OLYMPUS

Reprocessing Chemicals

Hygiene & Reprocessing Training Material

Start

OLYMPUS CONTINUUM

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The Content is a summary of the steps necessary to properly reprocess medical devices with focus on thermolabile endoscopes.

Always follow the detailed steps instructed in the latest instruction for use (reprocessing manual).

Click on the "I agree"-button to start

01 Detergents

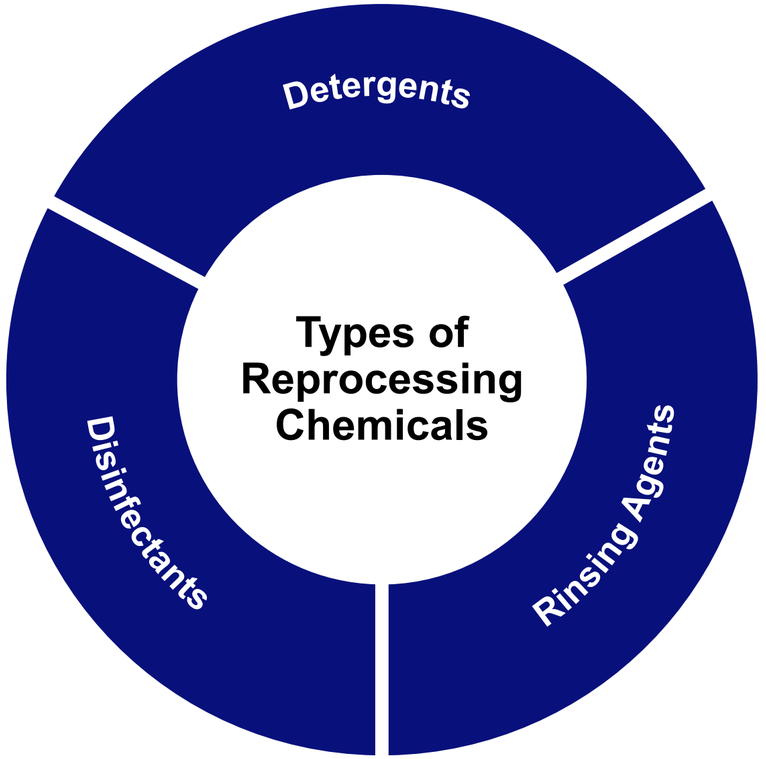
02 Disinfectants

03 Rinsing Agents

Types of Reprocessing Chemicals for Endoscope Processing

Types of Reprocessing Chemicals for Endoscope Processing

Reprocessing chemicals are a major element of the reprocessing workflow



Click on the buttons for further information.

Types of Reprocessing Chemicals for Endoscope Processing

Types of Reprocessing Chemicals for Endoscope Processing

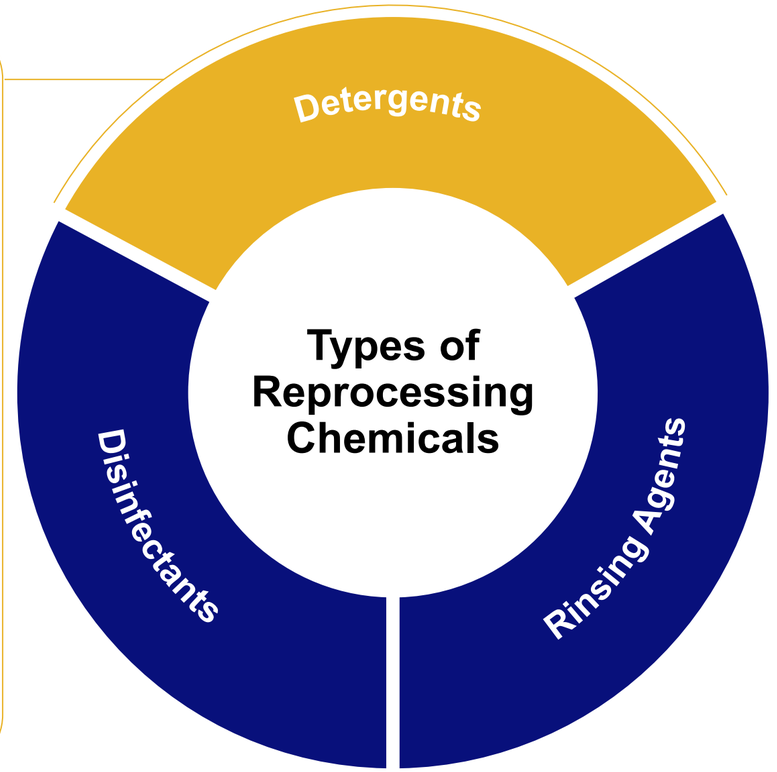
Reprocessing chemicals are a major element of the reprocessing workflow

Detergents

Intended to be used for:

- manual cleaning – including precleaning
- cleaning phase during automated processing in washer-disinfectors (WD) and endoscope washer-disinfectors (EWD/AER)

The automated processing in (endoscope) washer-disinfectors (WD) is the golden standard



