

Water Treatment Chemicals Discharged In Cooling Tower Blowdown & Drift

Table 1 - Green & Non-Green Biocides

Green Biocides	Non-Green Biocides – Organic* or Halogen** <i>* 70-80 million pounds per year of non-oxidizing biocides used in US ** source of AOX, or adsorbable organic halogen</i>
Ozone	N-Alkyl (C12, C14,C16) dimethyl benzyl ammonium chloride
Hydrogen Peroxide	5-chloro-2-methyl 4-isothiazolin-3-one
Tetrakis(hydroxymethyl) phosphonium sulfate (THPS)	2,2-dibromo-3-nitrilopropionamide (DBNPA)
	Gluteraldehyde
	Chlorine (** source of AOX)
	Bromine (** source of AOX)
	1-bromo-3-chloro-5,5-dimethylhydantoin (** source of AOX)
	Chlorinated isocyanurates (** source of AOX)
	Chlorine Dioxide (gas)

Table 2 - Green & Traditional Dispersants

Green Dispersants	Traditional Dispersants - Organic
Polyaspartic Acid	Polyacrylic Acid (PAA)
	Polymethacrylic Acid (PMAA)
	Polyacrylamide (PAm)
	Polymaleic Acid (PMA)
	AA/Am copolymers
	AA/MA copolymers
	AA/2-acrylamido-methylpropane sulfonic acid copolymers (AA/AMPS copolymers)
	AA/sulfonic acid/ sodium styrene sulfonate terpolymers (AA/SA/SSS terpolymers)
	MAA/AMPS copolymers

Table 3 - Green & Traditional Steel Corrosion Inhibitors

Green Corrosion Inhibitors	Traditional Corrosion Inhibitors - Organic / Phosphate / Metal
sodium silicate (polysilicate)	Hydroxy-2-phosphono acetic acid (HPA)
	Phosphate esters of alcohols and ethanolamines
	Sodium Benzoate
	Potassium pyrophosphate, Trisodium phosphate, and Sodium hexametaphosphate
	Sodium molybdate
	Zinc sulfate or chloride
	Zinc pyrophosphate

Table 4 - Green & Traditional Copper Corrosion Inhibitors

Green Corrosion Inhibitors For Copper	Traditional Corrosion Inhibitors For Copper - Organic
sodium silicate (polysilicate)	Benzotriazole
	Sodium tolyltriazole
	Sodium mercaptobenzothiazole

Table 5 - Green & Traditional Scale Inhibitors

Green Scale Inhibitors	Traditional Scale Inhibitors - Organic / Phosphate
Polyaspartic Acid	Aminotri(methylenephosphonic acid) or AMP for Calcium scales
	1-Hydroxyethylidene-1,1-diphosphonic acid or HEDP for Calcium scales
	2-phosphonobutane-1,2,4-tricarboxylic acid or PBTC for Calcium scales
	Hexamethylenediaminetetra (methylenephosphonic acid) or HMDT(MPA) for Ca sulfate
	Diethylenetriaminepenta (methylenephosphonic acid) or DETP(MPA) for Ba sulfate