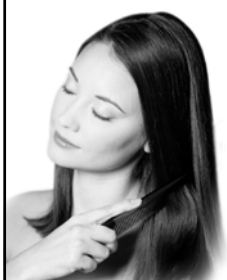


University of Ljubljana
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BALZAMI ZA LASE REGENERATORJI



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Kozmetični izdelki II
Univerzitetni študijski program Kozmetologija
Študijsko leto 2012/13



- šamponi odstranjujejo sebum - regeneratorji posnemajo pozitivne lastnosti sebuma, preprečujejo pa masten izgled las
- popravljajo poškodovane lase
- delujejo začasno – do naslednjega šamponiranja



POŠKODBE LAS

- kemični stres
- mehanski stres
- stres iz okolja

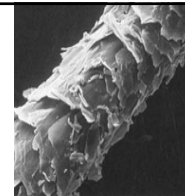


POSLEDICE NA LASEH

- šibkejši, lažje lomljivi lasje
- izgubljen sijaj
- pusti, »brez življenja«



Poškodovana površina las



Površina kutikule v normalnih okoliščinah:

- **hidrofobne lastnosti**
(m.k.: 18-MEA - metil eikozanojska kislina)

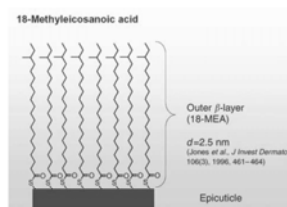


Figure 1. The β -layer - 18-methyl eicosanoic acid is intimately bound to the exo-cuticle and intensely hydrophobic.

Izoelektrična točka keratina 3.67 → pri višjem pH imajo lasje negativen naboj.

Gostota neg. naboja las narašča od korenin do konic las (fotodegradacija proteinov).

Vloga regeneratorjev

- obnavljajo strukturo las in vplivajo na videz človeških las
- olajšajo česanje mokrih in suhih las
- zmanjšajo naelektrenost las
- povečajo lesk, sijaj las
- povečajo volumen las
- popravijo lasno strukturo
- povečajo vlažnost

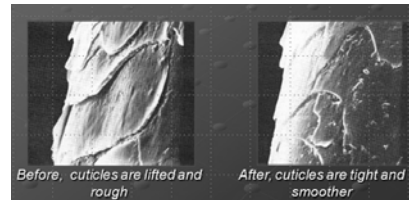
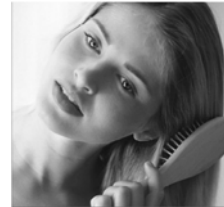


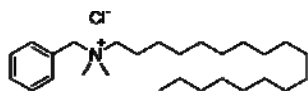
TABLE 2 Role of Hair Conditioners

Hair conditioner benefit	Effect on hair	Mechanism of action
Decreased static electricity	Prevents fly-away hair	Neutralizes negative charge on hair shafts
Increased hair shine	Creates the appearance of healthy hair	Coats the individual hair shafts with a light reflective material
Decreased intershaft hair friction	Decreases the ability of the hair to tangle	Sticks the loosened cuticular scale to the hair shafts
Increased hair manageability	Improves the ability of the hair to remain in a desired hairstyle	Fills in surface defects in the hair shafts to minimize static electricity
Increased hair softness	Improves the tactile characteristics of the hair shafts	Smooths loosened cuticular scale to create an even hair surface
Temporarily mends split ends	Improves the appearance of frayed distal hair shafts	Sticks the exposed cortex and medulla together to temporarily mend the protein split

