From creams to tonics – an overview on different types of applications

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The supply of cosmetic products on the market is endless. It is difficult to keep track of the immense range of preparations – even for professionals. In addition to the different formulations there also is a large variety of types of application with all their advantages and disadvantages. The following overview shows which type of product is best suited for which purpose.

Haptic-, sensorial properties and practicability of products often are the decisive factors for consumers. The actual aim, however, is effectiveness which depends on how the components are processed – in other words, in an aqueous solution, a gel or in an emulsion. The different types of application are crucial for certain properties, as for instance how fast and how long the formulation is effective. They also influence the grade of availability of active agents in the skin.

Additional criterion to consider: the specific cosmetic additives in the different types of application that can have synergistic effects but also negatively influence the skin care- and environmental properties. Just to mention some examples: penetration-enhancing substances increase the availability of substances; preservatives affect the microbiome of the skin; perfumes have allergenic potential; other cosmetic additives are physiologically or biologically not degradable. Cosmetic additives can also be highly effective active agents – such as native phosphatidylcholine in liposomes and nanodispersions or hydrogenated phosphatidylcholine in lamellar creams.

pH as a significant criterion

The pH value is a significant criterion in all aqueous applications. Without buffers it can range from 5-7. In cases where salt components buffer the pH value, or in other words, keep it at a constant level, the pH level should match the individual pH value of the skin. Should that not be the case, there is a risk of disorders in the skin barrier, of the epidermal enzymes and of the microbiome.

In combination with instruments

Combinations of the different types of application with instrument-based treatments such as the iontophoresis (aqueous solutions with mostly negatively charged active agents), radiofrequency (RF; high energy input), ultrasound, medical needling (dermal needling) should only be carried out by staff who is qualified for instrument-based treatments and has a certain knowledge on the suitability of the preparations and their contents. Examples:

- Preparations with preservatives, perfume components that are subject to declaration and denatured alcohol are counterproductive with monopolar RF.
- If anything, only non-aqueous, lipophilic lubricant media and active agents can be used in combination with bi- and multipolar RF.

The table below gives an overview on different applications in the sections skin cleansing, skin protection, skin care and decorative cosmetics.

Type of application	Composition	Additives	Typical usage	Hints
Solutions – aqueous	Water-soluble herbal extracts, vitamins, amino acids, moisturizing substances (glycerin, urea etc.), hyaluronic acid in low concentration	Preservatives[1], alternatively: cans and ampoules (sterile) or low alcohol- and glycol-contents	Sera (possibly modular), moisturizers, tonics, lotions, antimicrobial dermal needling tonics	Filling possibly in aerosol cans with propellant gas, dispensers with spraying- or foaming attachment[2] or pipette bottles
	Water, tensides	Tensides[8] in low concentration; preservatives[1]	Micelle water, mild skin cleansing	Rinse-off-products
Solutions – alcoholic	Essential oils, perfumes	High alcohol- or isopropyl alcohol contents	Fitness frictions (cooling), inunctions, perfumes	Not suitable for skin care purposes
Solutions – non-aqueous	Organic, liquid solvents	None	Nail enamels	Not suitable for skin care purposes
Essential oils	Volatile herbal extracts, e.g. rose oil (alias attar)	None	Perfumes, bath- and cream additives, room scents, aromatherapy	Follow Dangerous Substances Directive
Fatty oils	Native triglycerides and/or synthetic ester oils	Antioxidants[3] at triglycerides with bound essential fatty acids	Massage oils, body oils, baby cleansing and baby skin care	Suitable for atopic, very dry and sensitive skin
Butters	Shea- and cocoa butter contain cholesterol-like phytosterines and wax esters	None	Lipid-rich skin care, frequently locally applied, e.g. breast and genital area	Suitable for atopic, very dry skin, very economical product, slow penetration
Balms – e.g. benzoin, frankincense, myrrh	Natural herbal secretions containing essential oils, free acids, aromatic esters and aldehydes	Balms and their extracts lose their resin characteristics when processed in nanodispersions	Anti-inflammatory sera	Suitable for rosacea and acne skin care: boswellic acids (frankincense extract)
Hydrogels	Water and gelling agents, e.g. xanthan gum, hyaluronic acid or synthetic carbomers	Preservation see aqueous solutions	Hair- and skin care, modular base gels, moisturizers, cleansing gels (with tensides)	Ultrasound medium
Oleogels – degradable	Triglycerides, wax esters, phytosterines	Penetration-enhancing substances: phosphatidylcholine[4]	Child care, skin protection, in particular cases suitable for rosacea skin care	Good penetration; suitable for atopic and very dry skin
Oleogels – mineral	Paraffin oils, vaseline, ceresin waxes, (ozokerite)	Frequent consistency agent: silica	Ointments, topical pharmaceutical drugs, mascara, camouflages and eye shadows	Poor penetration (occlusive), regenerative processes are slowed down (plaster effect)
Sticks	Waxes, pigments, fatty oils	Antioxidants	Lip(care)sticks, eyeliner pencils and concealer sticks	Semisolid to solid
Shake mixtures	Oil and water	Emulsifier free, preservation see aqueous solutions	Sensitive skin, problem skin, pharmaceutical drugs	Shake well before use
Emulsions[5]	Oil in water (O/W)	O/W-emulsifiers[6], preservatives[1], preservative free: foams (aerosol cans), aqueous phase frequently hypertonic[7]	Mild skin care (creams, milk) tenside free cleansing (milk)	Reduced washout effect in case of physiologically compatible emulsifiers: e.g. mono- and diglycerides

