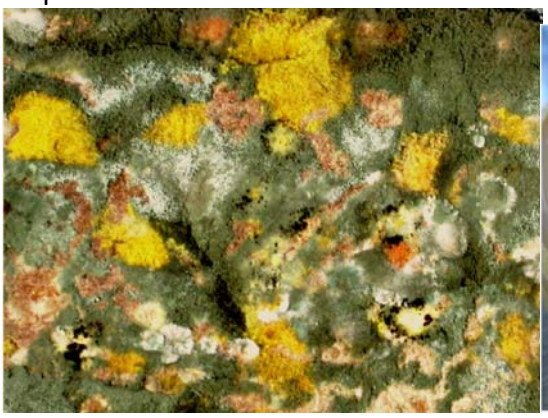
Gesellschaft Österreichischer Chemiker

Field manual:

Preservatives and influencing factors during production

Practical recommendations

To prevent …




Cosmetic products are in danger of becoming a culture medium for microorganisms. Therefore, preservatives are essential to protect them. Microbial decay may cause danger to a consumer's health – as the European Rapid Alert System **RAPEX** demonstrates. (http://ec.europa.eu/consumers/safety/rapex/).

Due to the microbial risk, in accordance with article 10 and 11 of the Regulation (EC) No. 1223/2009 on cosmetic products together with Annex I, the safety report has to include information covering the cosmetic product's microbiological quality. It must be stored for controls by the competent authorities.

That will include the equivalent quality of raw materials, containers, packaging materials as well as the result of the preservation challenge test. In particular products exclusively for children under three years of age, for use near the eye and on mucous membranes, require a high degree of awareness.

CONTENT

1 PREAMBLE

The “Gesellschaft Österreichischer Chemiker” (GÖCH) task force “Cosmetics Microbiology” prepared the present field manual as a starter guide for everyone without particular experience in this matter. It will help to take into account the relevant basics. To decide correctly, it is necessary to check the up-to-date status and validity of the cited sources (law, literature etc.).

2 CURRENT LEGAL BASICS CONCERNING PRESERVATIVES ACCORDING TO REGULATION (EC) No 1223/2009

As a basic principle, Regulation (EC) No 1223/2009 Chapter II Article 3 applies: A cosmetic product made available on the market has to be safe. See www.eur-lex.eu

To ensure safety it is necessary to comply with the rules written in the individual articles. Additionally, the specific regulations of particular substances in the Annexes are of concern.
It’s the duty of the responsible person.

Regulation(EC) No 1223/2009 defines a misuse principle and a prohibition principle.

Misuse principle: everything is allowed, if not explicitly forbidden by the authorities. Unique limitation: the product shall be safe. Annex II lists prohibited substances and Annex III lists restricted substances. Some of the substances in Annex III are limited to specific application fields, body parts and concentrations.

Prohibition principle: Preservatives, UV-filters and dyes are subject to interdiction, except substances represented in a white list. The preservatives passed a process of approval and appear in Annex V.
Article 2, subsection (l) defines that ‘preservatives’ means substances which are exclusively or mainly intended to inhibit the development of micro-organisms in the cosmetic product.

The white list of Annex V does not regulate every particular use of antimicrobial substances. The annex focuses on substances dedicated to protect the product. Multifunctional molecules may also be additive supporters. Primary use of such substances may be solvent, fragrance, pH regulator,

buffer and so on. Although the ability to fight the contamination is a minor function, the claim “no preservatives” cannot be used.

Some of the preservatives listed in Annex V may serve additionally or mainly another function in the product. The conditions of the particular use may be regulated in one of the other annexes. In that case the use has to comply. For example, zinc pyrithion as an anti-dandruff, inorganic bisulfites, triclocarban, benzyl alcohol as a solvent or a fragrance, phenoxyisopropanole, derivatives of benzalkonium, salicylic acid as a keratolytic agent are regulated in Annex III as well as in Annex V. Apply Annex III, if the dedication is not preservation. If you want to preserve, the limits and regulations of Annex V are valid.

The safety report has to document the results of a preservation challenge test. Such a test shows efficacy of the preservative’s system. All products need to prove a positive result. Products for single use and products at “low risk to be contaminated” are excluded due to the low microbial risk. It rests upon high alcohol concentration, based on organic solvents, or represents products with a very high or very low pH value. EN ISO 29621-2016 helps to find an orientation.

