

Health & Beauty Solutions

Next Generation Retinoids for Well-Aging and Radiant Skin

April 27, 2022



Agenda

- HBS Overview
- Mechanisms for skin damage and the benefits of retinoids – focus on retinaldehyde
- Benefits of delivery systems with retinaldehyde
- BHT-Free Retinol Products

Health & Beauty Solutions



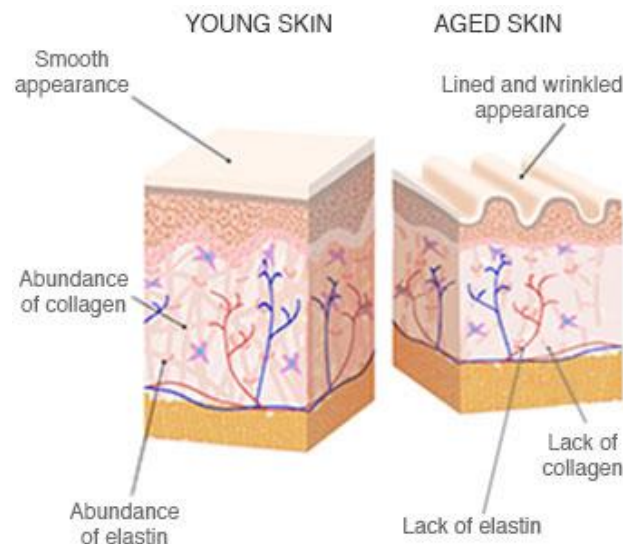
HBS is a leading provider of

- Delivery system for cosmetic, OTC and Rx active ingredients based on our proprietary microparticle delivery systems
 - MICROSPONGE[®], MICROSPONGE[®] **N**, POLY-PORE[®], LUXOMATTE[®] **N** and POLYTRAP[®] product lines
- Clay based rheology products
 - MAGNABRITE[®] – Magnesium Aluminum Silicate products
 - POLARGEL[®] – Bentonite products
 - HECTABRITE[®] – Hectorite products
- Retinol liquid concentrates

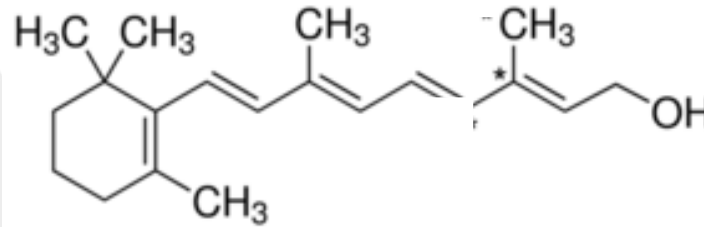
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Aging of the Skin

- ▶ Sun protected skin will naturally age due to:
 - Thinning of the epidermis leading to easily damage skin
 - Degradation of collagen and elastin causes the skin to be less firm and the formation of wrinkles
 - Visible age spots and unevenness of the tone of the skin
- ▶ Estimated that > 80 % of the damage can be due to UV exposure
 - UV light stimulates a pathway that activates MMP that leads to the degradation of collagen and elastin



