OXYGEN: THE GAS THAT CHANGED EVERYTHING

Chapter 1: What is the World Made Of? (2:39)

Today we know that matter comes in more than 100 distinct varieties, neatly arranged in the Periodic Table of the Elements. But for most of history, matter was a profound mystery – a 2,000-year detective story in which people across the world were trying to identify the elements and figure out how to use them. This series features seven extraordinary scientists, all trying to answer the same simple question: What is the world made of?

Chapter 2: The Dabbler: Joseph Priestley (4:11)

After the 1754 discovery of carbon dioxide reveals there's a whole new dimension of matter to be explored – gases – an ever-curious British minister named Joseph Priestley discovers nine new "airs." Inspired by a visit to a nearby brewery, he also invents a method for making soda water, touching off an improbable series of events.

Chapter 3: The Portuguese Spy (2:31)

A defrocked Portuguese monk, working as a French industrial spy, hears that Priestley's "windy water" might be a cure for scurvy, a disease that plagues sailors on long sea voyages. He passes this potential military secret on to France's brightest young chemist, setting Antoine Lavoisier on the path toward his greatest discoveries.

Chapter 4: The Thinker: Antoine Lavoisier (2:10)

Lavoisier is a 28-year-old tax administrator, but his true passion is chemistry. Before and after work each day, he spends hours in his private laboratory, assisted by his young wife. Acting on the tip about soda water, Lavoisier sets out to study gases, realizing this field has the potential to bring about a scientific revolution.

Chapter 5: Phlogiston (3:17)

Chemistry's leading theory is based on the idea that a fiery principle called "phlogiston" is given up during combustion. Phlogiston is also supposed to be involved in the formation of metals and rust, then called a "calx." But Lavoisier notices a flaw in the theory: Metals become *heavier* as they rust, even though phlogiston is leaving them. Obsessed with the weights of his experimental ingredients, Lavoisier sets out to solve this riddle.

Chapter 6: The Puzzle of Rust (3:07)

In a remarkable experiment in 1772, Lavoisier discovers that a tremendous volume of air is released as a calx changes back into a metal. Air, or some part of the air, is responsible for calxes' being heavier than expected. But the identity of this mystery gas eludes Lavoisier for two years ... until it's revealed by Joseph Priestley.

Chapter 7: A Mysterious New Gas (3:00)

By now, Priestley is studying a curious substance called the red calx of mercury. When heated, it turns back into liquid mercury and gives off a gas. Priestley collects the gas, expecting it to be carbon dioxide, which would put out a candle. Instead, to his amazement, this gas makes candles burn bigger and brighter than ordinary air.

Chapter 8: A Fateful Dinner (2:17)

Two months later, on a visit to Paris, Priestley has dinner with France's leading scientists ... including Antoine Lavoisier. Ever eager to share his findings, Priestley tells Lavoisier about his new gas. Realizing this may the gas he's been looking for, Lavoisier hurries to the local apothecary to buy his own sample of mercury calx.

Chapter 9: Oxygen (4:07)

Back in England, Priestley discovers that mice trapped under glass in this new gas survive much longer than in ordinary air. It's some kind of super-air. Meanwhile, across the channel, Lavoisier is carrying out the same experiments. In April 1775, he announces his discovery of the new gas to the Royal Academy of Sciences – never mentioning that Priestley had told him about it over dinner. Lavoisier calls the new gas "oxygen."

Chapter 10: The Chemical Revolution (4:00)

While Priestley made the discovery, only Lavoisier understands the implications of this new gas. Over the next 15 years, Lavoisier shows that air is a mixture of two gases (oxygen and nitrogen); that water, too, is a product of two gases (oxygen and hydrogen); that fire is not an element, as the ancient Greeks believed, but a *process* of combining with oxygen; and that ores, long considered elements, are actually metallic elements chemically fused with oxygen. This last discovery sets off a worldwide race to find new elements.

Chapter 11: The Third Man (1:30)

Priestley is the first to publish his discovery of the remarkable gas we call oxygen. Lavoisier is the first to understand its true significance. But there's a third man in the oxygen story: a Swedish apothecary named Carl Wilhelm Scheele. Scheele is the first to discover the gas but decides to publish his results in a book ... and waits years for his mentor to write the preface. By the time the book appears, Lavoisier has already begun to build a whole new chemistry on the foundation of Priestley's oxygen.