Physical / chemical parameter	Limit	Example
pH – value	≤ 3.0	Peeling (Glycolic acid)
pH – v	≥ 10.0	Hair straightening substances
Ethanol or other alcohols	≥ 20 %	Hairsprays Tonics Perfumes
Water activity (a_W)	≤ 0.75	Lip balm Lip stick Rouge
Ethyl acetate, butyl acetate	≥ 10%	Nail polish
Hydrogen peroxide	> 3%	Hair brightener Bleaching Liquid for permanent wave
Aluminiumchlorohydrate	≥ 25 %	Antiperspirant

Additionally, to the test during the development, microbial purity according to EN ISO 17516-2014 requires continuous control of the finished product. Every batch requires microbial examination except such as those characterized as low microbial risk products. The table lists limits applying to EN ISO 17516-2014.

microorganism species	products for children less than 3 years and for the eye region	other products
Sum of aerobic mesophile microorganism (bacteria *ISO 21149* plus yeasts and mold fungi *ISO 16212*)	≤ $1x10^2$CFU per g/ml[a]	≤ $1x10^3$CFU per g/ml[b]

Escherichia coli *(ISO 21150)*	Not detectable in 1g or 1ml	Not detectable in 1g or 1ml
Pseudomonas aeruginosa *(ISO 22717)*	Not detectable in 1g or 1ml	Not detectable in 1g or 1ml
Staphyloccoccus aureus *(ISO 22718)*	Not detectable in 1g or 1ml	Not detectable in 1g or 1ml
Candida albicans *(ISO 18416)*	Not detectable in 1g or 1ml	Not detectable in 1g or 1ml
a) The result will be valued as out of spec if it is > 200 CFU/g or ml. b) The result will be valued as out of spec if it is > 2.000 CFU/g or ml.		

Although, if the results are in conformity with the limits, every presence of germs makes it obligatory to control the compliance during the products lifetime. It shall be ensured that growth is excluded. The absence of pathogenic germs in 1g or 1ml needs verification.

According to article 8, cosmetic products placed on the market should be produced according to good manufacturing practice (GMP) to ensure their safety. The Regulation (EC) No 1223/2009 refers to EN ISO 22716:2007 "Cosmetics - Good Manufacturing Practices (GMP) - Guidelines on Good Manufacturing Practices" made public via the Official Journal of the European Communities. In May 2007, the Austrian Codex Commission published a recommendation on manufacturing cosmetic products, available in the current version under https://www.verbrauchergesundheit.gv.at/lebensmittel/lebensmittelkontrolle/leitlinie_der_oesterr__codexkommission_gmp_april_2010.pdf?4e90vw

A process-control must evaluate, check and survey all sources of microbial contamination on a regular basis.

Pay particular attention to:

Concentration of preservatives or their mixtures should be as high as necessary to protect the product and as little as possible.

Gaps or insufficient measures in production hygiene shall not be covered by higher preservation.

Besides compliance with the regulatory requirements, the following information (in German) may be useful in addition.

- Österreichischen Lebensmittelbuch, Codexkapitel B33, Teilkapitel Naturkosmetik (http://www.lebensmittelbuch.at/b-33-kosmetische-mittel/naturkosmetik/)
- Certifications of specific cosmetic products

3 A GUIDE TO SELECT PRESERVATIVES IN CONFORMITY TO THE ANNEX

The table below lists alphabetically the most commonly used preservatives (status 06 2017). Check the validity and the current status of the legal regulations as well as transitional periods of changes at the time of application.

Field manual preservatives
Last update June 2018

Perservative	Not suitable / not permitted if:	Suitable / permitted if:	Remark	Maximum concentration according to Regulatoin No. 1223/ 2009 in %	Product type
2-Bromo-2-nitropropane-1,3-diole (Bronopol)	alcalinic pH, Light causes change of color amines, amides --> formation of nitrosamines		avoid formation of nitrosamines, to use with prudence: may irritate mucosa membrane, danger of inducing allergy.	0,1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Behentrimonium Chloride / Cetrimonium Bromide / Cetrimonium Chloride / Laurtrimonium Bromide / Laurtrimonium Chloride / Steartrimonium Bromide / Steartrimonium Chloride /	not compatible with anionic surfactants and peptides	stability in acidic media		0,1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Benzalkonium Chloride / Benzalkonium Bromide / Benzalkonium Saccharinate	not compatible with anionic components, detergents or anionic thickeners (carbomers) eye products!		avoid contact with the eyes	0,1 as Benzalkonium chloride	

Use the link to www.goech.at to download the Excel file in German or English. A searching routine and the possibility to add personal notes does exist. Find it also as annex I in English.

4 FURTHER CRITERIA HELPFUL TO SELECT PRESERVATIVES

4.1) Container

The selection of the container, coming into direct contact with the product, may influence the stability. You have to examine the compatibility with a stability test in advance.

The container's design may influence a possible contamination during use. The contamination by micro-organisms can be excluded almost completely by aerosol containers. As opposed to, the widely open cream containers seem to be a preferred target. It is necessary to take it into account during the selection of the preservatives system.

4.2.) Tolerability of a cosmetic product

The tolerability of the preserved formulation shall be adapted for sensitive areas, such as the area around the eyes and the mucous membranes. Formulations containing high concentrations of alcohol or potassium

sorbate and so on need particular awareness. The human patch test or application in an ophthalmological survey delivers proof of tolerability.

