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Multipipette[®] M4 · Repeater[®] M4

Chemical Resistance

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Important hints

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1 Important hints

High demands are placed on the plastic used for Multipette M4/Repeater M4 when it comes to dimensional stability, wear resistance, UV resistance, and resistance to chemicals.

To meet these requirements, the plastics have been refined to improve the standard properties of the corresponding plastic. Therefore, the data in the following tables does not necessarily apply to plastics with the same abbreviations that are used in other products.

If one assumes that only the tip of the Combitip advanced comes into contact with the liquid during proper handling, and aggressive liquids do not remain in the Combitip advanced for a long period of time, aggressive chemicals can be carefully used for a limited time. This limited time is reduced for aggressive liquids with a high vapor pressure. For liquids with high vapor pressure, gases enter the Multipette M4/ Repeater M4 during dispensing. The gases may condense at various locations in the Multipette M4/ Repeater M4. Materials may be damaged if this condensate remains in the Multipette M4/Repeater M4 for a longer period of time.

The possibility of a shortened service life for the Multipette M4/Repeater M4 must be considered when using aggressive liquids.

The statements made in the tables only apply for handling at room temperature.

The material safety data sheets of the corresponding chemicals, and the safety notes on the bottle, must be observed for all chemicals prior to dispensing.

Very slow aspiration speed and dispensing speeds must be observed when dispensing highly viscous liquids, especially for larger volumes. Please note that, liquid with a higher viscosity may continue to flow after the piston movement has been completed. Wait until this period has elapsed.

If you have any questions on chemicals that are not included in the attached tables, please contact our Application Support. The corresponding deduction by analogy within a material class can assist you during the assessment of the dispensing property and the chemical resistance.

The Eppendorf AG warranty shall become void with the use of chemicals that pose an increased risk or as a result of improper handling.

2 Materials used

The following materials used in the Multipette M4/Repeater M4 are important for the user:

2.1 Materials

The parts of the Multipette M4/Repeater M4 that can be accessed by the user are made from the following materials:

Component	Material
Housing parts	Improved polypropylene (PP)
Filling lever, operating lever	Improved polypropylene (PP), dyed
Viewing window	Polycarbonate (PC)
Volume selection dial	Acrylonitrile styrene copolymerisate with polycarbonate (ASA/PC)
Other external components	<ul style="list-style-type: none"> • Polyetherimide (PEI) • Polybutylene terephthalate (PBT) • Polyetheretherketone (PEEK) • Acrylonitrile styrene copolymerisate with polycarbonate (ASA/PC) • Silicone

Component	Material
Holder	Acrylonitrile styrene copolymerisate with polycarbonate (ASA/PC)

Combitip advanced	Material
Cylinder	Polypropylene (PP)
Piston 0.1 mL and 0.2 mL	Polyethylene (PE) with glass fiber (GF)
Piston 0.5 mL to 50 mL	Polyethylene (PE)
Adapter advanced	Polybutylene terephthalate (PBT)

Evaluation criteria

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3 Evaluation criteria

The following evaluation criteria and the tables on chemical resistance provide you with information on the chemical resistance of the materials in the Multipette/Repeater M4. Because the liquid has a minimal chance of coming into contact with the device during normal application, evaluation criteria which are somewhat different than the criteria for the Combitips advanced apply in this case (see Combitips advanced instructions for use). Furthermore, this chapter contains information on suitable disinfectant and decontamination agents for the outsides of the Multipette M4/Repeater M4.

■■■	<p>Resistant The chemical can be used.</p>
■■	<p>Limited resistance and/or suitable for limited use The chemical can be used for a limited period of time. Observe explanatory footnotes in the tables!</p>
■	<p>Increased risk and/or increased wear The chemical can only be used with utmost caution. If handled improperly, the chemical must be removed immediately because subsequent damages can occur very quickly. The systematic and random error of the Combitips advanced must be regularly checked using the current batch! Observe explanatory footnotes in the tables! A shorter service life (for example, corrosion on metal parts due to fuming acids) can be expected compared to the use of chemicals which have been evaluated as "Resistant".</p>

4 Chemical resistance

4.1 Acids and alkalines

Description Acids and alkalines	Concentration	PP	PEI	PBT	ASA/ PC	PC*1	PEEK	Silicone	Metal*6
Ammonia solution	25 %	■■■■	■■■■	■■■■	■	■■■■	■■■■	■■■■	■■■■
Ammonia solution	2 %	■■■■	■■■■	■■■■	■■	■■■■	■■■■	■■■■	■■■■
Acetic acid	96 %	■■■■	■■■■	■■■■	■	■■■■	■■■■	■■■■	■■■■
Acetic acid	12 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Caustic soda	40 %	■■■■	■■■■	■■	■■■■	■■	■■■■	■■■■	■■*4
Caustic soda	20 %	■■■■	■■■■	■■	■■■■	■■■■	■■■■	■■■■	■■■■
Caustic soda	4 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Perchloric acid	10 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Phosphoric acid	85 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*4
Nitric acid	65 %	■■*3	■■*3	■■*3	■■*3	■■*3	■■■■	■*4	■*2,4
Nitric acid	6 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*4	■■■■
Hydrochloric acid	32 %	■■■■	■■■■	■■■■	■■	■■■■	■■■■	■*4	■*2,4
Hydrochloric acid	4 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*4
Sulfuric acid	95 %	■■■■	■■■■	■■■■	■	■■■■	■■■■	■*4	■*4
Sulfuric acid	16 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*4
Trichloroacetic acid	40 %	■■■■	■■■■	■	■	■■■■	■■■■	■*4	■■*4
Trichloroacetic acid	10 %	■■■■	■■■■	■	■■■■	■■■■	■■■■	■■*4	■■■■
Trifluoroacetic acid (TFA)	100 %	■■■■	■	■	■	■*5	■■■■	■*4	■■*4
Trifluoroacetic acid (TFA)	10 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■

*1 Polycarbonate (PC) will be used for the display cover.

