Contributions to Atomic Theory

This worksheet explores your understanding of contributions made to atomic theory.

EXERCISES

A. The following questions relate to Rutherford’s experiments with the scattering of alpha particles by gold foil.
   1) Some alpha particles bounced straight back towards the source. What information did this reveal about the nucleus?

   2) What did the nature of the deflections reveal about the charge on the nucleus?

   3) Most of the alpha particles passed through the gold foil with little or no deflection. What did Rutherford conclude from this?

B. Name the scientist responsible for each contribution to atomic theory. Choose from the following people: Dalton, Thomson, Rutherford, Chadwick, Bohr, or Schrödinger.
   1) Electrons can possess only certain specified energies.
   2) All atoms of a given element have the same size, shape and mass.
   3) I discovered the electron.
   4) I discovered the neutron.
   5) Electrons travel around the nucleus in orbits of fixed size and energy.
   6) Compounds are formed from simple combinations of atoms.
   7) The mass of the proton is 1837 times that of the electron.
   8) The energy of an electron changes by a specific amount when the electron goes from one orbit to another.
B. **Dalton, Thomson, Rutherford, Chadwick, Bohr, or Schrodinger?**

9) I developed a wave equation which describes the behaviour of electrons in atoms.

10) My theories are back up by the fact that light is emitted from an atom only at certain frequencies.

11) Each element is composed of tiny particles called atoms which are unique for each element.

12) My theory shows that electrons *don’t* lose energy a little at a time and eventually spiral into the nucleus, as my colleagues believed.

13) I bombarded beryllium with α-particles and found that highly energetic, uncharged particles were emitted.

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**SOLUTIONS**

A. (1) For the α-particles to bounce straight back, they must have encountered something positively charged and much more massive than they were.

   (2) The nucleus must be positively charged to deflect the positively-charged α-particles.

   (3) An atom consists of a dense, positive nucleus that contains all the protons and nearly all of the atom’s mass. Electrons would then be distributed within the rest of the atom’s volume.