4.3.) Target group and area of application

If the cosmetic product serves particularly sensitive people (babies, atopic persons, consumers with highly sensitive skin) the selection of the preservative system must be taken into account carefully.

4.4) The preservation challenge test's results

The efficacy of the chosen system must be documented by a preservation challenge test. This test is mandatory for formulations which may allow growth of microorganisms due to Regulation (EC) No. 1223/2009.

The procedure described in DIN EN ISO 11930:213-10 is similar to the method in the Pharmacopoeia Europea. To interpret the results, the publication of the GÖCH task force "Cosmetics Microbiology" from 2012 is helpful. The results are proved by a round robin test.

5 CARDINAL ERRORS AFFECTING PRESERVATION OF COSMETIC PRODUCTS

5.1.) Serious errors

- Uncritical use of statements without proof.
- Too little knowledge of preservative's chemical and physical properties as well as too little knowledge of synergistic or deactivating additives (eg. Inactivation, degradation and instabilities of preservatives)
- Neglect of the preservative's sensibility against high temperatures.
- Neglect of interaction of preservative's system with other substances present in the container and the formulation.
- Underestimation of the importance of solubility in fat and/or oil or deactivation of the preservative's system during the product's life cycle.
- Oil - water partition coefficient.
- Neglect of scientific literature, recommendation of suppliers of recommendations given by product characterization sheets: way to process, best efficacy conditions, pH value.
- Insufficient survey of preservative's efficacy (including a challenge test) in the final product.
- Copy of the preservative's system from other products (other formulations) without examination.
- Deviation from validated manufacturing process (time of addition too late or too early or change of addition's sequence may have fatal consequences).
- Deviation from GMP – rules (the product release process, the personnel hygiene and production hygiene, change control).

5.2.) Some examples experienced many times

5.2.1.) pH influence

Particular organic acids need to set the optimum value of pH by buffering – specifically if they only preserve, if they are not dissociated:

Sorbic, benzoic, salicylic and dehydroacetic acid have a low water solubility. Their salts are easily soluble. The pH shall be set later to the optimum value by a system of buffers.

Sorbic and benzoic acid are used reasonably in a pH range of 4.8 to 5.0. Values over 5.3 decrease drastically the ability to preserve. If the pH is too low, the sorbic acid easily precipitates and is no longer available as a preservative.

That is the reason why the pH's setting with the buffering system must follow after the end of emulsifying process and the addition of all components of the formulation.

Wallhäuser's publication "Praxis der Sterilisation, Desinfektion, Antiseptik und Konservierung" indicates a pH range from 5.0 to 6.5 for dehydroacetic acid. Only 16% of the effective, not the dissociated portion, are available at the pH 6.0, where mould fungi are affected. Other literature shows pH 5.0 until alkalinity. Rationally, an upper limit of pH 5.3 is recommended and the proof by a preservation challenge test is obligatory.

Keep in mind the difference between chemistry's definition of neutrality of pH 7.0 and the range of the skin's determination from pH 4.1 to 5.8 according to GDCh "Datenblätter 02/2008". D. Segger et al, IFSCC Magazine 10, 107-110(2007)

5.2.2.) False evaluation of preservation's ability of particular substances as alcohols and glycols

Pharmaceutical literature shows protection of ethanol, isopropyl alcohol and propylene glycole at 20% and glycole at 40% against microbial decay of the water phase. It does not apply if the new materials transport a microbial burden or if the manipulation delivers a considerable amount of germs. Without treatment to reduce the burden, plant extracts may show a germ count of 10^3 - 10^4 cfu per g.

5.2.3.) Characteristics of substances adjuvant to preservation

In addition to the cosmetic benefit as moisturizers or skin conditioners, some raw materials and active ingredients are able to reduce the microbial burden. However, they influence the stability by changing the physical parameters (e.g. the surface tension). Thermal and mechanical stress may induce separation of the phases. To duly exclude such changes, it is necessary to collateralize the composition of the formulation by a thermic challenge test during development. (See e.g. Cosmetics Europe: Guidelines on Stability Testing of Cosmetic Products).

5.2.4.) Technical mistakes in production

It is dangerous to change the correct sequence of addition of the preservatives, deviation of the foreseen temperature control and false instant of time of the addition of materials during production:

- Preservation systems containing phenoxyethanol should be added at the end – otherwise the homogeneous distribution into the bulk fails and the material precipitates.

- Formaldehyde – releasing substances (as imidazolinyl urea) added above 50°C liberate the formaldehyde, and the gazeous material vanishes under vacuum.
- Stirring of air or another gazeous material into an emulsion may cause short and long-term instability.
- Insufficient homogenisation results in poor fine distribution of lipophilic or hydrophilic parts of an emulsion.
- Change of devices as filters, pumps and external equipment may directly influence the efficacy of the system of preservation, showing different characteristics of physical parameters.
- Deviation of time schedules may cause a decrease of the efficacy of preservation by sedimentation, precipitation, partial or complete inactivation.