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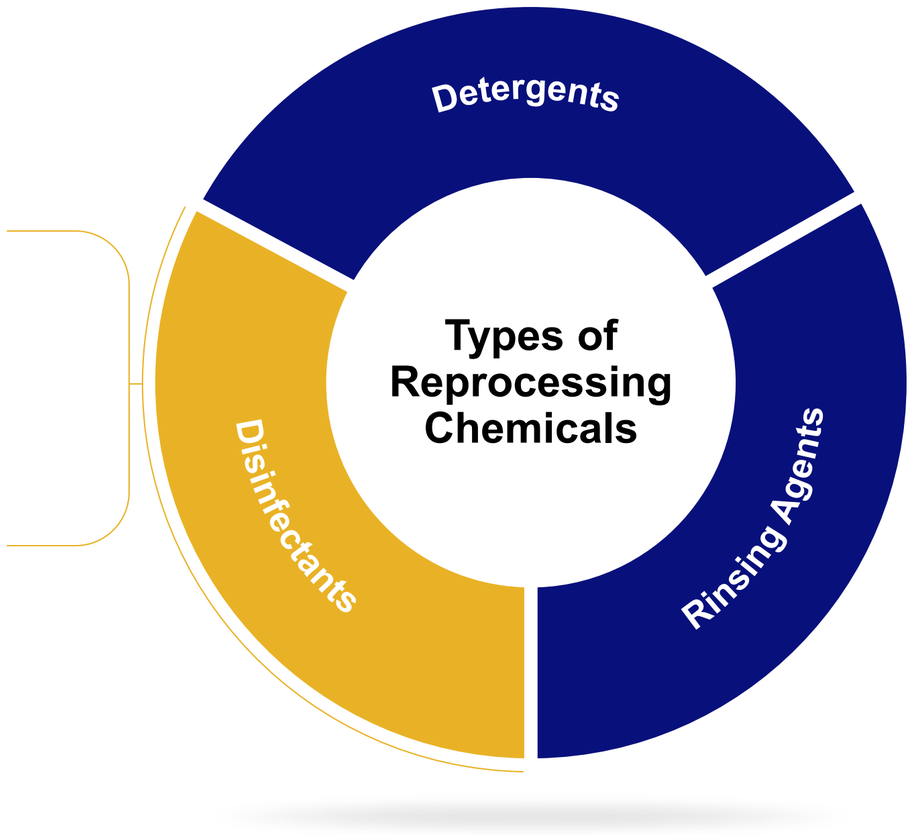

Disinfectants

Available for:

- manual disinfection
- automated disinfection

Click on the buttons for further information.

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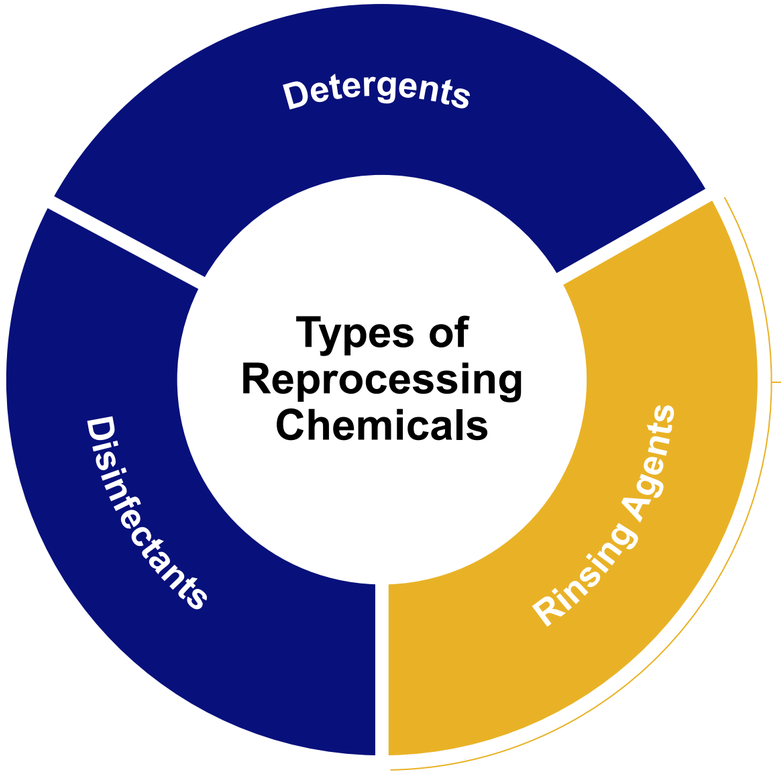
Reprocessing chemicals are a major element of the reprocessing workflow



Rinsing Agents

- improve the instruments‘ drying results in some (endoscope) washer-disinfectors (WD) processes

Click on the buttons for further information.

Types of Reprocessing Chemicals for Endoscope Processing

Types of Reprocessing Chemicals for Endoscope Processing

Reprocessing chemicals are a major element of the reprocessing workflow

Detergents and disinfectants are available for many different application areas like hands, surfaces, instruments etc. For the different application areas, different active ingredients are being used.

Instruments are reprocessed either manually or automated.
For the automated reprocessing of instruments, different methods – **chemothermal** or **thermal reprocessing** – can be applied depending on the type of instrument.

This presentation focuses on the reprocessing of instruments, and in particular flexible endoscopes

Thermal reprocessing is not applicable for most of the flexible endoscopes currently used, as they are not resistant to higher temperatures (> 60 °C) due to their design and materials.