Historical Look at the Use of Retinoids

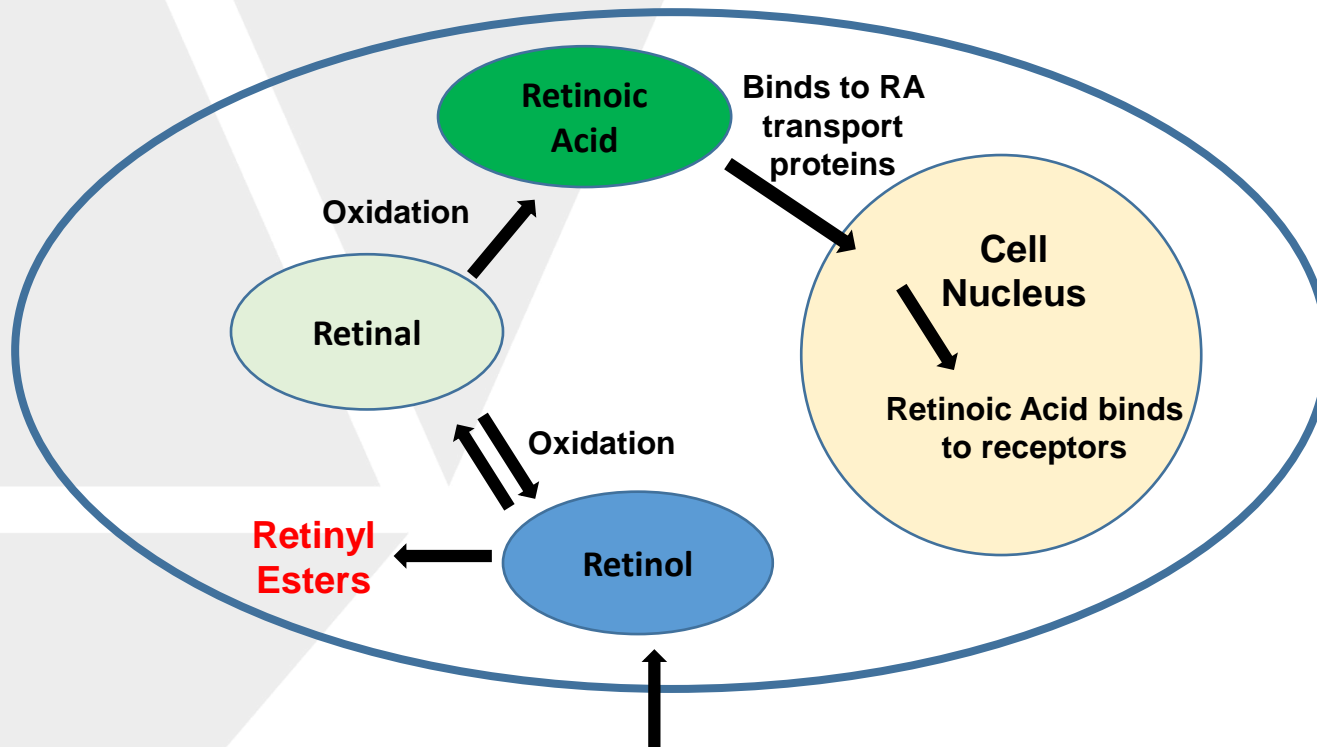


- Retinol (Vitamin A) is an essential nutrient that is critical to the body
- Retinoids first used to treat acne (oral) where it was observed that it influenced the thickness of the epidermis
- Topical retinoic acid introduced to the market for acne (1971)
- Early retinol studies were frustrated by poor stability of the active
- Many companies use less-effective forms of retinol, like retinyl palmitate or retinyl propionate, since they are easier to formulate with.
- The next generation – Retinaldehyde (Retinal)

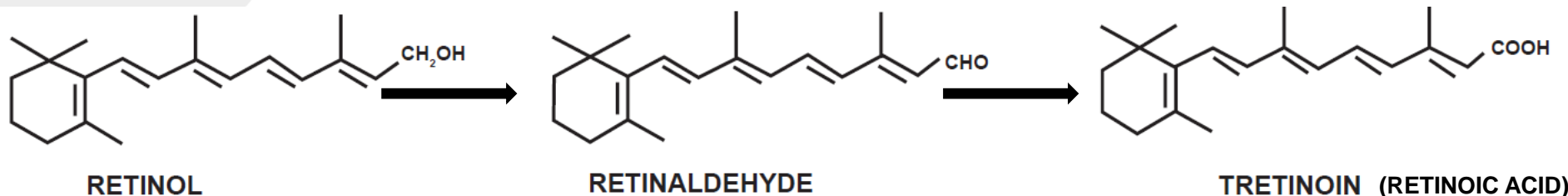
Why retinoids?

