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TO GET RID OF ITS DUST

Smithson Tennant

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Abstract Smithson Tennant (1761–1815), a British physician turned chemist and chemical engineer, published very few papers but they were significant enough as to leave a mark in science and technology. He proved that diamond is a pure allotropic form of carbon, established that carbon dioxide was composed of only carbon and oxygen, discovered iridium and osmium in the residue of platinum ore, invented a simple procedure for producing potassium in large quantities, and established the basis of multiple effect evaporation. In addition, he proved the deleterious effect of magnesium oxide and carbonate in agriculture, emery was a variety of corundum, and that potassium nitrate reacted with gold.

PALABRAS CLAVE
Agricultura;
Dióxido de carbono;
Diamante;
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Osmio;
Potasio;
Platino

Smithson Tennant

Resumen Smithson Tennant (1761-1815), un médico inglés convertido en químico e ingeniero químico, publicó muy pocos artículos científicos pero ellos fueron suficientemente importantes para dejar una marca en ciencia y tecnología. Tennant demostró que el diamante es una forma alotrópica pura del carbón, estableció la composición correcta del dióxido de carbono, descubrió el iridio y el osmio en los residuos del mineral de platino, inventó un método simple para fabricar potasio en cantidad, y estableció las bases de la evaporación por efecto múltiple. Además, demostró el efecto nocivo del óxido de magnesio y su carbonato en la agricultura, que el esmeril era una variedad del corundo, así como la acción química del nitrato de potasio sobre el oro.

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Life and career

Smithson Tennant (1761–1815) was born on 30 November 1761 at Selby, Yorkshire, the only child of Mary Daunt, the daughter of a local physician, and the Reverend Calvert Tennant, absentee rector of Great Warley in Essex and fellow of St. John's College, Cambridge. His father, wanting to shape his son as himself, began to teach him Greek when he was only five years of age. Tennant's father passed away in 1772 and his mother in 1781; while riding out with her son she was thrown from her horse and killed on the spot, a fate which would be also that of her only son (Barrow, 1849; Whishaw, 1815).

After his father's death his mother sent Smithson to different grammar schools in Yorkshire, at Scorton, Tadcaster, and Beverley (the oldest state school in England). While at school at Tadcaster, he enjoyed attending the public lectures given by Adam Walker (1731–1821), a popular science traveling lecturer on experimental philosophy (Peacock, 1855). According to John Whishaw (1764–1840), ''although Smithson was very young, he put several pertinent questions to the lecturer regarding some of the experiments, and displayed so much intelligent curiosity as to attract the attention of the audience, and give great additional interest to the lecture. Walker requested that he would continue to attend his lectures during the remainder of the course'' (Usselman, 2005; Whishaw, 1815).

In 1781, after his mother's death, Tennant enrolled at the University of Edinburgh, where he attended courses on anatomy and surgery, chemistry and materia medica. He was particularly attracted by the chemistry lectures given by Joseph Black (1728–1799) (Usselman, 2005). In October 1782 he entered Christ's College, Cambridge, to study chemistry and botany, He was at first admitted as a Pensioner and afterwards as Fellow Commoner (Peacock, 1855; Usselman, 2004; Whishaw, 1815).

On January 18, 1785, with the support of some of his Cambridge colleagues, the mathematicians Edward Waring (1736–1798) and Isaac Milner (1750–1820), the physician John Jebb (1736–1786), the astronomer Nevil Maskelyne (1732–1811), and the chemist Richard Watson, Bishop of Llandaff, (1737–1816), he was elected, at the remarkably early age of 24, a Fellow of the Royal Society (Whishaw, 1815). During this period Tennant became a close friend of William Hyde Wollaston (1766–1828), a medical student at Gonville and Caius College, with whom he was to start a very successful commercial partnership in 1800 (Usselman, 2004).

In 1788 he took his first medical degree as Bachelor of Physics and afterwards left Cambridge and moved to London. In 1796 he took his degree of Doctor of Physics at Cambridge; being economically independent he chose to pursue his chemistry interests instead of medical practice, a very fortunate decision for science. His substantial chemical contributions led to being awarded the 1804 Copley medal by the Royal Society (Peacock, 1855; Whishaw, 1815).

In 1813, Francis John Hyde Wollaston (1762–1823) resigned his Jacksonian Professorship at Cambridge to become rector of Cold Norton in Essex. William Farish (1759–837), professor of chemistry and natural philosophy, was elected as his successor, vacating his chair as Professor of Chemistry. In May 1813 Tennant was elected to replace him (Usselman, 2005; Whishaw, 1815).

In September 1814 Tennant took a trip to visit the southern provinces of France. On February 15, 1815, he arrived at Calais, with General Baron Bulow (1757–1808), in order to take a boat back to England. The boat departed on February 22 but the strong winds forced it back to port. Tennant and Bulow took advantage of the free time available to take horses and visit Bonaparte's pillar located nearby. On their way back a bridge over which they were riding collapsed; both were thrown, with their horses, into the ditch. Tennant's skull was so severely fractured, that he died within an hour. Tennant was buried a few days later in the public cemetery at Boulogne (Barrow, 1849; Peacock, 1855; Usselman, 2004).

Smithson Tennant published very few scientific papers, but some of them were significant enough to leave a mark in science and technology. In 1791 he communicated to the Royal Society his analysis of fixed air (carbon dioxide) (Tennant, 1791). Antoine-Laurent Lavoisier (1743–1794) had proved that carbon dioxide was a compound of oxygen and carbon, but no one had decomposed the gas into its elements or found their ratio (Lavoisier, 1772a, 1772b). Tennant noticing that carbon was unable to decompose calcium phosphate, in spite of its substantial attraction for oxygen, inferred that the combined affinities of phosphorus for oxygen and of phosphoric acid for calcium were stronger than that of carbon for oxygen. Consequently, it was to be expected that reacting marble (calcium carbonate) with phosphorus under a strong heat would generate calcium phosphate and carbon. The experimental results confirmed his expectations, leading to the correct ultimate analysis of carbon dioxide and the discovery of a new compound, consisting of phosphorus and lime (Peacock, 1855; Tennant, 1791; Whishaw, 1815).

During 1797 Tennant reported the results of his experiments about the combustion of diamond and its composition. He heated powdered diamond with potassium nitrate in a gold tube and obtained carbon dioxide as the only product, proving that diamond ''consists entirely of charcoal, differing from the usual state of that substance only by its crystallized form'' and that the diamond afforded no more CO_2 than an equal weight of charcoal (Tennant, 1797a). In a second paper published in 1797 Tennant proved that under strong heating both gold and platina reacted with nitre (potassium nitrate) to form soluble calxes (Tennant, 1797b).

About 1797 Tennant purchased 500 acres of newly enclosed land near Shipham in Somerset, and this led him to studies in rural economy. Two years later he reported to the Royal Society that the use of magnesium carbonate (or its calcined product) as a fertilizer produced the opposite results; the grains hardly germinated and soon perished. The two magnesium compounds turned the soil barren, even when applied in small amounts. Analytical work on magnesia limestone (dolomite) led him to conclude that both carbonates were actually combined rather than accidentally mixed (Tennant, 1799).

In 1802 he proved that the main component of emery was alumina and that this material was similar to the corundum or adamantine spar of China, and not an ore of iron, as had been previously supposed (Tennant, 1802).