The automated chemothermal reprocessing in (endoscope) washer-disinfectors (WD) is the golden standard.

Types of Reprocessing Chemicals | Safety Measures

Aspects to consider

Safety measures / PPE

In order to guarantee a safe use:

- Follow the instructions for use as well as the safety instructions given in the respective Material Safety Data Sheets (MSDS)

Material Safety Data Sheet

- Not only when handling detergents, but when handling chemicals in general
- The necessary Personal Protective Equipment (i.e. gloves, goggles) can also be found in the MSDS

01 Detergents

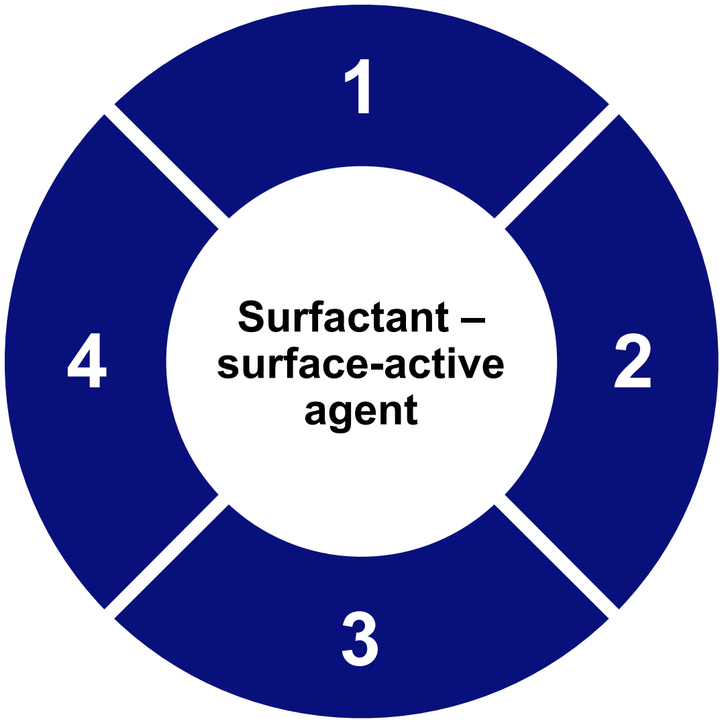
Types of Reprocessing Chemicals | Detergents

Main ingredients of detergents for Endoscope processing

Surfactants

Surfactant – surface-active agent

- describes compounds that lower the surface tension of water
- one of the primary ingredients of detergents as they can remove even water-insoluble soiling (e.g. fat, oil and grease) from the treated surfaces and dissolve them in water
- have a hydrophobic (water-insoluble) tail and a hydrophilic (water-loving) head



Surfactant

Click on the buttons
For further information.

Types of Reprocessing Chemicals | Detergents

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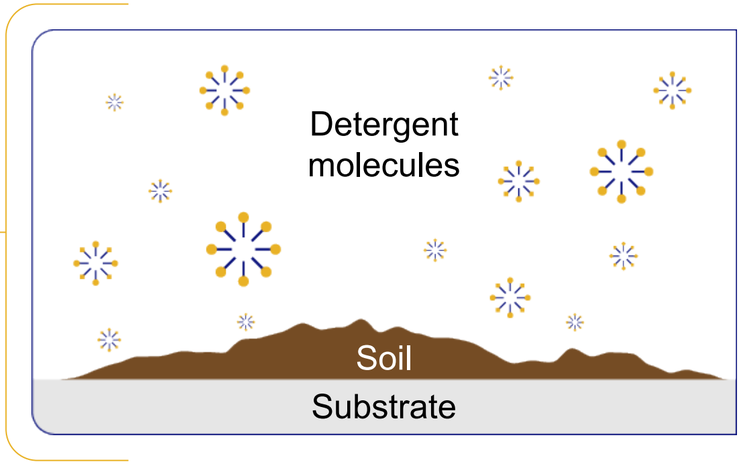

Soiled surface

Surfactant

Click on the buttons
For further information.

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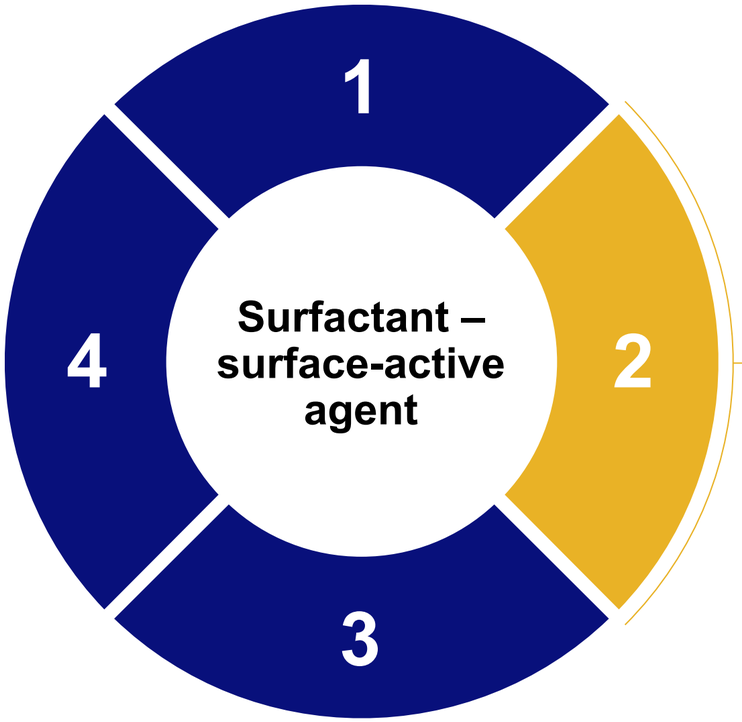

