

DMITRI MENDELEEV: CHEMISTRY'S IMPROBABLE SAVIOR

Chapter 1: Chemistry's Unruly Garden (2:55)

By the middle of the 19th century, new scientific instruments like the battery and the spectroscope have led to an explosion in the number of known elements. This is exciting ... but also troubling to chemists. Something is needed to bring order to chemistry's unruly garden.

Chapter 2: Improbable Savior (2:16)

The answer will ultimately come from an unlikely source – a young Russian chemistry professor named Dmitri Mendeleev, whose mother has sacrificed her own life to deliver him from Siberia to St. Petersburg for a chance at a career in science.

Chapter 3: Atomic Weight (2:25)

As a young graduate student, Mendeleev attends the first-ever international chemistry conference in Karlsruhe, Germany, in 1860. The conference results in the first consistent set of atomic weights and inspires many to try to organize the elements. But no one can quite put the puzzle together.

Chapter 4: Textbook (2:24)

Mendeleev lands a post at St. Petersburg University, where he must teach introductory chemistry. Unhappy with the existing Russian chemistry textbooks, he sets out to write his own. Struggling to organize the book over a wintry weekend in 1869, he decides he must first organize the elements themselves.

Chapter 5: Chemical Families (2:34)

Focusing on a few well-known “chemical families” – group of elements that were known to have similar chemical properties – Mendeleev finds a striking mathematical pattern in their atomic weights. Setting his textbook aside, he set outs to see if this clue will allow him to organize all 63 of the known elements.

Chapter 6: Jigsaw Puzzle (1:44)

Mendeleev lays out the elements in order of rising atomic weight but sometimes skips a spot to make sure elements with similar properties fall into columns. From one draft to the next, he keeps the chemical families together, like composite pieces of a jigsaw puzzle.

Chapter 7: The First Periodic Table (3:50)

On Monday morning, still hard at work on the table, Mendeleev shoos away the driver who's come to take him to the train station for a planned trip. All day, he continues struggling to make all the pieces fit. Finally, that evening, he cracks it. The next day, he orders copies of his table sent to Europe's leading chemists.

Chapter 8 – Law of Nature (1:38)

For Mendeleev, the table is not just a convenient way to arrange the elements. It reveals a Law of Nature: that the properties of the elements are determined by their atomic weights and vary in a regular, periodic way. He's sure the table's empty spots will someday be filled by elements that haven't been discovered yet.

Chapter 9 – Predictions (1:25)

Mendeleev is so confident in his Periodic Law that he makes precise predictions about the properties of three of the missing elements in his table. His reputation is assured when all three elements are discovered in the next 15 years, with just the properties he predicted they would have.

Chapter 10: The Noble Gases (2:38)

In the 1890s, Mendeleev's table is threatened by the discovery of two new gases – argon and helium – that don't fit into the table. But when three similar gases – neon, krypton and xenon – are discovered a few years later, Mendeleev simply adds a new column to the table. The noble gases end up vindicating his Periodic Law.