5.3.) Change of the system of preservatives

Every change involves certain additional steps to consider

- Re-evaluation of safety /update of the safety report/ updating of product notification/change of labelling.
- Check of container's suitability.
- New preservation challenge test, new stability test, proof of marketability.
- Skin tolerance re-evaluation

Note:

- Close communication with the safety assessor during development is highly recommended. Some preservatives may be excluded in advance. That saves time and money.
- The change of substances with secondary preservative properties (e.g. from botanical sources) may cause an increase of irritation and allergic reactions after the product's launch on the market.

Some enterprises had to change the system of preservation again - a huge no-return-investment of time and money.

5.4.) Disappointing approaches to germ- infected products: is strictly to be avoided.

A cosmetic product's contamination under observance of GMPs rules is exceptional.

Every contamination demands precise fault analysis.

Experts rate the measurements listed below extremely critically and advise against using it. If in doubt the protection of consumer's health has priority and it is better to throw away the batch.

In addition, microorganisms cause a change in odor, color and texture, inactivation of active principles and the presence of metabolic waste of microorganisms in the product and violation of limits may occur.

- 5.4.1.) The dilution or mix of contaminated material with one non-contaminated material

This should never be done! Sometimes microorganisms adapt to a specific preparation. It means, they are less sensitive against the preservatives and/or the system of preservation. The mixing with a non-

contaminated batch will offer the germs the opportunity to grow in the complete new batch. It inflicts a complete loss.

- 5.4.2.) To add an additional amount of preservatives

This is no choice. In such a case, the contaminants are normally adapted to the preservative system and includes the danger of exceeding the microbiological limits.

- 5.4.3.) Heat treatment

The thermic stress damages fragrances, emulsions and causes inactivation of active ingredients and some preservatives.

- 5.4.4.) Gamma ray treatment

There is no control of chemical reactions leading to undesirable side products or total decay of the formulation. Containers may get brittle and can change color.

6 LITERATURE

ENGLISH

- REGULATION (EC) No 1223/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on cosmetic UPDATED VERSION by amendments http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1223&qid=1524598591404
- European Pharmacopoeia (Ph. Eur. 5.1.3, Efficacy of antimicrobial preservation)
- EN ISO 22716:2007 Cosmetics - Good Manufacturing Practices (GMP) - Guidelines on Good Manufacturing Practices
- SCCS Notes of Guidance, 9th revision, 4-4.4
- D. Segger et al., IFSCC Magazine 10, 107 – 110 (2007)
- Cosmetics Europe: Guidelines on Stability Testing of Cosmetic Products (https://www.cosmeticseurope.eu/publications-cosmetics-europe-association/guidelines.html?view=item&id=20)
- Approved preservatives for Cosmetics, A Review of Actives Listed in Regulation (EC) No 1223/2009 on cosmetic products – Annex V, Wolfgang Siegert 2014, Schülke& Mayr, EpubliGmbH, ISBN 978-3-8442-9192-6
- Cosmetics Europe: Guidelines on Stability Testing of Cosmetic Products https://www.cosmeticseurope.eu/download/WlJxZmI5UmhhTWhGNXVxNDArRk1uQT09
- Guidelines to Commission Regulation (EU) No 655/2013 laying down common criteria for the justification of claims usedin relation to cosmetic products http://ec.europa.eu/growth/sectors/cosmetics/legislation_en
- EN ISO 11930-2012 Cosmetics - Microbiology - Evaluation of the antimicrobial protection of a cosmetic product
- ISO 29621:2017 Cosmetics - Microbiology - Guidelines for the risk assessment and identification of microbiologically low-risk products
- ISO 17516:2014 Cosmetics -- Microbiology -- Microbiological limits

GERMAN

(IF NECESSARY, THE WORKING PARTY OF GOECH WILL PROVIDE SUPPORT)

- Österreichisches Recht: www.ris.bka.gv.at
- GÖCH Arbeitskreis Mikrobiologie kosmetischer Mittel „Ringversuch zum Konservierungsbelastungstest (KBT) für kosmetische Mittel“ Dezember 2012 (http://www.goech.at/files/ringversuch_ueberarbeitung_veroeffentlichung_goech_20121227_2.pdf)
- Datenblätter zur Bewertung der Wirksamkeit von Wirkstoffen in kosmetischen Mitteln der Gesellschaft Deutscher Chemiker GDCh (https://www.gdch.de/netzwerk-strukturen/fachstrukturen/lebensmittelchemische-gesellschaft/arbeitsgruppen/kosmetische-mittel.html)
- Heinz Knieriemen: Kosmetik-Inhaltsstoffe von A-Z (3. Auflage, 2008); AT Verlag, Baden und München, ISBN 978-3-85502-974-7
- http://www.fda.gov/ohrms/dockets/dailys/04/oct04/101904/04n-0050-rpt0001-E-03-Hoechst-vol7.pdf
- Konservierung kosmetischer Mittel, DGK, Verlag für chemische Industrie, H. Ziolkowsky GmbH, Augsburg, 1995, ISBN 387846 171 2

