Hydroquinone and hydroquinone derivatives

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Inhibitor mechanism

Polymerization is initiated by free radicals. Inhibitors tie up these free radicals by reacting with them to form stable compounds. Hydroquinone and certain derivatives form these stable compounds in the presence of oxygen. The free radical first reacts with oxygen to form a peroxy free radical. Hydroquinone then reacts with this peroxy free radical to form a free radical complex. After that, the complex reacts with another peroxy free radical to form a stable compound.

Eastman offers hydroquinone and derivatives that are practical storage and process inhibitors alone or in combinations. Evaluate your specific system or application to pick the most suitable inhibitor. This publication can help you find the most likely candidates and remind you that this family of compounds can be used for more than stopping undesirable reactions.

Hydroquinone (HQ)

HQ is a good general-purpose inhibitor, stabilizer, antioxidant and intermediate. It is offered in photographic and United States Pharmacopeia (USP) grades. One of HQ's major uses is as an intermediate to make other inhibitors, stabilizers, antioxidants, agricultural chemicals and dyes.

Mono-tertiary-butylhydroquinone (MTBHQ)

MTBHQ is an effective storage inhibitor for unsaturated polyesters. It's also a suitable antioxidant for nonfood fats and oils and unstable organic solvents. MTBHQ can be used as a cook stabilizer for highly reactive unsaturated polyesters.

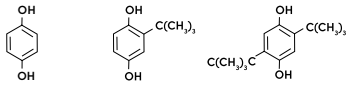
2,5-Di-tertiary-butylhydroquinone (DTBHQ)

DTBHQ is an effective inhibitor, antioxidant and stabilizer. It is useful as an antioxidant for rubber articles and as a stabilizer against odor and color development in various compositions. It also works — when combined with other inhibitors — as a storage inhibitor for unsaturated polyesters. In addition, DTBHQ is used as a stopping agent in rubber emulsions and an anti-skinning agent in paints.

Applications

	HQ	MTBHQ	DTBHQ
Antioxidant			
for nonfood fats and oils	●	●	
Inhibitors			
for vinyl monomers	●	●	●
for acrylic monomers	●		
for unsaturated polyesters	●	●	●
against peroxides in certain solvents	●	●	
Intermediates			
for antioxidants and antiozonants	●		●
for agricultural chemicals	●		
for dyes	●		
Stabilizers			
against skinning in paints	●		
against color in emulsion polymerizations			●
against color in detergents			
against color in polyether polyols			
against UV in certain compounds		●	●
Depigmenting agents			
for cosmetic creams	●		
Stopping agents			
for polymerization reactions			●
Catalysts			
for oxidation of mercaptans			

Typical properties[a]



	HQ[b]	MTBHQ	DTBHQ
Empirical formula	$C_6H_6O_2$	$C_{10}H_{14}O_2$	$C_{14}H_{22}O_2$
Molecular weight	110.11	166.21	222.31
Physical form	crystals	crystals	crystals
Color	white to off-white	white to tan	white to tan
Specific gravity	1.328	1.109	1.084
Bulk density, g/mL	0.66	0.22	0.61
Assay, wt%	99.0 min	98.0 min	99.0 min
Ash, wt%	0.004	—	—
Water, wt%	0.36	0.13	0.06
Melting point, °C (°F)	171 (340)	125 (257)	216 (421)
Boiling point, °C (°F)	286 (547)	300 (572)	313 (595)
Flash point, °C (°F)	177 (351)	171 (340)	216 (421)
Fire point, °C (°F)	191 (921)	174 (345)	216 (421)
Autoignition temp., °C (°F)	494 (921)	457 (855)	421 (790)
Angle of repose	33	58	34
Solubility at 25°C, g/100 g, in			
Water	7	insoluble	insoluble
Acetone	20	112	39
Ethyl acetate	22	575	48
Ethyl alcohol	57	605	35
Benzene	insoluble	insoluble	2

[a]Reported for information only. Eastman makes no representation that material in any particular shipment will conform to the values listed.
[b]Typical property bulletins are available for all grades of hydroquinone and derivatives.

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CI-18021A 2/24