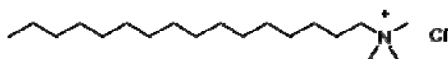
Sestavine regeneratorjev

KATIONSKE PAS

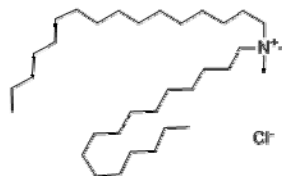
- kvaterne amonijeve spojine
- učinkovitost, dostopnost, nizka cena



stearalkonijev klorid



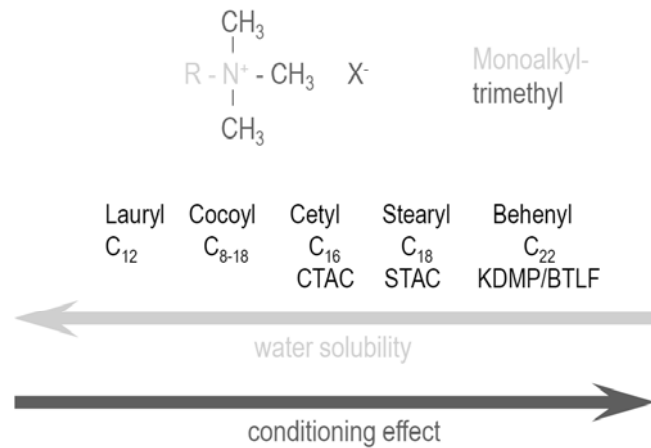
cetrimonijev klorid



dicetildimonijev klorid

- slabosti: slaba vodotopnost, inkompatibilnost z anionskimi PAS (šamponi)

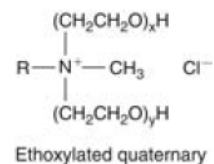
Vpliv kemijske strukture



Kompatibilnost z anionskimi PAS

ETOKSILIRANE KVATERNE AMONIJEVE SPOJINE

- manjša iritacija kože
- zmanjšana regenerativna učinkovitost
- PEG-2 kokomonijev klorid
(x+y = 2, R = C₁₂ veriga)
- PEG-15 stearmonijev klorid
(x+y = 15, R = C₁₈ veriga)



KATIONSKE POLIMERI

- tvorijo film na površini las – gladka površina, ki odbija svetlobo – sijaj
- več pozitivno nabitih skupin na molekulo polimera - ↓ naelektrenost las
- ↑ volumen poškodovanih las, popravljajo razcepljene konice, las ne puščajo mastnih
- možno kombiniranje kationskih PAS in kationskih polimerov
- večja kompatibilnost z anionskimi PAS (2-v-1 šamponi)
- polikvaterniji (PQ-10, PQ-24, PQ-29...)

Table 2. Examples of Quaternary Derivatives Used in Personal Care Formulations

Starting Material	INCI or Chemical Name of Cationic Derivative
Guar	Guar Hydroxypropyltrimonium Chloride Hydroxypropyl Guar Hydroxypropyltrimonium Chloride
Cellulose	Polyquaternium-10 Polyquaternium-24 Cocodimonium Hydroxypropyloxyethyl Cellulose Lauryldimonium Hydroxypropyloxyethyl Cellulose Stearyldimonium Hydroxyethyl Cellulose Stearyldimonium Hydroxypropyl Oxyethyl Cellulose
Lanolin	Quaternium-33
Chitosan	Polyquaternium-29
Sugars	Hydroxypropyltrimonium honey Lauryl Methyl Gluceth-10 Hydroxypropyldimonium Chloride Dextran Hydroxypropyltrimonium Chloride
Starches	Hydroxypropyltrimonium Hydrolyzed Wheat Starch Hydroxypropyltrimonium Hydrolyzed Corn (Maize) Starch Hydroxypropyltrimonium Hydrolyzed Potato Starch Hydroxypropyltrimonium Hydrolyzed Amylopectin

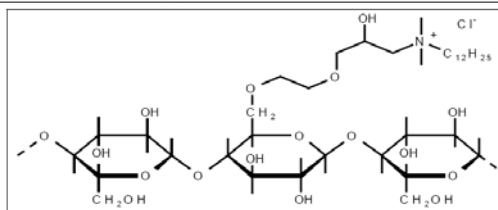


Figure 7. Polyquaternium-24

HIDROLIZATI PROTEINOV

- za poškodovane lase: na mestih, kjer ni kutikule, se odlagajo proteini iz regeneratorskega (hidrolizirani: MW: 1000 do 10000 Da)
- proteini penetrirajo v lase skozi te odprtine in ↑ krepkost las (začasno – do naslednjega umivanja)
- proteini iz živalskega kolagena, keratina, placente, jajc, proteini svile, soje, koruze, pšenice
- pomemben je čas kontakta z lasmi