- ▶ Retinoids have been shown clinically to:
 - Increase procollagen production
 - Increase cellular proliferation and skin cell turnover
 - Stimulate production of glycosaminoglycan
 - Protect Langerhans cells from UV depletion
 - Reduce age spots
 - Improve the evenness of the skin tone
 - Reduce fine lines and wrinkles

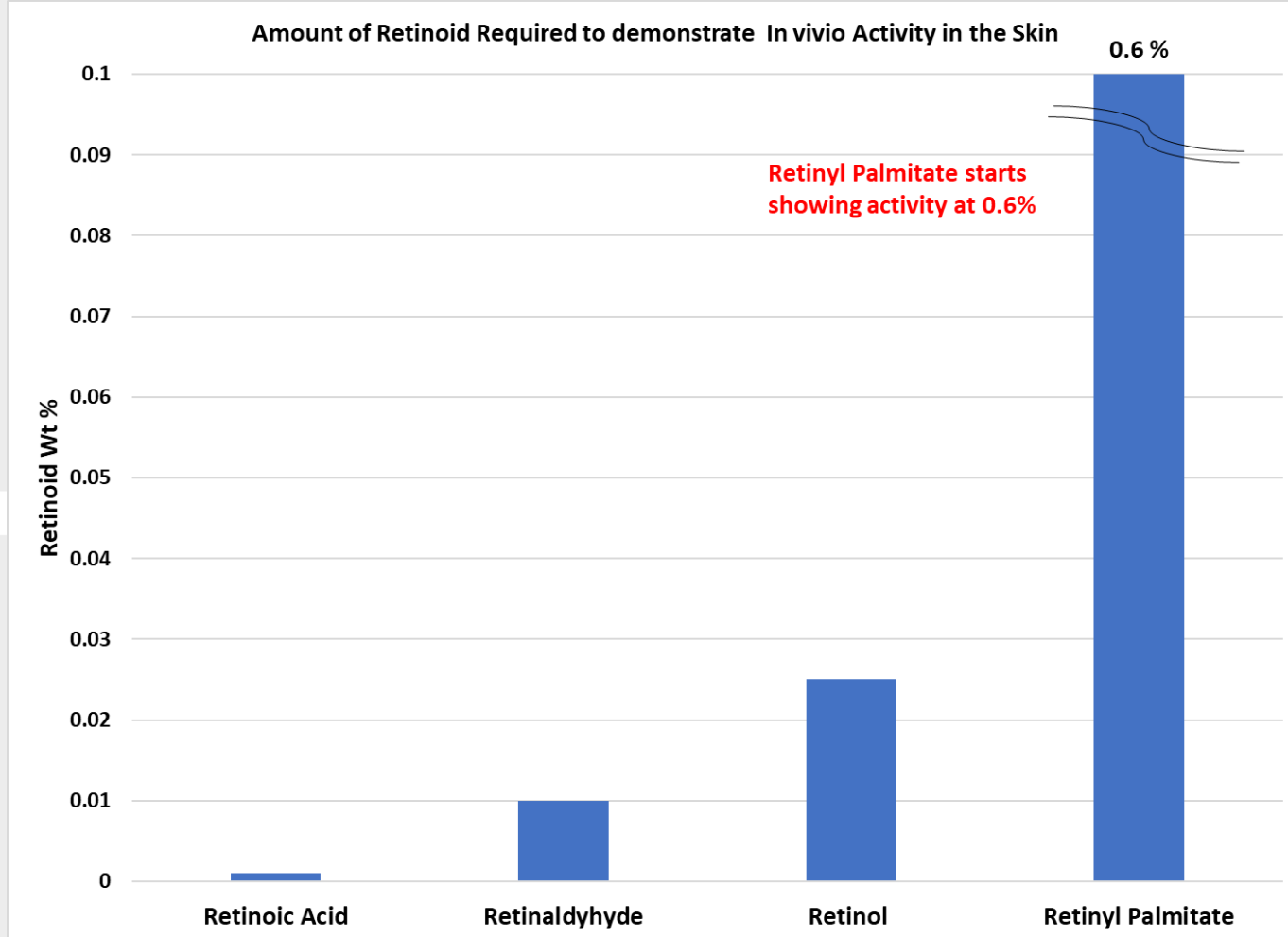
Retinaldehyde Advantage – More Efficient Conversion to Retinoic Acid