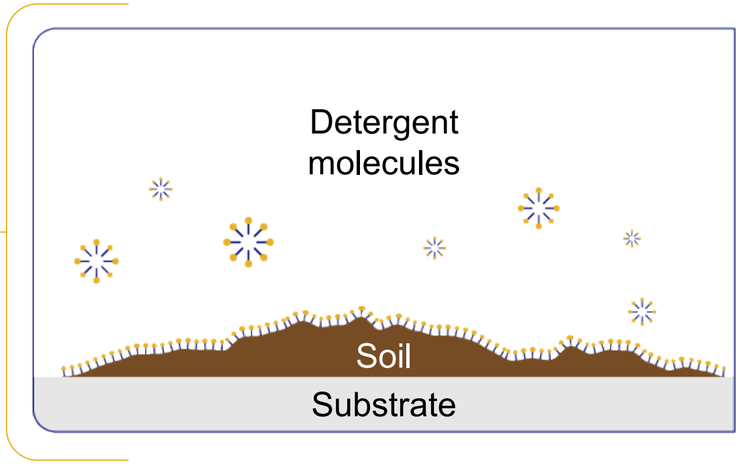

Surfactant surrounding Soil

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Types of Reprocessing Chemicals | Detergents

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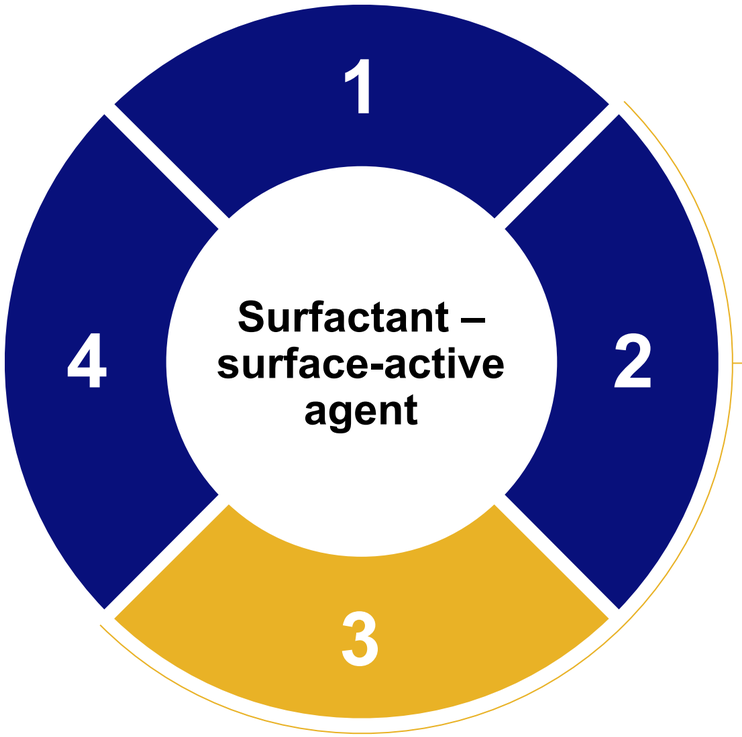
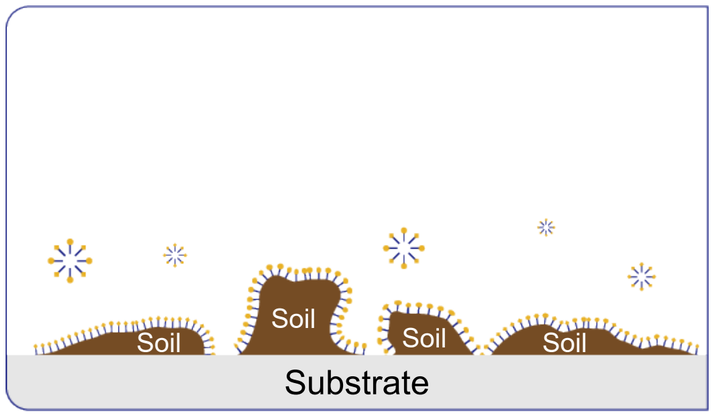
Surfactant





Soil Pulling from Substrate

Click on the buttons
For further information.