Protein (animal based)	Hydroxypropyltrimonium Hydrolyzed Collagen
	Lauryldimonium Hydroxypropyl Hydrolyzed Collagen
	Cocodimonium Hydroxypropyl Hydrolyzed Collagen
	Stearyltrimonium Hydroxyethyl Hydrolyzed Collagen
	Stearyltrimonium Hydroxypropyl Hydrolyzed Collagen
	Hydroxypropyltrimonium Hydrolyzed Keratin
	Cocodimonium Hydroxypropyl Hydrolyzed Hair Keratin
	Cocodimonium Hydroxypropyl Hydrolyzed Keratin
	Hydroxypropyltrimonium Gelatin
	Hydroxypropyltrimonium Hydrolyzed Casein
Protein (vegetable based)	Hydroxypropyltrimonium Hydrolyzed Wheat Protein
	Cocodimonium Hydroxypropyl Hydrolyzed Wheat Protein
	Lauryldimonium Hydroxypropyl Hydrolyzed Wheat Protein
	Stearyltrimonium Hydroxypropyl Hydrolyzed Wheat Protein
	Hydroxypropyltrimonium Hydrolyzed Soy Protein
	Cocodimonium Hydroxypropyl Hydrolyzed Soy Protein
	Lauryldimonium Hydroxypropyl Hydrolyzed Soy Protein
	Hydroxypropyltrimonium Hydrolyzed Conchiolin Protein
	Hydroxypropyltrimonium Hydrolyzed Rice Bran Protein
	Ginseng Hydroxypropyltrimonium Chloride
	Hydroxypropyltrimonium Hydrolyzed Silk Protein
	Hydroxypropyltrimonium Hydrolyzed Whey Protein
	Hydroxypropyltrimonium Jojoba Protein
	Cassia Hydroxypropyltrimonium Chloride
	Locust Bean Hydroxypropyltrimonium Chloride

SILIKONI

- naredijo tanek hidrofoben film na laseh, voda ga ne spreje
- ↓ naelektrenost in trenje las, ↑ sijaj las (zgladijo kutikulo)
- največja obstojnost silikonov na kemično neobdelanih laseh - hidrofobna narava
- dimetikon, ciklometikon, dimetikon kopoliol

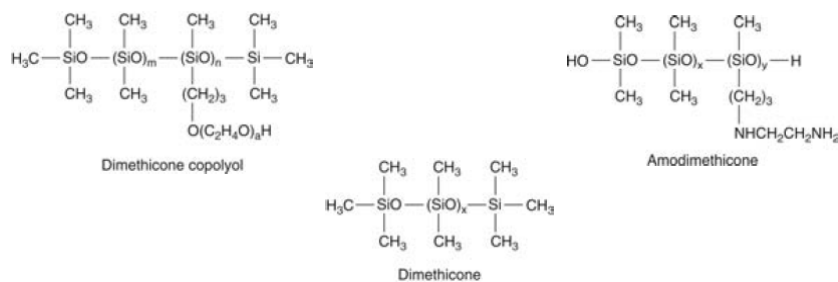


TABLE 3 Hair Conditioner Categories

Hair conditioner category	Primary ingredient	Main advantage	Hair grooming benefit
Cationic detergent	Quaternary ammonium compounds	Smooth cuticle, decrease static electricity	Excellent to restore damaged, chemically processed hair
Film-former	Polymers	Fill hair shaft defects, decrease static electricity, improve shine	Improve the appearance of dry hair, improve grooming of coarse, kinky hair
Protein-containing	Hydrolyzed proteins	Penetrate hair shaft to minimally increase strength	Temporarily mend split ends
Silicones	Dimethicone, cyclomethicone, amodimethicone	Thin coating placed on hair shafts	Decrease static electricity, decrease combing friction, add shine

