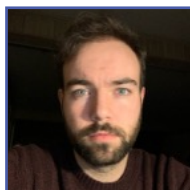


Never-Ending Change: Atomic Models, Incommensurability, and the Tentative Nature of Science



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The historical development of atomic models provides a compelling illustration of the tentative and continually revisable nature of scientific knowledge. From Thomson's early corpuscular conception to Rutherford's nuclear model, from Bohr's quantized structure to the probabilistic descriptions of modern quantum mechanics, each transition reflects more than a refinement of previous ideas. These shifts reveal changes in problem agendas, representational commitments, and standards of explanatory adequacy that make direct translation between models conceptually difficult. This difficulty exemplifies the partial incommensurability described in contemporary philosophy of science, showing that successive theories may construct distinct conceptual worlds rather than linear improvements of a single framework.

In chemistry education, however, atomic theory is often taught as if it followed a straightforward cumulative progression. This narrative obscures the deeper epistemological lesson: scientific models are provisional tools shaped by evolving evidence, methods, and theoretical priorities. Presenting atomic models through the lens of tentativeness and incommensurability helps students recognize that scientific knowledge is open to revision and that theoretical change often involves rethinking fundamental assumptions rather than merely adding new details.

Integrating these ideas into chemistry instruction enriches students' understanding of how science operates, encouraging them to navigate multiple models critically and to appreciate the conceptual discontinuities that accompany scientific progress. This approach strengthens scientific literacy by demonstrating that uncertainty, revision, and theoretical plurality are not weaknesses of science, but essential features of its dynamic and self-correcting character.

Biography:

Víctor Martínez-Martínez holds a degree in Chemistry and a PhD in Science Education, with a dissertation focused on the nature of science and STEM education. He is currently completing a master's degree in Logic and Philosophy of Science, deepening his engagement with the conceptual foundations of scientific practice. His research is driven by the conviction that insights from philosophy of science and social studies of science are essential for improving scientific literacy and educational practice. He works to integrate these perspectives into curriculum design, teacher training, and the broader understanding of how science operates within contemporary societies.