

Procedure for disinfectants in microbiological laboratories

Disinfect

Disinfection is the chemical or physical process in which the number of microorganisms, such as bacteria, fungi and viruses on surfaces or materials is reduced to an acceptable level.

Legislation and regulations for disinfectants

The Dutch GMO regulation¹ states the following:

- Work surfaces must be disinfected after an experiment, after contamination and at the end of the day.
- Materials that have been in contact with (micro-)organisms or GMOs, such as tools and equipment, should be inactivated or disinfected before washing, reusing or disposing of them.

The purpose of disinfection is to ensure that the biological agent and/or GMO is inactivated before it leaves the containment area.

Chemical substances used for disinfection (disinfectants) must be authorized in the Netherlands by the Board for the Authorization of Plant Protection Products and Biocides (CTGB).

The Working Conditions Act (Arbowet) states that exposure to hazardous substances, including chemicals, may not harm the health of workers in the short or long term.

Disinfection with ethanol

Ethanol is often the first disinfectant that comes to mind. However, ethanol is considered a carcinogen (H250) and a reprotoxic substance (H360)². This is not in line with the requirements of the Dutch Working Conditions Act. For this reason, other substances are also taken into account in this procedure when selecting the appropriate disinfectant to use.

Work

This procedure covers activities in contained laboratories where experiments with (micro-)organisms, such as bacteria, yeast, fungi, viruses, but also with cells, tissue, phyto material and GMO's are being performed.

Criteria

The selection of an appropriate disinfectant is based on a combination of the following four criteria:

- the effectiveness
- the required contact time with the micro-organism
- occupational safety for employees
- user friendliness

Based on these criteria, three alternatives disinfectants emerged that have been approved by the CTGB for the disinfection of surfaces and materials. See the appendix for a complete overview of other authorized disinfectants and their criteria.

¹ Genetically Modified Organisms Environmental Management Regulations 2013, Annex 9

² Working Conditions Decree Section 2. Additional requirements for carcinogenic or mutagenic substances and carcinogenic processes

- Ethanol 70%
- Incidin Oxy Foam (1.5% hydrogen peroxide)
- Incidin Oxy Wipe (1% hydrogen peroxide)

Table of application criteria

Fabric	Application time	Effectiveness	Carcinogenic	User-friendly
Ethanol	++	++	+	+
Incidin Foam	+	++	-	++
Incidin Oxy wipe	+	++	-	++

The corresponding exposure times and the micro-organisms for which the disinfectants are effective are listed in the following table.

Table of disinfectants for surfaces and materials

Product	Description	% or G/L	Exposure time for disinfection	Organism(s)
Ethanol	Ethanol	70%	30 sec.	Bacteria, yeasts
Incidin Oxyfoam	Hydrogen peroxide	1.5%	5 min. 15 min for mycobacteria.	Bacteria (excl. bacterial spores), yeasts, fungi
Incidin Oxywipe	Hydrogen peroxide	1%	5 min. 15 min for mycobacteria.	Bacteria (incl. mycobacteria), fungi

Application of disinfectants

For disinfection of surfaces and materials, the **priority order based** on the combination of the criteria effectiveness, application time, safety and user-friendliness is as follows:

- **Incidin Oxy Foam** is the preferred disinfectant. Apply in situations where a slightly longer processing time is not a problem.
- **Incidin Oxy Wipe** is applied in situations where a slightly longer processing time is not a problem. May NOT be used in a biological safety cabinet. Due to the airflow the wipes dry out too quickly, so the contact time cannot be guaranteed.
- **Ethanol 70%** is used when the speed of the work process and a short contact time is important. Use an alternative for ethanol at the start of an experiment, when setting up and at the end of the experiment/day (priority choice).

Examples

Incidin Oxy Foam and Incidin Oxy Wipe

Incidin Oxy Foam is used in various organisations for disinfection as a replacement for ethanol. It leaves no residue on the surfaces and the results of external biological screenings are good. However, one must take into account a longer contact time (5 min) when applying.

Situations in which Incidin Oxy can be used:

- The biosafety cabinet is disinfected with Incidin Oxy Foam.
- Tools are wiped with Oxy wipe prior to use in the biosafety cabinet.
- Changing cages in animal facility: Gloves (Nitrile Xtra gloves) are sprayed with Incidin Foam after each cage.

Ethanol 70%

The aim is to reduce the exposure to ethanol. This can be achieved by disinfecting tools and surfaces:

- by applying ethanol on a paper wipe by using a squeeze bottle with a bound beam that is kept close to the paper. This limits the production of aerosols.
At the end of the day store the squeeze bottles in the safety cupboard for chemicals.
The use of a plant sprayer/nebulizer is not permitted. See the link to the video below³.
- under an extracted airflow such as in a fume hood or a biological safety cabinet.

