

Luciano Coccagna

**CHEMICALS FOR WATER
DISINFECTION**

contributi di
Claudia Lasagna
e Giorgio Temporelli

FrancoAngeli

INDEX

Preface		pag.	9
Introduction		»	11
1. Disinfection mechanisms		»	13
1.1. Looking for a definition		»	13
1.2. Removal		»	15
1.2.1. Conventional systems		»	16
1.2.1.1. With sedimentation step		»	16
1.2.1.2. Without sedimentation step		»	20
1.2.1.3. Direct filtration		»	21
1.2.1.4. Conventional system vs direct filtration in terms of particles removal		»	21
1.2.1.5. Conventional system vs direct filtration		»	26
1.2.2. Barrier separation		»	28
1.3. Killing/Inactivation		»	33
1.4. Factors affecting disinfection		»	39
1.5. Disinfectants impurities		»	42
1.5.1. Sodium Hypochlorite storage		»	42
1.5.2. ClO ₂ reactions & reagents		»	44
2. Disinfectants and peculiar mode of action		»	46
2.1. Chlorine and its derivatives		»	46
2.1.1. Generality and chemical characteristics		»	46
2.1.2. Disinfection mechanism		»	58
2.2. Chlorine Dioxide		»	59

2.2.1.	Generality and chemical characteristics	pag.	59
2.2.2.	Disinfection mechanism	»	66
2.3.	Ozone and Oxygen	»	67
2.3.1.	Generality and chemical characteristics	»	67
2.3.2.	Disinfection mechanism	»	79
2.4.	Chlorocyanurates/Chlorocyanuric Acid	»	81
2.4.1.	Generality and chemical characteristics	»	81
2.4.2.	Disinfection mechanism	»	84
2.5.	Peroxidants	»	84
2.5.1.	Generality and chemical characteristics	»	84
2.5.2.	Disinfection mechanism	»	87
2.6.	Other Oxidants	»	91
2.6.1.	Generality and chemical characteristics	»	91
2.6.2.	Disinfection mechanism	»	94
2.7.	Miscellaneous	»	95
2.7.1.	Silver and Silver salts. Silver & Copper	»	95
2.7.2.	Diamonds	»	96
2.7.3.	Solar disinfection (SODIS)	»	96
3.	Technical Specifications of disinfectants (EN Standards overview)	»	98
3.1.	Introduction	»	98
3.1.1.	Acetic Acid	»	99
3.1.2.	Calcium Hypochlorite	»	102
3.1.3.	Chlorine	»	104
3.1.4.	Chlorine Dioxide	»	108
3.1.5.	Ethanol	»	111
3.1.6.	Hydrochloric Acid	»	114
3.1.7.	Hydrogen Peroxide	»	117
3.1.8.	Oxygen	»	119
3.1.9.	Ozone	»	122
3.1.10.	Potassium Permanganate	»	126
3.1.11.	Potassium Peroxomonosulfate	»	129
3.1.12.	Silver salts for the conservation of drinking water for intermittent use	»	132
3.1.13.	Sodium Chlorate	»	135
3.1.14.	Sodium Chlorite	»	137
3.1.15.	Sodium Dichloroisocyanurate Di-hydrate	»	140
3.1.16.	Sodium Hypochlorite	»	143

3.1.17.	Sodium Permanganate	pag.	146
3.1.18.	Sodium Peroxodisulfate	»	149
3.1.19.	Trichloroisocyanuric Acid	»	152
Bibliography		»	157
Acronyms		»	161
Glossary		»	165

Water treatment and coagulation

Water treatment and coagulation are terms used as colloquialisms for the use of appropriate reagents to remove or reduce turbidity, color, taste and/or odor from water. Definitions of "turbidity" and "color" are given in this document but both terms are often used in a more general sense. Coagulation, in this context, refers to the removal of suspended particles.

If a coagulant is a mineral compound, the term "flocs formed through flocculation" may be used, with "Coagulation" and "flocculation" and "Coagulants" and "flocs" being synonymous. The common names in English below are the industry's accepted, official names, as well as the characteristics and uses of the different chemicals by the industry for participation.

The term "Chemicals for water treatment" is used for distinguishing between the