

A Dictionary of
Chemistry

FIFTH EDITION

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Guldberg and P. Waage in 1863. It is strictly correct only for ideal gases. In real cases *activities can be used. See also **equilibrium constant**.

mass concentration See **concentration**.

massicot See **lead(II) oxide**.

mass number See **nucleon number**.

mass spectroscopy A technique used to determine relative atomic masses and the relative abundance of isotopes, and for chemical analysis and the study of ion reactions. In a *mass spectrometer* a sample (usually gaseous) is ionized and the positive ions produced are accelerated into a high-vacuum region containing electric and magnetic fields. These fields deflect and focus the ions onto a detector. The fields can be varied in a controlled way so that ions of different types can impinge on the detector. A *mass spectrum* is thus obtained consisting of a series of peaks of variable intensity to which mass/charge (m/e) values can be assigned. The original ions are usually produced by electron impact, although ion impact, photoionization, and field ionization are also used. For organic molecules, the mass spectrum consists of a series of peaks, one corresponding to the parent ion and the others to fragment ions produced by the ionization process. Different molecules can be identified by their characteristic pattern of lines. Analysis of mixtures can be done by gas chromatography-mass spectroscopy (see **gas chromatography**).

masurium A former name for *technetium.

matrix (pl. *matrices*) **1. (in chemistry)** A continuous solid phase in which particles (atoms, ions, etc.) are embedded. Unstable species, such as free radicals, can be trapped in an unreactive substrate, such as solid argon, and studied by spectroscopy. The species under investigation are separated by the matrix, hence the term *matrix isolation* for this technique. **2. (in geology)** The fine-grained material of rock in which the coarser-grained material is embedded. **3. (in mathematics)** A set of quantities in a rectangular array, used in certain mathematical operations. The array is usually enclosed in large parentheses or in square brackets.

matrix mechanics A formulation of *quantum mechanics using matrices (see **matrix**) to represent states and operators. Matrix mechanics was the first formulation of quantum mechanics to be stated (by Werner Heisenberg in 1925) and was developed by Heisenberg and Max Born (1882-1970) and the German physicist Pascual Jordan (1902-80). It was shown by Erwin Schrödinger in 1926 to be equivalent to the *wave mechanics formulation of quantum mechanics.

Maxwell, James Clerk (1831-79) British physicist, born in Edinburgh, who held academic posts at Aberdeen, London, and Cambridge. In the 1860s he was one of the founders of the *kinetic theory of gases, but his best-known work was a mathematical analysis of electromagnetic radiation, published in 1864.