³ <https://www.arboportaal.nl/documenten/videos/2010/1/1/blootstelling-alcohol-bij-desinfecteren>

Door Ctgb toegelaten desinfectiemiddelen		2022						
Naam	Producent	Type	CTGB Toelatings-nummer	Pt02	Werkzame stof	Percentage/concentratie/eenheid	Contact tijd	Spectrum
Klercide 70/30 IPA	Ecolab B.V.	Vloeistof	13315N	x	2-propanol 70% (propaan-2-ol)	550 G/L	5 min	Bacterien, gisten, schimmels
Cyndosan	Rogier Bosman Chemie BV	Vloeistof	12270N	x	didecyldimethylammoniumchloride	45 G/L	1:125 gebruik: 5 min	Bacterien, gisten (excl. mycobacterien en sporen)
Ethanol 70%	Added Pharma	Vloeistof	14200N	x	Ethanol	70%	30 sec	Bacterien, gisten
Ethanol 70% gedenatureerd	Fresenius Kabi Nederland B.V.	Vloeistof	14199N	x	ethanol	70 %V/V	30 sec	Bacterien, gisten (excl. mycobacterien en sporen)
Klercide 70/30 Denatured Ethanol	Ecolab B.V.	Vloeistof	14031N	x	ethanol	67 %V/V	5 min	Bacterien, gisten (excl. mycobacterien en sporen)
Spray Away Desinfectie Alcohol	Cemex Trescon B.V.	Vloeistof	14026N	x	ethanol	72,6 %w/w	30 sec	Bacterien, gisten, schimmels (excl. mycobacterien en sporen)
Alcohol 70% met Isopropylalcohol	Added Pharma	Vloeistof	14193N	x	Ethanol 70% v/v met isopropylalcohol	70% V/V	30 sec	Bacterien, gisten
Desderman pure	Schülke&Mayr, Benelux	Vloeistof	14436N		ethanol, bifenyli-2-ol	782 G/KG, 1 G/KG	30 sec	Bacteriën (excl. bacteriesporen),
Desderman pure gel	Schülke&Mayr, Benelux	Gel	14672N		ethanol, bifenyli-2-ol	782 G/KG, 1 G/KG	30 sec	Bacteriën (excl. bacteriesporen),
Incidin foam	EcoLab	Vloeistof	13175N	x	Ethanol, propaan-2-ol, Alkyl (C12-16)	10%, 20%, 0.4%,	5 min.	Bacteriën (excl. bacteriesporen),
Incidin Plus	EcoLab	Vloeistof	13538N	x	Glucoprotamine	265 G/L	1,5% gebruik: 5 min; 3% gebruik: 30 min (voor TBC afdelingen)	Bacteriën (excl. bacteriesporen), mycobacteriën, gisten
Apesin Chlorine tablets	Werner & Mertz Benelux NV SA	Tabletten	13430N	x	natriumdichloorcyanuraatdihydraat	99,40%	5 min	Bacteriën (excl. bacteriesporen), mycobacteriën, gisten, virus
Chlorine tabs	Christeys B.V.	Tabletten	11400N	x	natriumdichloorisocyanuraat	85 %w/w	5 min	Bacterien, gisten (excl. mycobacterien en sporen)
Medicarine chloortabletten	Ecolab B.V.	Tabletten	9451N	x	natriumdichloorisocyanuraat	86%	5 min	Bacterien, gisten, virussen (excl. mycobacterien en sporen)
Staflex chloortabletten	Diversey B.V.	Tabletten	6706N	x	natriumdichloorisocyanuraat	85,50%	5 min	Bacterien, gisten (excl. mycobacterien en sporen)
Suma Tab D4 chloortabletten	Diversey B.V.	Tabletten	7321N	x	natriumdichloorisocyanuraat	85%	5 min	Bacteriën (excl. bacteriesporen), mycobacteriën, gisten
Klercide Sporicidal Active Chlorine	Ecolab B.V.	Vloeistof	12797N	x	natriumhypochloriet	0,71 % (ALS ACTIEF CHLOOR)	5 min	Bacterien, gisten, schimmels
Virkon S	Antec International Ltd	Poeder	13676N	x	pentakalium bis(peroxymonosulfaat)bis(sulfaat)	45,3 %w/w	4% gebruik: 30 min	Bacterien, gisten, schimmels, virussen (excl. mycobacterien en sporen)
Azospray	Arrow Regulatory (Ireland) Limited acting on behalf of Vernacare Ltd	Vloeistof	NL-0020836-0002	x	propaan-2-ol	70 %w/w	1 min	Bacterien, gisten
InSpec IPA fles, InSpec IPA sproeifles	Brentagg	Vloeistof	NL-0020963-0001	x	propaan-2-ol	70 %V/V	5 min voor bacterien en gist, 15 min. voor schimmels	Bacterien, gisten, schimmels
Klenwipe 70/30 IPA	Ecolab B.V.	Doekjes	13518N	x	Propaan-2-ol	550 G/L	5 min	Bacterien, gisten, schimmels
Aseptix Disinfection Wipes	Aseptix B.V.	Doekjes	14175N	x	waterstofperoxide	1%	5 min. 15 min voor mycobacterien.	Bacteriën (excl. bacteriesporen), gisten, schimmels
Incidin Oxi wipes	EcoLab	Doekjes	14949N	x	waterstofperoxide	1%	5 min. 15 min voor mycobacterien.	Bacterien incl mycobacterien, schimmels
Incidin Oxyfoam	Ecolab	Vloeistof	15021N	x	waterstofperoxide	1.5%	5 min. 15 min voor mycobacterien.	Bacteriën (excl. bacteriesporen), gisten, schimmels
OxyDes Rapid	EcoLab	Vloeistof	15199N	x	waterstofperoxide	2%	5 min.	Bacterien, gisten (excl. mycobacterien en sporen)
Ultrason Ultra Rapid	Aseptix B.V.	Vloeistof	14176N	x	waterstofperoxide	1.5%	5 min. 15 min voor mycobacterien.	Bacteriën (excl. bacteriesporen), gisten, schimmels
Waterstofperoxide 35%	Brenntag	Concentraat	14094N	x	waterstofperoxide	35%	10% gebruik: 5 min	Bacterien, gisten, schimmels (excl. mycobacterien en sporen)