- Retinoic Acid is the active species that drives the skin benefits of retinoids
- Retinaldehyde is one step closer to being converted into retinoic acid



Retinaldehyde Advantage

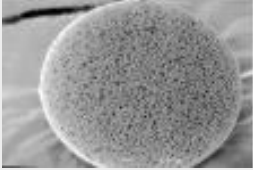
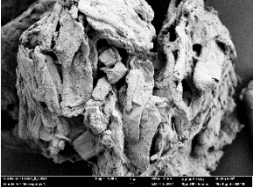


* Duell et. al *J. Invest. Derm.* 109, 301 (1997)

Effectiveness

Retinoic Acid > Retinaldehyde > Retinol >>> Retinyl Palmitate

HBS Microparticle Delivery Systems

Technology	Attributes	Actives	Size (µm)
MICROSPONGE® 	<ul style="list-style-type: none">-Sustained delivery-Sebum control-Silky feel to formulations-Name brand recognition in the pharma world	<ul style="list-style-type: none">-Oil Soluble-Water Soluble-Solids	10 – 20 µm
MICROSPONGE® N 	<ul style="list-style-type: none">-All Natural Microparticle-ISO 16128 & COSMOS Compliant-Sustained delivery-Sebum control	<ul style="list-style-type: none">- Oil Soluble- Water Soluble	10 – 20 µm

Benefits

- High loading capacity for both water and oil soluble ingredients
- Stabilizers can be added close to the active
- Sustained release of actives provides:
 - Reduced irritation
 - Extended Delivery claim
- Easy to formulate in a wide variety of product types

Retinaldehyde Entrapment Design

Product	Retinaldehyde Content	Natural Delivery System	BHA-Free	BHT-Free	Polysorbate-20 - Free
Microsponge [®] 520RA	20%	No	YES	No	YES
Microsponge [®] N 720TRA	20%	YES	YES	YES	YES