Types of Reprocessing Chemicals | Detergents

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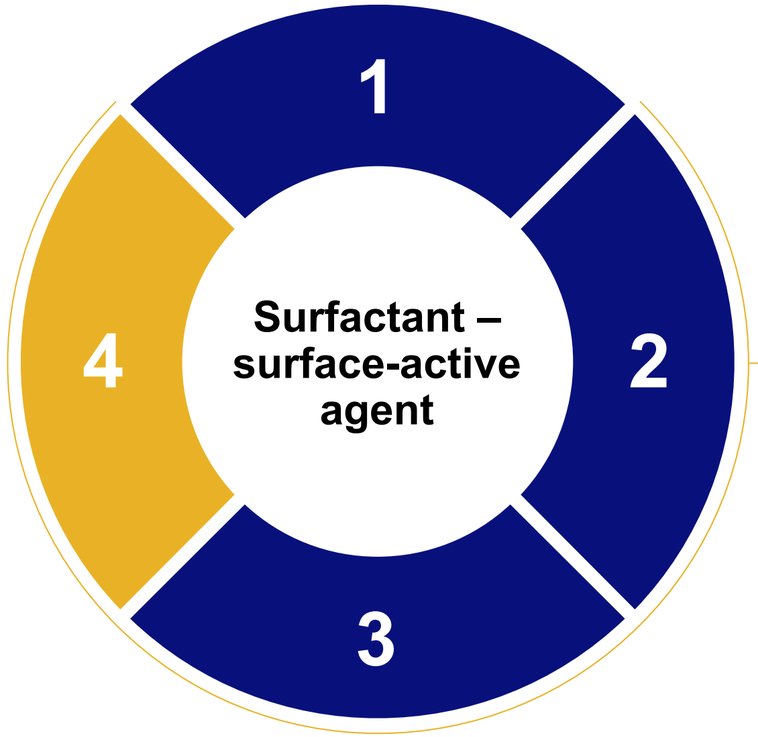
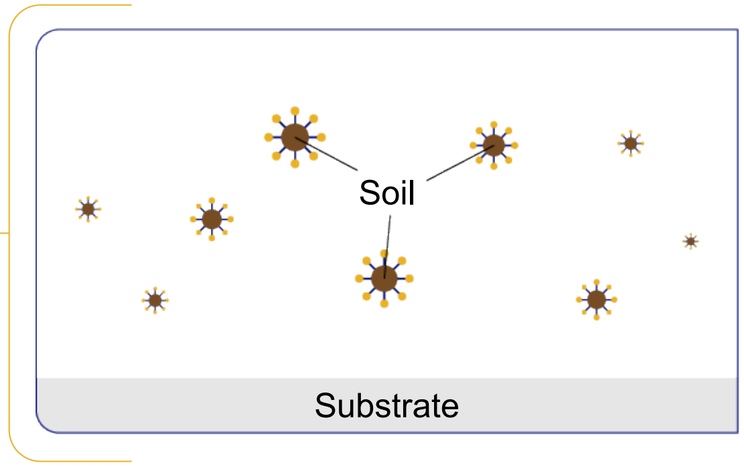




Clean Surface

Surfactant

Click on the buttons
For further information.

Types of Reprocessing Chemicals | Detergents

Main ingredients of detergents for Endoscope processing

Enzymes

Effect of proteases

Click on the Plus-Symbols for further information.

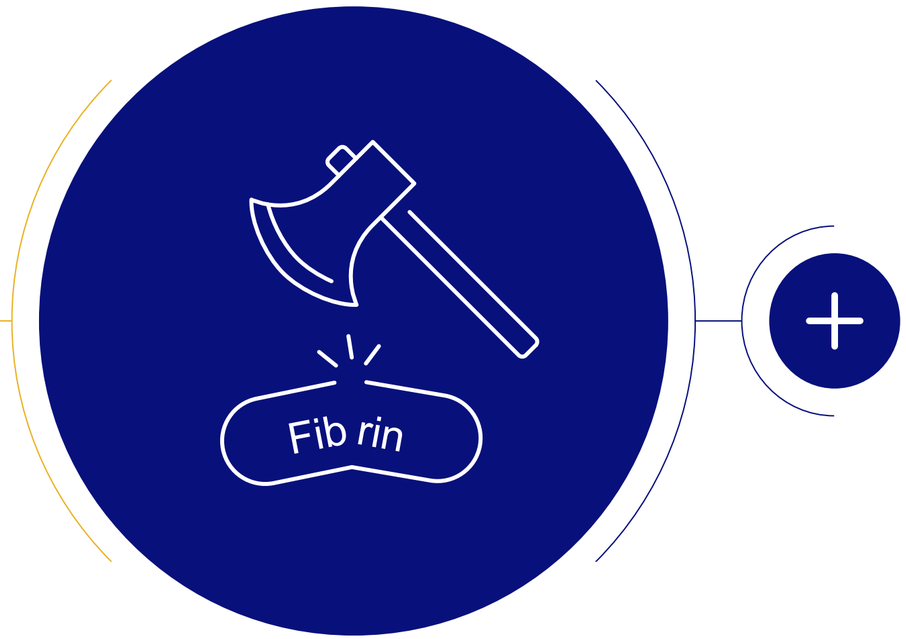
Types of Reprocessing Chemicals | Detergents

Main ingredients of detergents for Endoscope processing

Enzymes

In endoscope processing following enzymes are commonly used:

- Amylase
  - breaks down carbohydrates
- Lipase
  - breaks down lipids
- Protease
  - splits off the protein shares of soilings (e.g. fibrin) and breaks it further down