OSTALE SESTAVINE

- zgoščevala
- emolienti
- pomožne PAS
- dišave
- konzervansi

Zgoščevala

- maščobni alkoholi (cetanol), voski (karnauba), parafin, gumiji (guar gumi)
- zgoščevanje z dodatkom soli (NaCl) – dodajanje razredčene raztopine soli (10 % max.) zelo počasi med stalnim mešanjem



Emolienti

- lipofilne snovi dajejo lesk: naravne ali sintezne
- olja, estri in voski: jojobino olje, olivno olje, olje grenivkinih pečk; silikoni
- prednost imajo sintezna olja – tvorba filma z večjim sijajem
- porazdelitev po laseh – transparenten film, ki odbija vodo

Pomožne PAS

- kvaterne amonijeve spojine nimajo zadovoljivih emulgatorskih lastnosti, ki bi omogočale nastanek stabilne disperzije – potrebne so dodatne PAS
- neionske PAS (anionske niso primerne - inkompatibilnost)
- etoksilirani maščobni alkoholi (polisorbati 80)

VRSTE REGENERATORJEV

- KRATKOTRAJNI REGENERATORJI

- apliciramo jih na umite lase (1-5 min) ter speremo
- omejena sposobnost popravljanja poškodovanih las
- običajno kationske PAS



- INTENZIVNI REGENERATORJI (MASKE)

- na laseh pustimo 10-30 min – omogočimo penetracijo snovi in nastanek filma (za zelo poškodovane lase)
- lahko $\uparrow T \rightarrow$ nabrekanje kutikule $\rightarrow \uparrow$ penetracija
- visoke koncentracije kvaternih amonijevih PAS in proteinskih hidrolizatov



- REGENERATORJI BREZ IZPIRANJA

- apliciramo jih na obrisane lase in jih ne speremo - pomagajo pri oblikovanju las (vlažijo, ↓ trenje, ščitijo pred ↑T med sušenjem)

- za kodraste lase – tekoči parafin, olja, silikoni

- tanke, ravne lase naredijo mastne, ker se težko spirajo s šamponom



IZDELAVA REGENERATORJEV

- metoda združevanja faz: segrejemo oljno in vodno fazo → združimo → ohladimo
- visoko razmerje vodna/oljna faza → samo del vode segrejemo za tvorbo koncentrirane emulzije → ostalo vodo dodamo ohlajeni emulziji

Receptura 1

Formula I Hair conditioner

	% w/w
Cetrimonium chloride 30% active	3.00
Cetearyl alcohol	2.80
Perfume	q.s.
Preservative	q.s.
Citric acid	pH 3.0–5.0
Colour	q.s.
Water (deionized)	to 100.00

Manufacture

1. Add 90% of the water and the cetrimonium chloride to the main manufacturing vessel. Heat to 70–75°C.
2. Melt the cetearyl alcohol in a jacketed side vessel. Heat to 70–75°C.
3. When both phases are at 70–75°C, add the oil phase to the water phase with homogenization to form an emulsion.
4. When the emulsion has formed, commence cooling to 40°C with paddle stirring only.
5. Dissolve the preservative in a portion of the reserved water. Add to the main vessel with continuous mixing.
6. Add colour to the main vessel. Continue to cool.
7. Add fragrance to the main vessel. Mix until homogeneous.
8. Adjust pH with citric acid dissolved in water to pH 3.0–5.0.
9. Cool to 35°C.

Literatura

- Reich C, Su D and Kozubal C. Hair Conditioners In: Paye M, Barel AO, Maibach HI. Handbook of cosmetic science and technology, Taylor & Francis, 2006: 407-425.