated, combined, or rearranged (explains conservation of mass)
- William Crookes
    - glass vacuum tubes were being used to find the relationship between mass and charge
    - cathode ray, radiation from the cathode end (negative) to the anode end (positive)
    - TV uses cathode concepts
    - cathode rays were stream of negatively charged particles, electrons
- J. J. Thomson
    - found mass : charge ratio of electrons
    - concluded that mass of an electron was tiny, even compared to the lightest element, hydrogen
    - first subatomic particle discovered: atoms were divisible
    - created “plum pudding” model
- Robert Millikan
    - calculated the charge and mass of electrons using the mass : charge ratio by Thomson

- Ernest Rutherford
    - used gold-foil experiment to discover presence of protons
    - proposed the nucleus, a very dense and positively-charged center of the atom
    - eight years later, concluded that nucleus was made of positively charged particles called protons
- James Chadwick
    - discovered neutron, subatomic particle similar in mass to proton but no charge



The Atom

- defined as “the smallest particle of an element that retains the properties of the element”
- very tiny: for example, there are 2.9 x 10^22 atoms in a penny! (diameter is 1.28 x 10^-10m)