- Konservierung kosmetischer Mittel – Prüfmethoden, Teststrategie und Wirkabsicherung, DGK, Verlag für chemische Industrie, H. Ziolkowsky GmbH, Augsburg, 2015, ISBN: 978-3-87846-
- Wallhäußers Praxis der Sterilisation, Desinfektion, Antiseptik und Konservierung, Georg Thieme Verlag, Stuttgart, 2008, ISBN 978-3-13-141121-1
- Lebensmittelbuch B 33 http://www.lebensmittelbuch.at/b-33-kosmetische-mittel/naturkosmetik/
- Leitlinie der österreichischen Codexkommission zur Herstellung kosmetischer Mittel gemäß den Grundsätzen der „Guten Herstellungspraxis“ (Kosmetik-GMP) idgF https://www.verbrauchergesundheit.gv.at/lebensmittel/lebensmittelkontrolle/leitlinie_der_oesterr__codexkommission_gmp_april_2010.pdf?4e90vw

7 ADDITIONAL RECOMMENDATIONS

Orientation in accordance with this field manual does not relieve a producer from providing conformity with the current GMP – rules, current regulations and laws as well.

2nd edition, June 2018

8 ACKNOWLEDGMENTS

The Austrian Chemical Society (GÖCH) feels indebted to the contributors for their engagement:

Michael Bogdahn (Beiersdorf AG)
Erhard Diwald (Plantapharm GmbH)
Jörg Grohmann (Clariant Produkte (Deutschland) GmbH)
Karin Gromann (Österreichisches Bundesministerium für Gesundheit und Frauen)
Viviane Handler-Kunze (GW Cosmetics GmbH)
Sheida Hönlinger (SGS Institut Fresenius GmbH)
Bettina König (SGS Institut Fresenius Austria GmbH)
Erich Leitner (ELC)
Monika Meyer (Logocos Naturkosmetik AG)
Joelle Nussbaum (BAV Institut GmbH)
Gregor Özelt (Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH)
Simon Strickner (Adler Pharma Produktion und Vertrieb GmbH)
Andrea Weber (Dr. Babor GmbH & Co. KG)
Nadine Wentzel (Dr. Babor GmbH & Co. KG)

Very special thanks for particular support by the Ministry of Health and Women owe to:
Karin Gromann

We are grateful for keeping the minutes:
Viviane Handler-Kunze
Bettina König

Sheida Hönlinger	Erhard Diwald
GÖCH Microbiological Expert Circle’s scientific direction and organizational responsibility	Head of GÖCH Working Party Cosmetics

ANNEX 1: FIELD MANUAL: USE OF PRESERVATIVES

Field manual preservatives
Last update June 2018

Perservative	Not suitable / not permitted if:	Suitable / permitted if:	Remark	Maximum concentration according to Regulatoin No. 1223/ 2009 in %	Product type
2-Bromo-2-nitropropane-1,3-diole (Bronopol)	alkaline pH, light causes change of color amines, amides --> formation of nitrosamines		avoid formation of nitrosamines, to be use with care: may irritate mucosa membrane, danger of inducing allergy.	0.1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Behentrimonium Chloride / Cetrimonium Bromide / Cetrimonium Chloride / Laurtrimonium Bromide / Laurtrimonium Chloride / Steartrimonium Bromide / Steartrimonium Chloride	not compatible with anionic surfactants and peptides	stability in acidic media		0.1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Benzalkonium Chloride / Benzalkonium Bromide / Benzalkonium Saccharinate	not compatible with anionic components, detergents or anionic thickeners (carbomers) eye products		avoid contact with the eyes	0.1 calculated as Benzalkonium chloride	
Benzethonium Chloride	oral care products	"rinse off"-products "leave on"-products except oral care products		0.1	

Benzoic Acid / Sodium Benzoate	from 7.0 pH to alcalinity	oral care products, "leave on"products pH-optimum about 5.0		2.5 (acid) for "rinse off" except oral care products 1.7 (acid) for oral care products 0.5 (acid) for "leave on"	
Ammonium Benzoate / Calcium Benzoate / Potassium Benzoate / Magnesium Benzoate / MEA-Benzoate / Methyl Benzoate / Ethyl Benzoate / Propyl Benzoate / Butyl Benzoate / Isobutyl Benzoate / Isopropyl Benzoate / Phenyl Benzoate	from 7.0 pH to alcalinity	pH-optimum about 5.0		0.5 (acid)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Benzyl Alcohol	alkalinity, nonionic surfactans, oxidants		ingredient of essential oil and perfume	1.0	no restriction regarding application field in accordance to Regulation No. 1223/2009
Benzylparaben	banned from use in cosmetics (regulation 358/2014)		banned from use in cosmetics (regulation 358/2014)		