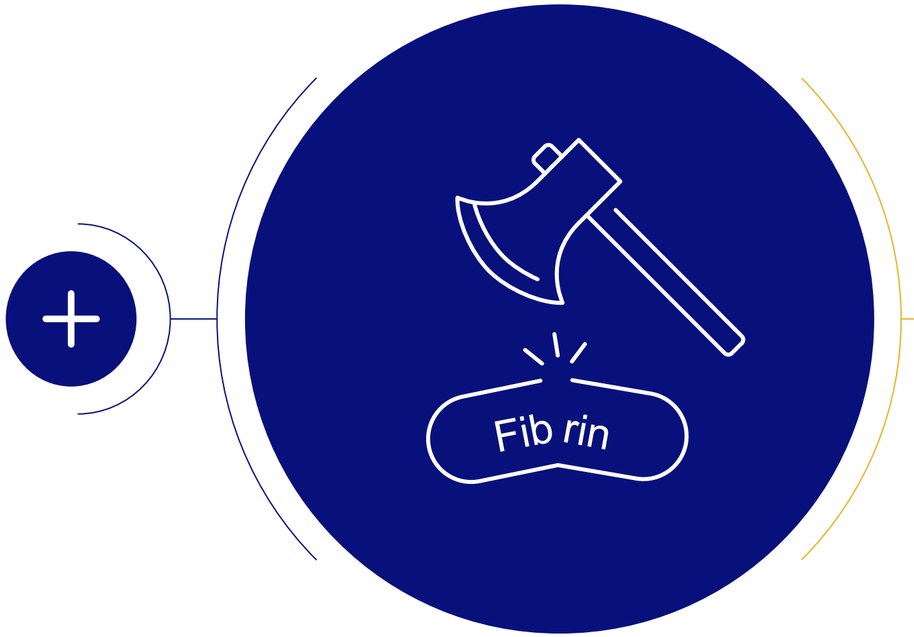
Effect of proteases

Click on the Plus-Symbols for further information.

Types of Reprocessing Chemicals | Detergents

Main ingredients of detergents for Endoscope processing

Enzymes



Breaking down the soiling into smaller, soluble parts, enzymes make it easer to remove it from the treated surfaces

Effect of proteases

Click on the Plus-Symbols for further information.

Types of Reprocessing Chemicals | Detergents

Aspects to consider

Detergents with disinfecting properties

Main claim for available products in the market:

- Since a disinfection step has to follow the manual cleaning in any case, adding disinfecting properties in a detergent shall increase the user safety during the cleaning process

Studies indicate that their use might support the development of resistances which could jeopardize the following disinfection process***

Users have to wear appropriate PPE, regardless of the type of product used

*** G. Kampf. The unknown role of disinfectant-detergents for failure of effective endoscope reprocessing, Journal of Hospital Infection (2018)

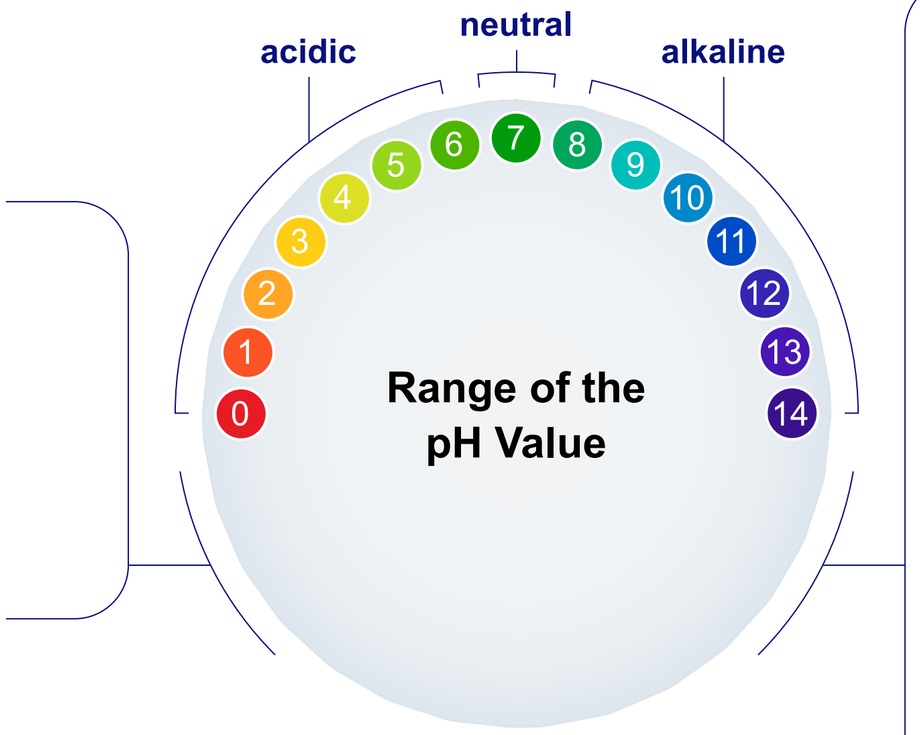
Types of Reprocessing Chemicals | Detergents

Aspects to consider

pH value

Scale of the acidity or basicity of an aqueous solution

A chemicals´ pH value has an impact on many aspects like material compatibility and even cleaning properties



