

oxidation state

A measure of the degree of oxidation of an atom in a substance. It is defined as the charge an atom might be imagined to have when electrons are counted according to an agreed-upon set of rules: (1) the oxidation state of a free element (uncombined element) is zero; (2) for a simple (monatomic) ion, the oxidation state is equal to the net charge on the ion; (3) hydrogen has an oxidation state of 1 and oxygen has an oxidation state of -2 when they are present in most compounds. (Exceptions to this are that hydrogen has an oxidation state of -1 in hydrides of active metals, e.g. LiH, and oxygen has an oxidation state of -1 in peroxides, e.g. H₂O₂); (4) the algebraic sum of oxidation states of all atoms in a neutral molecule must be zero, while in ions the algebraic sum of the oxidation states of the constituent atoms must be equal to the charge on the ion. For example, the oxidation states of sulfur in H₂S, S₈ (elementary sulfur), SO₂, SO₃, and H₂SO₄ are, respectively: -2, 0, +4, +6 and +6. The higher the oxidation state of a given atom, the greater is its degree of oxidation; the lower the oxidation state, the greater is its degree of reduction.

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N.B. Errors in this entry in the printed version of the Compendium (omission of minus signs) have been corrected.