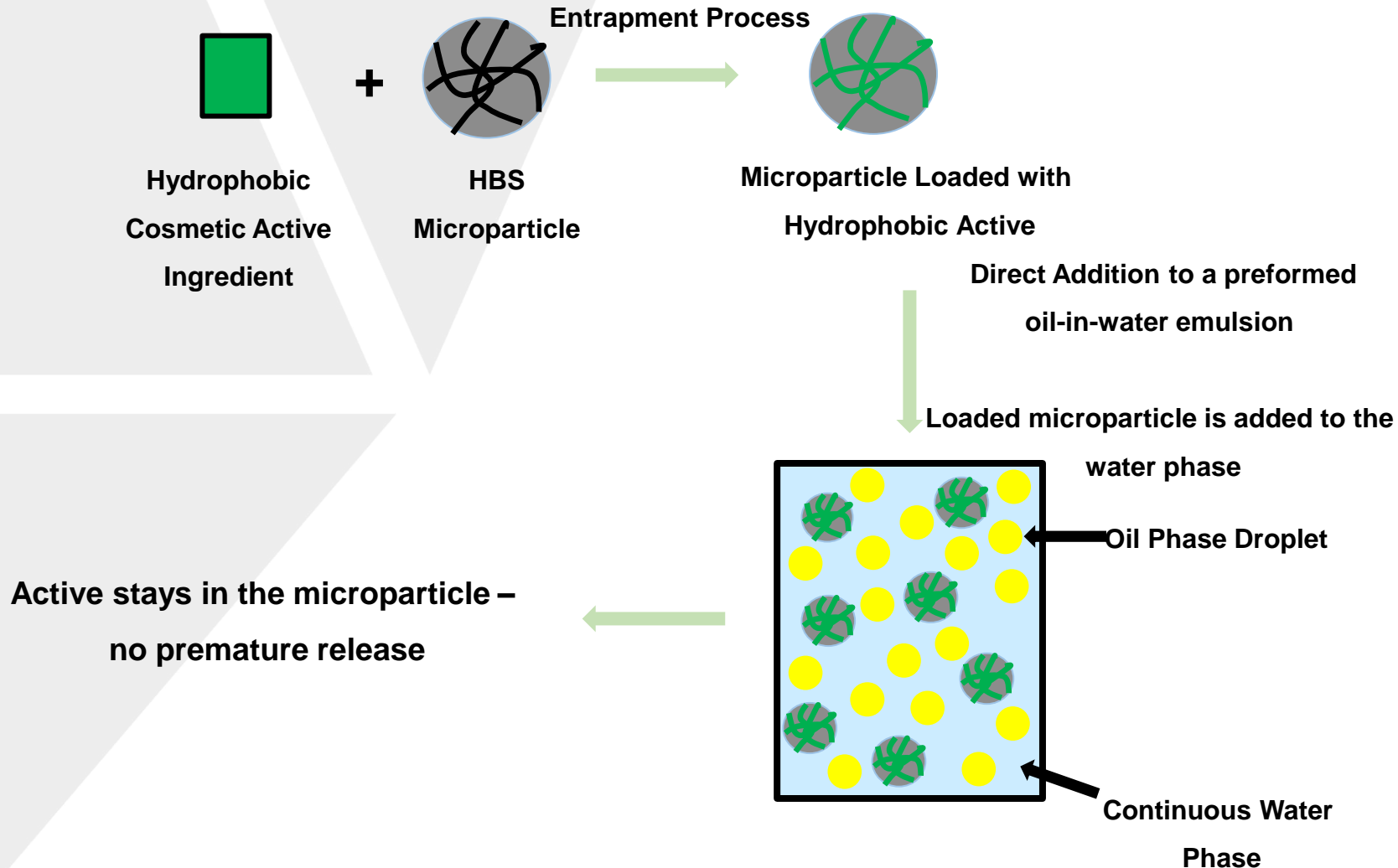
Microsponge[®] 520RA

INCI: Methyl Methacrylate/Glycol Methacrylate Copolymer, Retinal, BHT

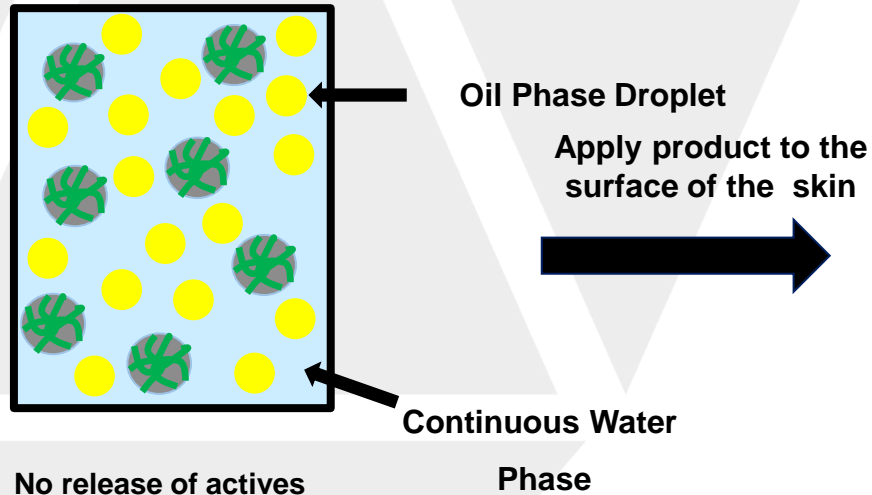