Butylparaben	macromoleculs, non ionogene and anionic raw materials in alcaline range, proteins, cationic surfactants, non ionogene macromolecules methyl cellulose, traganth, PVP		not suitable for "leave on"-products in the diaper area for children up to 3 years of age. Check, if warning "do not use on the nappy area" is necessary	0.14 as acid for the sum of concentrations together with propylparaben 0.8 as acid as mixture of esters of parabens, where sum of concentrations together with propylparaben does not exceed 0.14	
Chloroacetamid			Warning notice "Contains Chloroacetamide" **Ban expected**	0.3	no restriction regarding application field in accordance to Regulation No. 1223/2009
Chlorobutanol	not permitted in aerosols (sprays)		warning notice "contains chlorobutanol"	0.5	

Chlorhexidine / Chlorhexidine Diacetate / Chlorhexidine Digluconate / Chlorhexidine Dihydrochloride			classification (drug vs. cosmetic) if used as active antimicrobial component and not as a preservative (see ECJ -308/11)	0.3 (as chlorhexidine)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Chlorphenesin		pH-optimum: 4.0 - 6.0		0.3	no restriction regarding application field in accordance to Regulation No. 1223/2009
Dehydroacetic Acid / Sodium Dehydroacetate	not permitted in aerosols (sprays), if 7.0 pH and higher, incompatibility with formaldehyde or formaldehyde releasing substances, not compatible with nonionic surfactants	pH-optimum around 5.0	yellowing during storage	0.6 (as acid)	
Diazolidinyl Urea			potentially formaldehyde releasing substance. If concentration higher than 0.05% declaration "contains formaldehyde" necessary	0.5	no restriction regarding application field in accordance to Regulation No. 1223/2009
DMDM Hydantoin			potentially formaldehyde releasing substance. If concentration higher than 0.05% declaration "contains formaldehyde" necessary	0.6	no restriction regarding application field in accordance to Regulation No. 1223/2009
Ethylparaben	Macromoleculs, non ionogene and anionic raw materials in alcaline range, proteins, cationic surfactants, non ionogene macromoleculs methyl cellulose, traganth, PVP			0.4 as acid if used exclusively 0.8 as acid as part of a mixture of esters of parabens	

Formaldehyd	not permitted in aerosols (sprays)		declaration "Contains formaldehyde" if concentraton higher than 0.05% **Ban as preservative expected!**	0.1 (free formaldehyde) in oral care products 0.2 (free formaldehyde) in all other products	
Formic Acid / Sodium Formate	smell sensitive products	acidic pH		0.5 (as acid)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Glutaral	not permitted in aerosols (sprays), inactivation by proteins or sulfites	acidic pH	declaration of the warning "Contains glutaral" starting from 0.05% necessary	0.1	
Hexamidine / Hexamidine Diisethionate / Hexamidine Paraben				0.1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Imidazolidinyl Urea			potentially formaldehyde releasing substance, if concentration higher than 0.05% declaration "Contains formaldehyde" necessary	0.6	no restriction regarding application field in accordance to Regulation No. 1223/2009

Iodopropynyl Butylcarbamate (IPBC)	not to be used in products for children under 3 years of age, in oral care products and lip products, body lotions		not to be used in oral and lip products, not to be used in products for children under 3 years of age, except in bath products / shower gels and shampoo (for rinse off products) not to be used in products for children under 3 years of age (for leave on products and antiperspirants / deodorants) not to be used in body lotion and body cream (aimed to be applied on a large part of the body) check if warning notice "Not to be used for children under 3 years of age" is necessary, use only with care, halogenorganic compound	0.02 in "rinse off"products [1)] 0.01 in "leave on"products [2)] 0.0075 in antiperspirants / deodorants	
Isobutylparaben	use forbidden in cosmetics regulation (EU) No 358/2014		use forbidden in cosmetics regulation (EU) No 358/2014		
Isopropylparaben	use forbidden in cosmetics regulation (EU) No 358/2014		use forbidden in cosmetics regulation (EU) No 358/2014		
Methylisothiazolinone	leave on products	rinse off products	entries for methylisothiazolinone and a mixture of methylchloroisothiazolinone/methylisothiazolinone (3:1) exclude one each other Regulation (EU) No1223/2009 annex V entry 39 shows rules for the use of a mixture of methylisothiazolinone and methylchloroisothiazolinone The use of a mixture is not compatible with the use of methylchloroisothiazolinone as a single substance in the same product.	0.0015	
Methylchloroisothiazolinone / Methylisothiazolinone (mixture 3:1)	leave on products, sodium thioglycolates, amines, amino derivatives in alcaline range, strongly reducing components	rinse off products	the use of a mixture is not compatible with the use of methylchloroisothiazolinone as a singel substance in the same product.	0.0015	