- Acidic detergents with a pH value < 7
  - Used to dissolve lime (e.g. bathroom cleaners)
- Alkaline detergents with a pH value > 7
  - Suitable for dissolving fats and organic soiling
- Detergents for the cleaning of endoscopes (manual and automated cleaning)
  - Usually pH neutral or slightly alkaline as slightly alkaline detergents can support the removal of protein based soiling

Types of Reprocessing Chemicals | Detergents

Aspects to consider

Foam

It is important that formulas of detergents used for the cleaning of endoscopes are low foaming formulas

- Development of foam could inhibit the cleaning activity
- Can have a negative impact on the visibility of the treated instruments
  - E.g. so that leakages might not be seen
- In endoscope washer-disinfectors, the development of foam could lead to technical process interruptions

02 Disinfectants

Types of Reprocessing Chemicals | Disinfectants

Commonly used Active Substances in Disinfectants for Endoscope processing

Click on the buttons for further information.

Types of Reprocessing Chemicals | Disinfectants

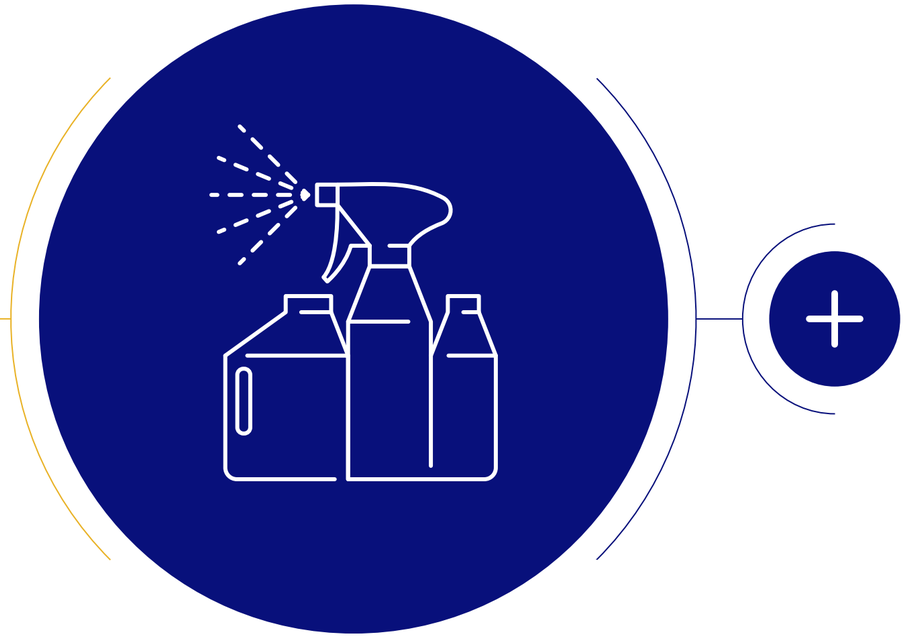
Click on the buttons for further information.

Commonly used Active Substances in Disinfectants for Endoscope processing

Peracetic Acid (PAA)

Evolves as golden standard for disinfection of flexible endoscopes

- Organic peroxide and colorless liquid with characteristic acid odor reminiscent of acetic acid
- Primary mode of action of PAA is oxidation
  - Denaturants proteins
  - Disrupts cell wall permeability
  - Oxidizes sulfhydryl and Sulphur bonds in proteins, enzymes and other metabolites
- Risk of the development of resistance is regarded to be very low due to the low specificity of reactions of peracetic acid



Types of Reprocessing Chemicals | Disinfectants

Commonly used Active Substances in Disinfectants for Endoscope processing

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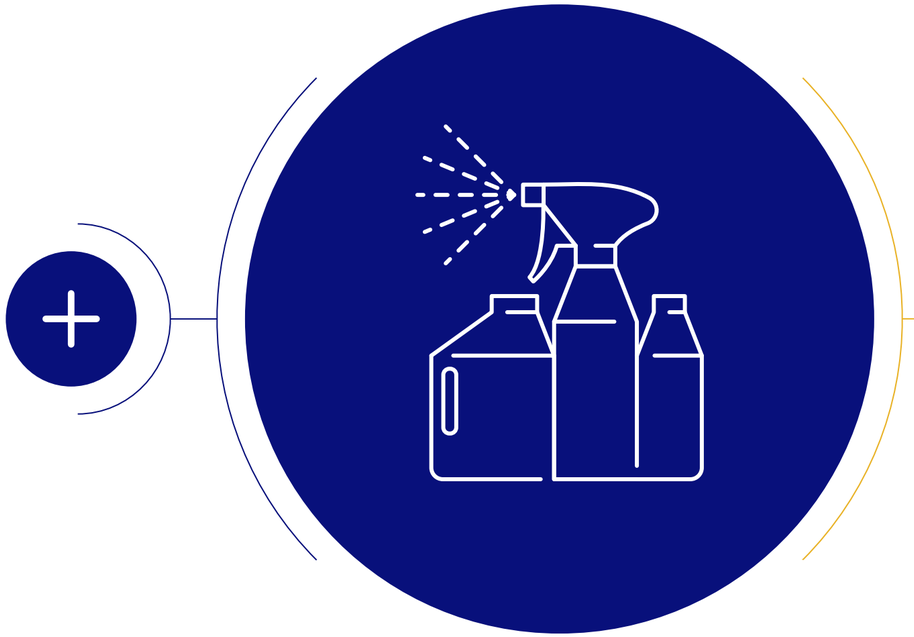