*2 Corrosion on internal metal parts - such as the gold-plated contacts - with repeated use of fuming acids.

*3 Discoloration; this does not affect functioning.

*4 Silicone and metal (combitip sensor) may be damaged as a result of direct contact with concentrated acids. Do not allow any liquid to penetrate the inside of the housing.

*5 Careful working is necessary to avoid causing damage to the display cover.

*6 Metal parts, such as gold-plated contacts, near the combitip sensor.

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4.2 Organic solvents

Description Organic solvents	Concentration	PP	PEI	PBT	ASA/ PC	PC*1	PEEK	Silicone	Metal
Acetone*2		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
Acetonitrile		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
Benzine		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*3	■■■■
Trichloromethane (chloroform)		■■■■	■*4	■■■■	■	■*5	■■■■	■■■■	■■■■
Dichloromethane (methylene chloride)		■■■■	■*4	■■■■	■	■*5	■■■■	■■■■	■■■■
Diethyl ether		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
DMSO (dimethyl sulfoxide)	10 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
DMSO (dimethyl sulfoxide)	50 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
DMSO (dimethyl sulfoxide)	100 %	■■■■	■■■■	■■■■	■	■■■■	■■■■	■■■■	■■■■
Acetic acid ethyl ester*2		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
Ethanol		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Formaldehyde	40 %	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Isoamyl alcohol		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Isopropanol		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■	■■■■
Methanol		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
Petroleum ether		■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■*3	■■■■
Phenol (water saturated)		■■■■	■*4	■■■■	■	■*5	■■■■	■■■■	■■■■
Carbon tetrachloride		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
Toluol		■■■■	■■■■	■■■■	■	■*5	■■■■	■■■■	■■■■
Xylol		■■■■	■■■■	■■■■	■	■*5	■■■■	■■*3	■■■■

*1 Polycarbonate (PC) will be used for the display cover.

*2 Wiping can attack the colored printing.

*3 Silicone (combitip sensor) can exhibit temporary swelling behavior with direct contact. Allow the Multipette to air out for several hours prior to the next use. Do not allow any liquid to penetrate the inside of the housing.

*4 Only applies in case of direct contact.

*5 Careful working is necessary to avoid causing damage to the display cover and the printing.

4.3 Cleaning agents and disinfectants

Cleaning and decontamination agents may only be used for the outer surfaces. The agents may not enter the Multipette M4/Repeater M 4.

Description Cleaning agents and disinfectants	Concentration	PP	PEI	PBT	ASA/ PC	PC	PEEK	Silicone	Metal*4
COUNT-OFF™ (disinfectant)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Dismozon® pure (peroxide-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
DNA AWAY™	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Helipur® (phenol-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hexaquart® S (QAV – based*1)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Isopropanol	70 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hi - TOR Plus (QAV - based*1)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Korsolex® basic (aldehyde-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Meliseptol® (alcohol-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Sodium hypochlorite*3	4 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■*3
RNase AWAY™	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Sterillium® (alcohol-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hydrogen peroxide	35 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Cidex Activated Dialdehyde Solution (aldehyde-based)	*2	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■

*1 Based on a quaternary ammonium compound

*2 The information relating to the cleaning agents and disinfectants is based on the commercially available product composition from 2009.

*3 Fully remove sodium hypochlorite after an exposure time of approximately 20 minutes. Under no circumstances may sodium hypochlorite be used near the combitip retainer because it cannot be fully removed from that location. Sodium hypochlorite may never be used near the volume selection dial or display because sodium hypochlorite solution which has entered the device will destroy the display.

*4 Metal parts, such as gold-plated contacts, near the combitip sensor.

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4.4 Saline solutions, buffers, wetting agents, oils and other solutions

Description Other	Concentration	PP	PEI	PBT	ASA/ PC	PC	PEEK	Silicone	Metal
Caesium chloride	Saturated	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
EDTA*1, pH 8	1.8 g/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Ficoll (polysaccharide)	1.077 g/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Formamide	50 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Glutaraldehyde	25 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Glycerol	50 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Guanidinium thiocyanate	4 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Mineral oil		■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Na - acetate, pH 5.2	2 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Paraffin oil		■■■	■■■	■■	■■■	■■■	■■■	■■■	■■■
Na-dodecyl sulfate (SDS, Na-lauryl sulfate)	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
TRIS buffer, pH 7.5	1 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Triton® X-100	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Tween® 20	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Water		■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■

*1 Ethylenediaminetetraacetate, ethylenediaminetetraacetic acid,
(ethylenedinitrilo)tetraacetic acid, C₁₀H₁₆N₂O₈

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