

Unit 8 – Particles

Essential Questions

How do the various atomic models compare with current scientific evidence?

How do models in science change over time?

How does the structure of the periodic table allow us to predict the chemical and physical properties of an element?

How is the periodic table a template of organization for the material world?

How harmful are the different types of radiation?

How is a nuclear equation balanced?

How is the half-life of a radioactive element used to determine how much of a sample is left after a given period of time?

Instructional goals

By the end of this unit, you should be able to do the following:

1. Charged particles
 - Describe the evidence that supports the idea that the simple particles have a property we call charge.
 - Describe the evidence that led Thomson to suggest that the mobile charge in atoms is negative.
 - Use the Thomson model of the atom to account for the fact that neutral atoms can become either positively or negatively charged by the loss or gain of electrons.
 - List properties that distinguish metals from non-metals.
2. Bonds
 - Describe the evidence that distinguishes ionic from molecular or atomic solids.
 - Given the formula of an ionic or molecular substance, state its name.
 - Given the name of ionic or molecular substance, write its formula.
 - From the name or formula of a substance determine whether that substance is ionic or molecular.
3. Nuclear Decay
 - Describe alpha, beta and gamma radiation in terms of composition, mass and penetrability.
 - Compare the decay process of alpha, beta and gamma radiation.
 - Conceptually explain half-life
 - Compare fission and fusion.

Sequence

1. Activity 1 - Sticky tape lab
2. Post-lab discussion: establishing electric charge
3. Activity 1a – Investigating the internal structure of an atom
4. Reading – Optional - Other sub-atomic particles
5. Activity 2 - Mendeleev's Periodic Chart
6. Exercise 1 – Counting sub-atomic particles
7. Activity 3 - Isotopes
8. Exercise 2 – Counting sub-atomic particles – Isotopes
9. Activity 4 – Dalton's Theory Redux
10. Activity 5 – Half-life of Cadium
11. Exercise 3 – Nuclear Decay
12. Reading – Classifying Elements
13. Test