[1] Preservatives are listed in the annex of the German Cosmetic Directive (Kosmetikverordnung – KVO). All of them have sensitizing potential.
[2] Foaming agents are e.g. saponins from herbal extracts.
[3] In presence of unsaturated fatty acids, antioxidants are also used in other forms of application.
[4] Applications containing phosphatidylcholine (PC) usually are free of preservatives since PC inactivates most of the preservatives listed in the annex of the German Cosmetic Directive. This is an advantage for the microbiome of the skin as it is neither damaged nor can resistances be developed. PC applications hence are particularly suited for sensitive- and problem skin.
[5] Special forms: multiple emulsions W/O/W and O/W/O
[6] Physiologically non-degradable emulsifiers lead to washout effects and, depending on their structure and critical micelle concentration (CMC), can also irritate sensitive skin.
[7] Hypertonia is caused by salts or low molecular, water-soluble compounds such as urea. Hypertonic water phases can also be found in O/W emulsions. In the case of barrier- and connective tissue disorders they can cause a temporary burning sensation on the skin.

Type of application	Composition	Additives	Typical usage	Hints
	Water in oil (W/O)	W/O emulsifiers[6], preservatives[1]	Rich skin care, skin protection	In comparison to O/W mostly lower water phase and less preservatives[1]
	Pickering emulsions	Solids such as silica, peptides (in the interfaces)	Skin care	W/O and O/W possible
Cold creams	Lanolin, phytosterines, bees wax, low amounts of water	Salts	Dry and sensitive skin	In comparison to W/O emulsions a more solid consistency
Lamellar bases	Oils and water in the form of physiological membrane structures	Phosphatidylcholine[4]	Skin protection, skin care, modular base creams: emulsifier free cleansing (milk)	Particularly suitable for dry and atopic skin; suitable for corneotherapeutic treatments (according to A.M.Kligman)
Microemulsions	Water, tensides, oil	Tensides[8] in high concentration	Transparent shampoos, cleansing gels	High skin irritation potential in tensides with high critical micelle concentration (CMC), rinse-off products
Nanodispersions	Water, particles with physiological membranes and encapsulated liquid, lipophilic active agents	Phosphatidylcholine[4]	Active agent concentrates, sera (possibly modular) – frequently for problem skin. Specific bath preparations (in-situ dispersions)	High penetration of active agents; particularly suited for dry and atopic skin as well as scars; particles physiologically degradable
	Water, solid lipophilic active agent particles in nano size	Tensides[8]	Active agent concentrates, sera, compound for skin care preparations	High penetration of not readily soluble active agents; particles physiologically degradable
Liposomes	Water, cellular physiological bilayer with encapsulated hydrophilic active agents	Phosphatidylcholine[4]	Active agent concentrates, sera (possibly modular) – frequently for problem skin	High penetration of active agents, particularly suitable for blemished skin, acne, perioral dermatitis
Suspensions	Micronized active agents	Cream bases	Ointments, UV-protection (mineral: ZnO, TiO_2)	Not readily soluble active agents
	Waxes, seed flours	Cream bases	Mechanical peelings plus skin care ("2 in 1")	Waxes are more gentle to the skin than seed flours
	Plastic particles consisting of PE, PP, PU	Cream bases	Mechanical peelings, occupational skin cleansing	Microplastics problems
	Salts or sugars, fatty oils or oil mixtures	Mixture to prepare before the treatment	Full-body peelings plus skin care ("2 in 1")	Peeling bodies are removed with water after the treatment
	Pigments, dyes, polyamide fibres	Mascara base	Mascara	Eye cosmetics (deco)
Foundations	Emulsions with high pigment content	Emulsifiers[6], emulsifier free: lamellar bases	Make-up	Slight UV protection
Powders	Minerals, pigments	Cutting agents: native flours, polyamides	Powders, compact powder	Slight UV protection
	Minerals, healing earth	Are mixed with water before the treatment	Cleansing- and skin care masks	Rinse-off products
	Algin, diatomaceous earth	Calcium sulphate; are mixed with water before the treatment	Hardening, occlusive modelling masks (20-30 min.)	Active agents concentrates are applied under the modelling masks
	Bromelain, papain; diatomaceous earth, kaolin	Are mixed with water before the treatment	Enzyme peelings (10-30 min.)	Rinse-off products
	Soda, citric acid, perfumes or dyes	Binding agent for pills and granules, e.g. starch	Bath additives (sparkling)	Observe pH-value!

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[8] Surface-active semisynthetic or fully synthetic compounds, e.g. sugar tensides. They only gradually differ from emulsifiers due to their usually higher CMC and are preferably used in cleansing products.