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Modern challenges and progress in the measurement of the atomic weights of the elements ADAM MAYER, MICHAEL WIESER, University of Calgary — Throughout history, the atomic weights of the elements had been regarded as constants of nature. However, in the late 1930s it was discovered that the atomic weights of some elements could vary naturally, either by radioactivity or by physical and chemical processes. This can lead to challenges in determining, and even defining, the atomic weight to an element. How do you define the weight of an element, when different samples have different weights? In this talk, I will discuss these challenges and how they are addressed by the International Union of Pure and Applied Chemistry when they publish the table of Atomic Weights. I will discuss the natural variability among some elements and how this variability changes how the atomic weight can be defined. I will also discuss how measurement bias can affect results, and how modern measurement techniques are used to correct the measurement biases based on reference materials traceable to organizations such as the National Institute of Standards and Technology. I will center this discussion around my own recently accepted atomic weight measurement for Molybdenum, which was referenced in the September 2013 issue of Popular Science.

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