Microsponge[®] **N** 720TRA

INCI: Cellulose, Retinal, Tocopherol

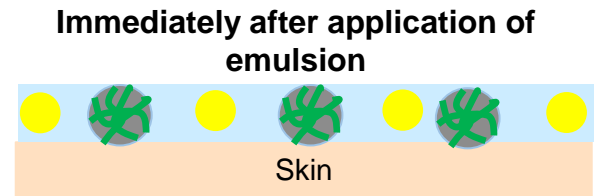
Hydrophobic Actives – o/w Emulsions



Release of Active after Application of o/w Emulsion



Apply product to the surface of the skin



Initially, water evaporates, and oil phase coalesces

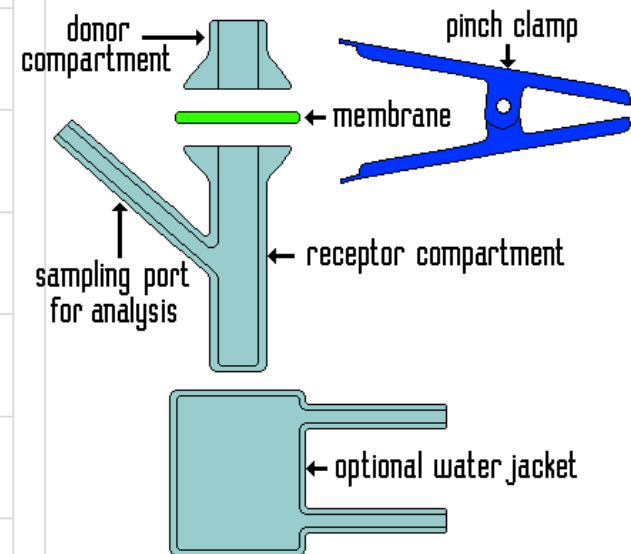
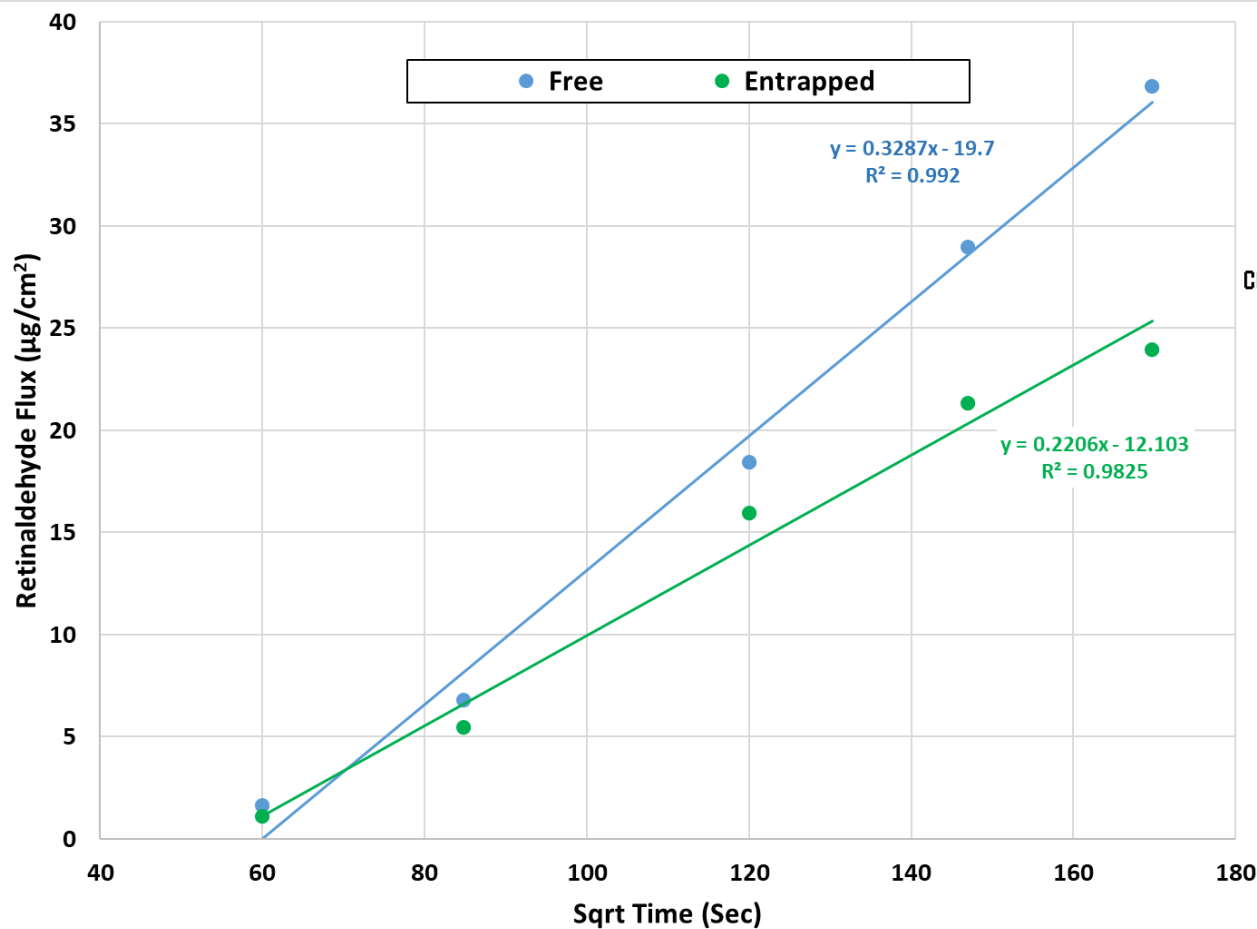


