

Sustainability in commercial laundering processes

Module 1
Usage of water

Chapter 4

Reasons for waste water load and possibilities of improving waste water quality

- Sources of waste water load
- Parameters influencing the waste water load
- Optimisation of washing process
 - Temperature, pH
 - Phosphates
 - Reduction of chlorine/AOX
- Reduction of waste water load (by treatment)
 - Other parameters

Learning targets

After finishing this chapter, you will

- know and be able to name sources of waste water load
- know influencing parameters of washing process on waste water parameters
- know how to influence these parameters in order to improve waste water quality

Sources of waste water load

Detergents and laundry aids

especially surfactants,
bleach agents, chlorine, alkalinity,
phosphate

+

Soil from laundry

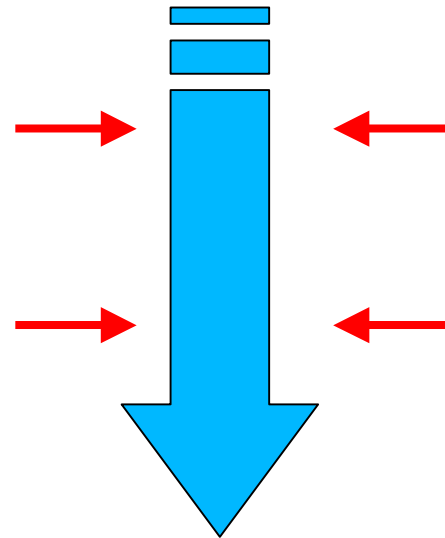
(especially from work wear, mats,
wiping cloth)
mineral oils, heavy metals, particles,
sand, lint generation

Steam

for washing machine heating
metals

Fresh water

particles, sand,
micro-organisms



Washing process

heat

Reactions

between soil
and detergent/water
ingredients: AOX

Waste water

Sources of waste water load

parameter\Origin	washing process	soil
pH	X	
Temperature	X	
Organic load	X	X
Phosphates	X	X
Sulphates	X	X
Lipophilic Compounds		X
Organic Solvents		X
Chlorine	X	
Hydrocarbons		X
AOX	X	X
Heavy Metals		X

- Measures for improvement of waste water quality dependent on the origin of waste water load
- Parameters that can be traced back to washing process can be influenced by modifying the washing process
- Parameters in consequence of soil demand waste water treatment methods

Optimisation of washing process

temperature, pH

- Kind and dosage of washing agent influence pH-value (see 4-1, 4-2)
- Reduction of detergents and laundry aids (“right” dosage)
 - saves resources
 - minimises waste water load, not only in relation to pH but also to other waste water parameters
 - costs for waste water load possibly decrease (to be considered for each laundry individually)⇒ twofold benefit
- Cold washing process may help in cases of problematically high temperatures (see 3-4)

Optimisation of washing process

Phosphates



- Washing agents may contain different content of phosphates
- Therefore, the phosphate-content in waste water can be influenced by kind of washing agent and dosage
- Too many phosphates in water lead to eutrophication; growth of algae increases which leads to absence of oxygen in water and collapse of ecosystem as a consequence
- Phosphate-free alternatives have to contain alternative water-hardness-removing agents, e.g. complexing agents (sequestrants) (see 4-1, 4-2)

Optimisation of washing process

reduction of chlorine/AOX

- Chlorine is very reactive
- Chlorine in washing liquor forms chlorine-organic compounds
- Those can be analytically quantified (AOX-measurements)
- Some AOX-compounds are regarded as toxic, that is why AOX values are limited for waste water
- Public authorities may take random samples

AOX-formation depends on

- Active chlorine concentration
- Kind of chlorine carrier
- Organic load of wash liquor

Optimisation of washing process

reduction of chlorine/AOX

Practical measures to minimise AOX-values

- Substitution of chlorine by chlorine-free alternatives
 - Hydrogen peroxide
 - Peracetic acid
- Application of chlorine in later phase of the rinse process
- Chlorine dioxide

- The parameters
 - Organic Load, phosphates, sulphates, lipophilic compounds, organic solvents, hydrocarbons, AOX and heavy metals
- Also depend on kind of laundry soiling
- Therefore, those parameters can be influenced by waste water treatment
 - Waste water treatment methods are explained in 1-5