Glutardialdehyde (GA)

- Colorless liquid with a pungent odor
- Oily liquid at room temperature
- In the European Union:
  - Mainly used in human medicine for the disinfection of inanimate surfaces
  - For reprocessing of flexible endoscopes (usually at 20g/l)
  - For disinfection of medical instruments
- The European Commission has approved Glutaraldehyde in 2015 as an active agent for various types of disinfectants

Types of Reprocessing Chemicals | Disinfectants

Advantages & Disadvantages

PAA vs. GA

	Advantage	Disadvantage
Glutardialdehyde	Broad spectrum combined with excellent material compatibility	Fixation of proteins, smell, health hazard
Peroxygen Compounds, e.g. **Peracetic Acid (PAA)**	Fast and broad activity	Aggressiveness of the active principle

Types of Reprocessing Chemicals

Corrosion inhibitors:

- To avoid corrosion by binding metal ions (iron, copper, aluminum) present in the water or by eliminating oxygen (O_2) with reagents that react with the oxygen

Complexing Agents:

- Special substances that bind or mask ions and thus withdraw them from the system

Defoaming Agents:

- To avoid undesirable foam development and to destroy foam that has been formed

Preservatives:

- To make the formulation durable

Dye:

- In order to improve the visibility of the chemicals
  - For manual reprocessing in the repro-cessing sinks
  - To make sure that the working solution can be easily differentiated from water

Perfume:

- To create a convenient odor
- Use is decreasing in order to reduce the allergic potential of the chemicals to a minimum

pH regulators

- To change or maintain a certain pH value
- Can be organic or mineral acids, bases, neutralizing agents or buffering agents

& others e.g.: Stabilizers Solubilizers, Solvents, ...

Types of Reprocessing Chemicals | Disinfectants

Aspects to consider

Antimicrobial efficacy

Most important property of disinfectant

- Impairing effect of a certain agent (active substance)/ product on populations of microorganisms
- May refer to inhibition of growth, complete killing or inactivation

Parameters impacting the antimicrobial efficacy of a disinfectant beside its chemical composition:

- Application concentration
- Contact time
- Application temperature
- Used water quality

The application parameters recommended by the disinfectants´ manufacturer must be adhered to, in order to ensure the disinfection success

Types of Reprocessing Chemicals | Disinfectants

Aspects to consider

Antimicrobial efficacy – A closer look

The required spectrum of efficacy for instrument disinfectants is defined in the European Norm EN 14885

For the final disinfection of semi-critical medical devices, such as most flexible endoscopes, the used disinfection procedures **must provide proven efficacy against bacteria (including mycobacteria), fungi and viruses**

European Standards to be passed	
Bactericidal Activity	EN 13727 (2/1), EN 14561 (2/2)
Yeasticidal Activity	EN 13624 (2/1), EN 14562 (2/2)

Additional European Standards	
Fungicidal Activity	EN 13624 (2/1), EN 14562 (2/2)
Tuberculocidal / Mycobactericidal Activity	EN 14348 (2/1), EN 14563 (2/2)
Virucidal Activity	EN 14348 (2/1), EN 14563 (2/2)
Sporicidal Activity	EN 17126 (2/1), (2/2) not yet available

Types of Reprocessing Chemicals | Disinfectants

Aspects to consider

Antimicrobial efficacy – A closer look

	The meaning behind the claims
Bactericidal Activity	Efficacy against bacteria
Yeasticidal Activity	Efficacy against yeast-like fungi
Fungicidal Activity	Efficacy against all fungi (incl. yeast-like fungi) and their spores
Tuberculocidal Activity	Efficacy against Mycobacterium tuberculosis
Mycobactericidal Activity	Efficacy against all mycobacteria (incl. Mycobacterium tuberculosis)
Virucidal Activity **against enveloped viruses**	Efficacy against enveloped viruses
Virucidal Activity	Efficacy against viruses (virucidal activity against enveloped viruses / limited spectrum virucidal activity / virucidal activity)
Sporicidal Activity	Efficacy against bacterial spores

Types of Reprocessing Chemicals | Disinfectants

Aspects to consider

Antimicrobial efficacy – A closer look

Second most important aspect

Reprocessing chemicals for flexible endoscopes have to be used in a way (e.g. concentration, process) that compatible with these instruments is verifiable

- **pH value**
  - Significant impact on the material compatibility
- **Process temperatures**
  - Supports the success of the processing
  - PAA processes usually using lower temperatures than GA processes

03 Rinsing Agents

Types of Reprocessing Chemicals | Rinsing Agents

Used in some reprocessing processes to:

- Improve the instruments drying results
- Reduce the drying time

In (endoscope) washer-disinfectors the treated instruments are rinsed with the rinsing agent in the final rinse step

- Rinsing agent is automatically dosed into the final rinse water according to the manufacturers´ recommendation
- Use of deionized water in the final rinse step might be recommended

Commonly used ingredients for rinsing aids:

- Surfactants
- Preservatives

Restart