Atomic Models from Evidence

Student Worksheet | g09_u03_w09

Today I can: explain how evidence changes models, compare historical atomic models, and identify limits of each representation.
Time/use: 95 minutes; class, homework, club, tutoring, or independent study.
Vocabulary: atom, model, evidence, cathode ray, nucleus, scattering, electron, spectrum, prediction.

A. Quick checks

1. What is a scientific model?

2. Why can a model change without earlier scientists being dishonest?

3. Which model feature did cathode-ray evidence support?

4. Which model feature did gold-foil scattering challenge?

5. What did a few large deflections suggest about the atom?

6. Does a model drawing show an atom at true scale?

7. Distinguish an observation from an inference in a scattering experiment.

B. Guided application

8. Put these evidence-model links in order: Dalton solid sphere, Thomson negative particles, Rutherford nucleus, Bohr energy-level model.

9. Compare Thomson and Rutherford models: one preserved feature and one changed feature.

10. Explain why most particles passing straight through foil supports mostly empty space.

11. Explain why a tiny fraction turning sharply conflicts with diffuse positive charge.

12. A spectrum has discrete lines. What type of model question does this raise?

13. Give one prediction made by a useful model and one observation that could weaken it.

14. Why should "orbit" in a beginner diagram not be treated as a miniature planet path?

C. Curiosity / application

15. Medical imaging uses models to infer unseen structures. Why should an image still be interpreted with evidence limits?

16. A museum labels a historical atomic model "wrong." Rewrite this more accurately.

17. Design a tabletop analogy for scattering that preserves one feature but state two ways it fails.

Competition Corner

18. Three results: 96% straight, 3.9% slight deflection, 0.1% sharp reversal. Construct the strongest supported claim about charge/mass distribution and two claims the data cannot settle.

19. A new result contradicts one prediction but matches another. Explain why scientists revise rather than automatically discard every model.

20. Compare a subway map and atom model: name one purpose, one useful simplification, and one dangerous overinterpretation for each.