Methylparaben	Macromoleculs, non ionogene and anionic raw matirials in alcaline range, proteins, cationic surfactants, non ionogene macromoleculs methyl cellulose, traganth, PVP			0.4 as acid if exclusively used 0.8 as acid as part of mixture of esters of parabens	no restriction regarding application field in accordance to Regulation No. 1223/2009
Chloroxylenol				0.5	no restriction regarding application field in accordance to Regulation No. 1223/2009
o-Cymen-5-ol				0.1	no restriction regarding application field in accordance to Regulation No. 1223/2009
Pentylparaben	use forbidden in cosmetics regulation (EU) No 358/2014		use forbidden in cosmetics regulation (EU) No 358/2014		
Phenoxyethanol	nonionic surfactants	7.0 pH	awareness of contamination with phenol	1.0	no restriction regarding application field in accordance to Regulation No. 1223/2009
Phenylparaben	use forbidden in cosmetics regulation (EU) No 358/2014		use forbidden in cosmetics regulation (EU) No 358/2014		
Piroctone Olamine		hair shampoo: 0.5-1.0% hair tonic: 0.05-0.1% deodorants: 0.1-0.3% conditioner: 0.1-0.3% hair gel and setting lotions: 0.05-0.2% hair cream: 0.1-0.3%		1.0 in rinse off products 0.5 all others products	

Polyaminopropyl Biguanide (PHMB)			ban according article 15 regulations (EU) No 1223/2009 (CMR-substance) **Status in revision**	0.3	no restriction regarding application field in accordance to Regulation No. 1223/2009
Potassium Sorbate	7.0 to alcalinity	pH-optimum about 5.0		0.6 (acid)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Propionic Acid / Ammonium Propionate / Calcium Propionate / Magnesium Propionate / Potassium Propionate / Sodium Propionate	smell sensitive products (intense odor characteristic) 7.0 to alcalinity			2 (as acid)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Propylparaben	macromoleculs, non ionogene and anionic raw matirials in alcaline range, proteins, cationic surfactants, non ionogene macromoleculs methyl cellulose, traganth, PVP		not suitable for leave on products in the diaper area for children up to 3 years of age, check, if warning remark "do not use in the diaper area" is necessary	0.14 as acid for the sum of concentrations together with propylparaben 0.8 as acid a mixture of esters of parabens, where sum of concentrations together with propylparaben does not exceed 0.14	
Quaternium-15			**Ban expected!**	0.2	no restriction regarding application field in accordance to Regulation No. 1223/2009

Salicylic Acid / Calcium Salicylate Magnesium Salicylate MEA-Salicylate Sodium Salicylate Potassium Salicylate TEA-Salicylate	products for children under 3 years of age except shampoos, alcalinity, light sensitive if combined with proteins	acidic pH	check if the warning notice "not to be used for children under 3 years of age" is necessary, if used for other purposes as a preservative look Annex III of regulation 1223/2009, active agent for peelings	0.5 (as acid)	
Sorbic Acid / Calcium Sorbate / Sodium Sorbate / Potassium Sorbate	7.0 to alcalinity, nonionic surfactants	pH-optimum about 5.0	yellowing during storage	0.6 (as acid)	no restriction regarding application field in accordance to Regulation No. 1223/2009
Triclocarban (TCC)			take care to purity criterea: 3,3',4,4'-Tetrachloroazobenzol ≤ 1 ppm 3,3',4,4'-Tetrachloroazoxybenzol ≤ 1 ppm, for other purposes than inhibition of growth of microorganisms in the product: the purpose must be recongnizeable by the presentation of the product.	0.2	no restriction regarding application field in accordance to Regulation No. 1223/2009
Triclosan	not suitable if polysorbate -80 and lecithine are present in excess	pH-optimum 4.8		0.3 toothpaste, soap for hand and body, shower gel, desodorant (not spray), facepowder and concealer, nail products and cleaning of fingernails and toenails before application of synthetic nails 0.2 mouthwash	
Zinc Pyrithione	preservative in "leave on"products, mouthwash	"rinse off"	if used for other purposes as preservative look at annex III regulation 1223/2009, active agent for peelings	1.0 use on hair (rinse off) 0.5 other (except oral use)	

1) "rinse off"-product: for temporary use(e.g. shower gel)
2) "leave on"-product: remaining on skin (e.g. cream)

