Quinone Functional Group Encyclopedia Article

Quinone Functional Group

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Quinone Functional Group

The **chemical compound** quinone, or 1,4-benzoquinone, is a unicyclic, or **ring** phenolic compound. Quinone is a derivative of **benzene**, with two hydrogens replaced by two oxygens, each double bonded to a ring **carbon** (Figure 1). Quinone exists as yellow crystals, with a sharp odor similar to **chlorine** bleach. The chemical formula for quinone is $C_6H_4O_2$, and its **molecular weight** is 108.1 grams per **mole**. Quinone is used as a chemical intermediate of complex reactions, an inhibitor of polymerization, a photographic chemical, an oxidizing agent, and a tanning agent. Benzoquinone and napthoquinone dyes also exist.

When a quinone cyclic **molecule** is the active portion of a larger molecule, it is referred to as being a *quinone* ***functional group***. Quinone functional groups have powerful biological activity and are found in the most basic life-sustaining chemical reactions. For example, quinone functional groups are part of molecules perticipating in both **cellular respiration** and **photosynthesis**. Ubiquinone, or **coenzyme** Q, is a ubiquitous electron-shuttling molecule found in nearly all cells. Coenzyme Q is an essential **electron** and **proton** carrier that functions in the production of biochemical **energy** during respiration in aerobic organisms. It also has antioxidant and membrane stabilizing properties that serve to prevent the damage to cells by **free radicals** that results from normal metabolic processes. The structure of coenzyme Q consists of a quinone ring attached to a larger side chain molecule. Similarly, in photosynthesis, **chlorophyll** and the quinones are joined together by a protein and other molecules to form the photosynthetic reaction center, where energy from sunlight is converted into chemical energy.