Hydrophobic active then starts to diffuse out of the microparticle driven by the concentration gradient

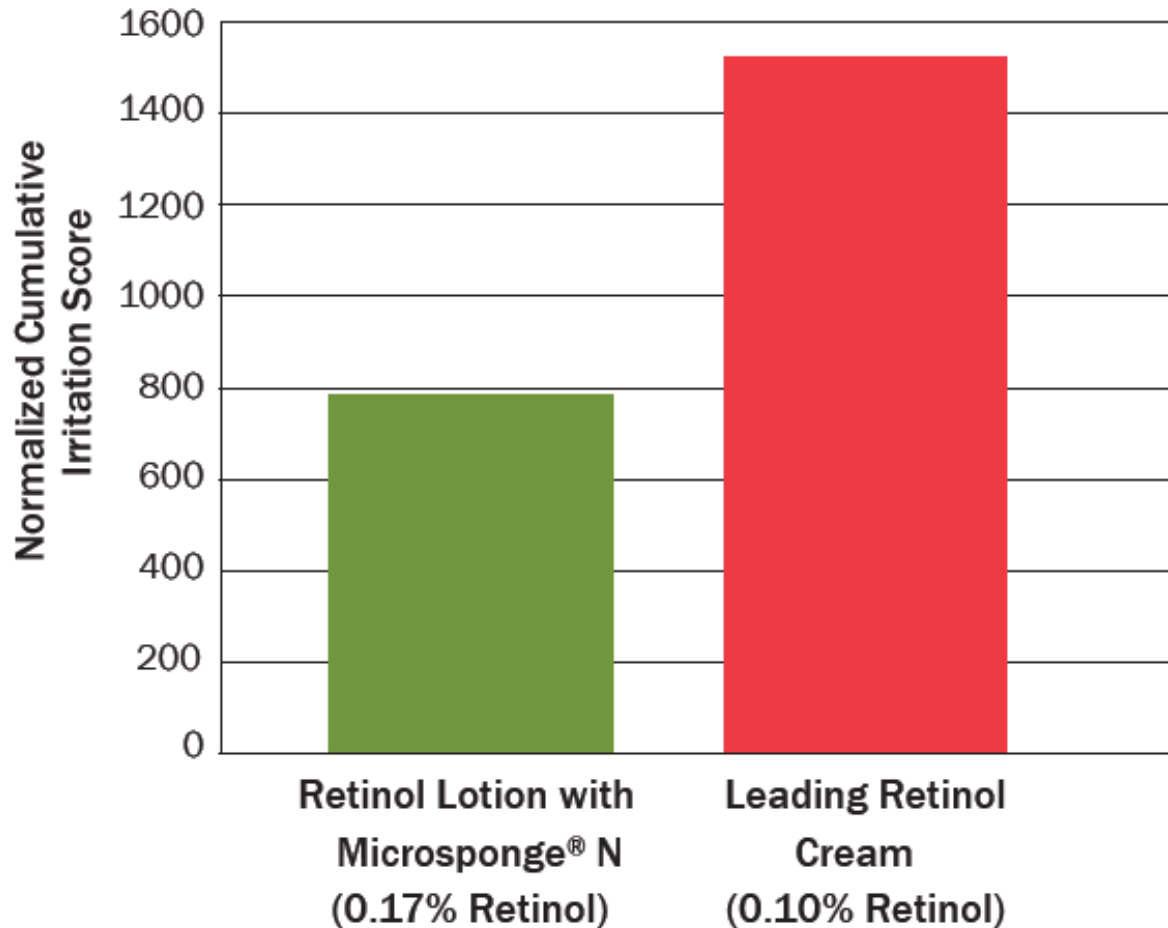
Franz Diffusion Cell Study

Evaluated sustained release for a 0.1 % retinaldehyde cream

- Retinaldehyde entrapped in MICROSPONGE® 520RA delivery system added to water phase of the emulsion
- Free: Retinaldehyde added to the oil phase of the emulsion



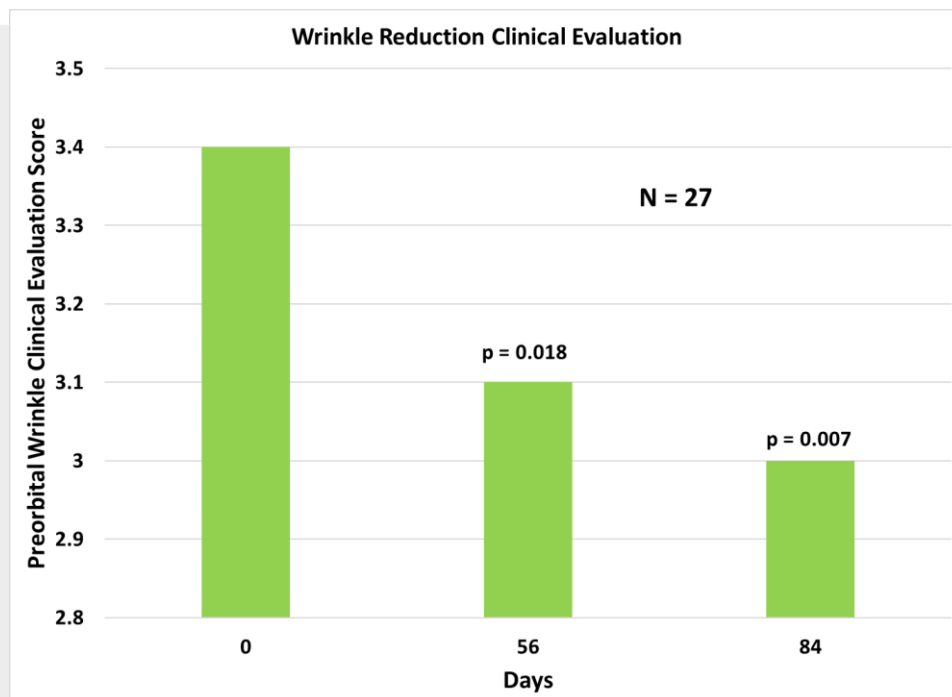
MICROSPONGE[®] **N** Retinoid Irritation Reduction



Shown to be statistically less irritating ($p < 0.05$) with 70% greater retinol content compared to the leading global brand

Efficacy of Microsponge® N Retinoid

- Vehicle: 0.15 % retinol (Microsponge® N) in an optimized o/w emulsion
- Panelists: N = 27, women 36 – 55 years old
- Protocol: Every morning and evening wash the face with a mild soap and apply product and during the daytime use sunscreen before going outside
- Duration: 84 days



INCI: Water, Glycerin, C12-15 Alkyl Benzoate, Caprylic/Capric Triglyceride, Dimethicone, Cellulose, Glycerate, Cetyl Alcohol, Capryl Methicone, PEG-100 Stearate, Isocetyl Behenate, