# Oxide meaning in chemistry

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Oxides are associated with all elements except a few noble gases. The pathways for the formation of this diverse family of compounds are correspondingly numerous.

Many metal oxides arise by decomposition of other metal compounds, e.g. carbonates, hydroxides, and nitrates. In the making of calcium oxide, calcium carbonate (limestone) breaks down upon heating, releasing carbon dioxide:[2]

The reaction of elements with oxygen in air is a key step in corrosion relevant to the commercial use of iron especially. Almost all elements form oxides upon heating with oxygen atmosphere. For example, zinc powder will burn in air to give zinc oxide:[5]

The production of metals from ores often involves the production of oxides by roasting (heating) metal sulfide minerals in air. In this way, MoS2 (molybdenite) is converted to molybdenum trioxide, the precursor to virtually all molybdenum compounds:[6]

Noble metals (such as gold and platinum) are prized because they resist direct chemical combination with oxygen.[2]

Important and prevalent nonmetal oxides are carbon dioxide and carbon monoxide. These species form upon full or partial oxidation of carbon or hydrocarbons. With a deficiency of oxygen, the monoxide is produced:[2]

Elemental nitrogen (N2) is difficult to convert to oxides, but the combustion of ammonia gives nitric oxide, which further reacts with oxygen:

The chemical produced on the largest scale industrially is sulfuric acid. It is produced by the oxidation of sulfur to sulfur dioxide, which is separately oxidized to sulfur trioxide:[8]

Oxides have a range of structures, from individual molecules to polymeric and crystalline structures. At standard conditions, oxides may range from solids to gases. Solid oxides of metals usually have polymeric structures at ambient conditions.[9]

Although most metal oxides are crystalline solids, many non-metal oxides are molecules. Examples of molecular oxides are carbon dioxide and carbon monoxide. All simple oxides of nitrogen are molecular, e.g., NO, N2O, NO2 and N2O4. Phosphorus pentoxide is a more complex molecular oxide with a deceptive name, the real formula being P4O10. Tetroxides are rare, with a few more common examples being ruthenium tetroxide, osmium tetroxide, and xenon tetroxide.[2]

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Reduction of metal oxide to the metal is practiced on a large scale in the production of some metals. Many metal oxides convert to metals simply by heating, (see Thermal decomposition). For example, silver oxide decomposes at 200 ?C:[10]

Most often, however, metals oxides are reduced by a chemical reagent. A common and cheap reducing agent is carbon in the form of coke. The most prominent example is that of iron ore smelting. Many reactions are involved, but the simplified equation is usually shown as:[2]

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