ANNEXES CORRELATION TABLE

Name	INCI-Declaration	Annex 1223/2009
Formic Acid	Formic Acid	V, 14
Benzalkonium Chloride	Benzalkonium Chloride	V, 54
Benzethonium Chloride	Benzethonium Chloride	V, 53
Benzoic Acid	Benzoic Acid	V, 1
Benzyl Alcohol	Benzyl Alcohol	V, 34
Benzyl 4-hydroxybenzoate	Benzylparaben	II, 1377
Bronopol	2-Bromo-2-nitropropane-1,3-diol	V, 21
Butyl 4-hydroxybenzoate	Butylparaben	V, 12a
Cetyltrimethylammoniumchloride	Cetrimonium Chloride	V, 44
Chlorhexidine	Chlorhexidine	V, 42
2-Chloracetamide	Chloroacetamide	V, 41
Chlorbutanol	Chlorobutanol	V, 11
Chlorxylenol	Chloroxylenol	V, 26
Chlorphenesin	Chlorphenesin	V, 50
Dehydroacetic Acid	Dehydroacetic Acid	V, 13
Diazolidinyl Urea	Diazolidinyl Urea	V, 46
DMDM-Hydantoin	DMDM Hydantoin	V, 33
Ethyl 4-hydroxybenzoat	Ethylparaben	V, 12
Formaldehyde	Formaldehyde	V, 5
Glutaral	Glutaral	V, 48
Hexamidine	Hexamidine	V, 47
Imidazolidinyl Urea	Imidazolidinyl Urea	V, 27
3-Iod-2-propinylbutylcarbamate (IPBC)	Iodopropynyl butylcarbamate	V, 56
Isobutyl 4-hydroxybenzoate	Isobutylparaben	II, 1375
Isopropyl 4-hydroxybenzoate	Isopropylparaben	II, 1374
Potassium Sorbate	Potassium Sorbate	V, 4
Mixture of 5- Chlor-2-methyl- 3(2H)-isothiazolone and 2-Methyl- 3(2H)-isothiazolone 3:1	Methylchloroisothiazolinone / Methylisothiazolinone	V, 39
Methylisothiazolinone (MIT)	Methylisothiazolinone	V, 57
Methyl 4-hydroxybenzoate	Methylparaben	V, 12
4-Isopropyl-3-methylphenol	o-Cymen-5-ol	V, 38
Pentyl 4-hydroxybenzoate	Pentylparaben	II, 1378
2-Phenoxyethanol	Phenoxyethanol	V, 29
Phenyl 4-hydroxybenzoat	Phenylparaben	II, 1376
Piroctone Olamine	Piroctone Olamine	V, 35
Polyaminopropyl Biguanide (PHMB)	Polyaminopropyl biguanide	V, 28
Propionic Acid	Propionic Acid	V, 2
Propyl 4-hydroxybenzoate	Propylparaben	V, 12a
Quaternium-15	Quaternium-15	V, 31
Salicylic Acid	Salicylic Acid	V, 3
Sorbic Acid	Sorbic Acid	V, 4
Triclocarban (TCC)	Triclocarban	V, 23
Triclosan	Triclosan	V, 25
Zinc Pyrithione	Zinc Pyrithione	V, 8

Annex II regulation 1223/2009	LIST OF SUBSTANCES PROHIBITED IN COSMETIC PRODUCTS
Annex V regulation 1223/2009	LIST OF PRESERVATIVES ALLOWED IN COSMETIC PRODUCTS

CONVERSION FACTORS

Substance	Molar mass (g/mol)	Conversion factor
Benzoic acid	**122,12**	
Sodium benzoate	144,11	Sodium benzoate:Benzoic acid=1,18:1
Sorbic acid	**112,13**	
Potassium sorbate	150,22	Potassium sorbate:Sorbic acid=1,34:1
Dehydroacetic acid	**168,15**	
Sodium dehydroacetate	190,13	Sodium Dehydroacetate:Dehydroacetic acid=1,13:1
Salicylic acid	**138,12**	
Sodium salicylate	160,10	Sodium salicylate:Salicylic acid=1,16:1
4-Hydroxybenzoic acid	**138,12**	
Methylparabene	152,20	Methylparabene:4-Hydroxybenzoic acid=1,1 : 1
Ethylparabene	166,20	Ethylparabene:4-Hydroxybenzoic acid=1,2 : 1
Propylparabene	180,20	Propyparabene:4-Hydroxybenzoic acid=1,3 : 1
Butylparabene	194,20	Butylparabene:4-Hydroxybenzoic acid=1,4 : 1
Diazolidinyl urea	**278,23**	
DMDM Hydantoin	**188,12**	
Formic acid	**46,03**	
Sodium formiate	68,01	Sodium formiate:Formic acid=1,48:1
Propionic acid	**74,08**	
Ammonium propionate	91,11	Ammonium propionate:Propionic acid=1,23:1
Calcium propionate	186,22	Calcium propionate:Propionic acid=2,51:1
Magnesium propionate	170,45	Magnesium propionate:Propionic acid=2,3:1
Potassium propionate	112,17	Potassium propionate:Propionic acid=1,51:1
Sodium propionate	96,06	Sodium propionate:Propionic acid=1,3:1