Sears D.W. (1974) Dalton, John (1766-1844). *How it Works*, 704-705. Marshal Cavendish, London.

DALTON, John (1766-1844)

John Dalton was a chemist and meteorologist. He is now famous for the atomic theory, and for his law of partial pressure (see GAS LAWS). These two apparently unrelated ideas stem from the love of METEOROLOGY Dalton acquired as a boy.

John Dalton was born on 6 September, 1766. His father was a Quaker woolweaver in Eaglesfield, near Cockermouth in Cumberland. He went to school until he was 12, when he began teaching, first at a school which he opened himself and then at a school in Kendal. Throughout his life he remained a Quaker.

Dalton acquired an interest in meteorology from a teacher, Elihu Robinson. From 1787 until he died he kept a meteorological diary and he wrote a book on meteorology which was published shortly after leaving Kendal in 1793. In that year he went to Manchester to be a tutor at New College, a position he was to hold for six years. After arriving in Manchester, Dalton published a description of his peculiar eyesight; his complaint is now called Daltonism or colour blindness. The description was the first good account of the affliction and brought it to general attention. To Dalton leaves appeared to have the same colour as red sealing wax, and the sky appeared pink.

In June 1800 John Dalton resigned from New College so that he could concentrate on his researches. He supported himself by giving private lessons at 1s 6d, 2s and, when famous, at 2s 6d an hour. Dalton was a man of regular habits and meticulous about his dress. He usually wore knee breeches, grey stockings, buckled shoes, and a white neck cloth, and he carried a gold tipped cane. Every day, except Sundays and

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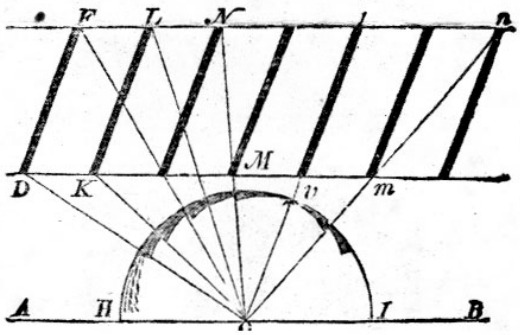
Top right: a table of Dalton's atomic symbols. It can be seen that they do not quite correspond to those of today, but it was a start.



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Right: Dalton drew this diagram to explain why the curved appearance of the aurora was due to the earth's curvature. The phenonemon is caused by particle collisions in the air 65 to 500 miles (105 to 800 km) high, giving off light, often as brilliant yellow-green arcs.

Below: Dalton stirring up the bottom of a pond to liberate marsh gas (mainly methane), for a boy to collect in upturned jars. This gas is produced by decaying vegetation; sometimes it ignites spontaneously.

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Thursdays, he worked in the laboratory from 8 am until 9 pm. On Thursday afternoons he went for a game of bowls at the 'Dog and Partridge'. After work he had supper and would then light his pipe and discuss the day's affairs with the Johns, the family in whose house he rented a room. Dalton was a silent, rather undemonstrative man and he never married.

His interest in meteorology led him to experiment with water and gases. In 1801 he read a series of papers to the Manchester Literary and Philosophical Society of which he was to become president in 1817. In one of them Dalton announced the law of partial pressures. This states that the pressure of a gas in a mixture is equal to the pressure it would exert if it occupied the same volume alone at the same temperature. The total of these partial pressures gives the pressure of the gas mixture. He also described a HYGROMETER he had designed to measure the humidity and argued that air is a mixture of gases, including water vapour, and not a single compound.

On his birthday in 1803, Dalton made an entry in his notebook in which he derived a list of atomic weights. On the next few pages he wrote out the atomic theory. There has been considerable debate as to how Dalton arrived at this, but it was probably the solubility of gases that led him to the theory. Dalton's notebooks and other documents were destroyed during World War 2, but they had been well examined by then. He did not publish the theory straight away, but mentioned it to another chemist, Thomas Thomson, who described it in a book. The next year Dalton described the atomic theory in his own textbook, *A New System of Chemical Philosophy,* using his own chemical symbols. The main postulates were: matter consists of indivisible atoms; all atoms of a given element are identical in weight and in every other property; different elements have different kinds of atoms of different weight; atoms are indestructible and merely rearrange themselves in chemical reactions (this was the basis of his law of multiple proportion).

The theory made him famous. He was invited to lecture in most of the learned centres, and when he visited Paris he was greeted by numerous eminent French scientists and shown AMPÈRE's apparatus for demonstrating electromagnetic phenomena. In 1822 he was elected a Fellow of the Royal Society and later became their first Royal Medallist. The French Academy of Science, in 1830, elected him one of its eight foreign associates, a great honour.

Dalton's daily routine did not change after he became famous. He published some more work on chemistry and meteorology, and republished his meteorological book. The first serious illness in Dalton's life occured in 1837 when he suffered a paralytic attack. In May 1844 he had an apoplectic attack and on 27 July he was found dead in his bed, having just made an entry in his diary about the weather. Forty thousand people filed past his coffin and there was a 100 carriage funeral procession.

According to his own account Dalton was not brilliant, but won his achievements by perseverance. His school record shows this to be true. He published 140 papers but very few are remembered. The atomic theory, however, was a triumph. By 1800 there existed numerous rules and laws about chemical reactions. In a delightfully simple way the atomic theory explained them all and led to the discovery of more. It is for this reason that Dalton is best remembered. A statue was erected to his memory in Manchester.