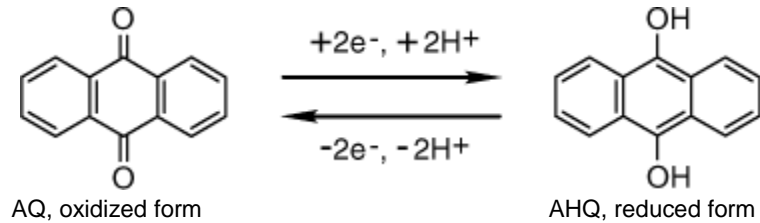


ANTHRAQUINONE (AQ)

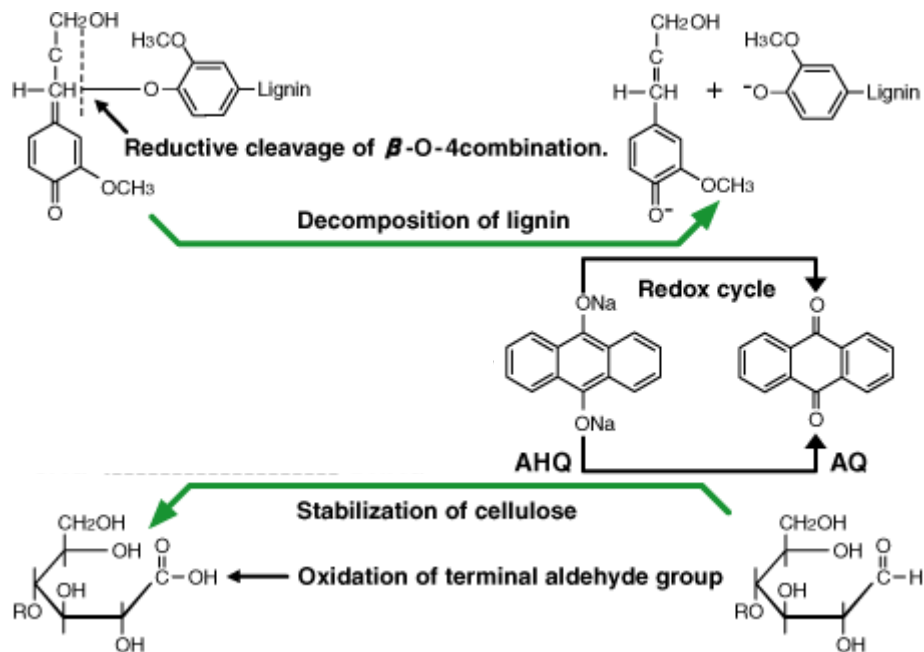
Anthraquinone is used by the pulp and paper industry worldwide as a process additive. Use of anthraquinone serves to reduce forest resource consumption further benefitting the Earth's climate. The principle characteristic of this quinone compound is that the chemical structure carries out a reversible redox reaction.



This means that it can work as a redox catalyst when added to the wood digester. As a catalyst anthraquinone reduces energy consumption by speeding up the reaction and reducing the amount of hazardous chemicals required to process the wood, this too has beneficial global warming effects.

The effect of this redox reaction from the anthraquinone compound is stabilization of carbohydrates by oxidation of the terminal aldehyde groups of cellulose and hemicellulose (collectively called the peeling process) as well as accelerated delignification through the cleavage of the β -phenylether bond of lignin. The result is less wood consumption, reduced chemical usage, and lower energy use...all environmentally desirable qualities.

Figure of the quinone effect



BENEFITS

The effects of AQ application provide an improved cooking process with two key advantages;

- increased pulp yield by stabilization of carbohydrates and,
- increased rate of reaction for the delignification process.

Increased pulp yield is a well known and technically documented effect of the use of AQ in both kraft and soda cooking processes. Typical yield increases are;

- hardwood, 1.5% on ODW with 60% carry through the bleach process and,
- softwood, 1.0% on ODW with 60% carry through the bleach process.

The increased rate of reaction provided by AQ application allows for milder cook conditions including:

- lower cook temperature,
- shorter cook time, and
- reduction of active alkali; and, while not typically exploited,
- anthraquinone can significantly reduce sulfur requirements.

Milder cook conditions relieves common bottlenecks to production including;

- caustification,
- lime kiln,
- evaporator line, and
- recovery boiler operations.

Relief of common bottlenecks results in increased production rates via accelerated continuous digester rates and reduced batch digester cycle times, both of which increase INCREMENTAL tons by as much as 3-5 percent.

The pulp and paper industry has benefitted greatly from anthraquinone application; chip savings, pulp yield improvement and removal of bottlenecks of the digester, caustification, kiln and recovery boiler are all important process improvements realized at mills worldwide. CPT Pulp & Paper, LLC is the industry leader and the premier supplier of anthraquinone, providing product and application technology to Globally for over 12 years.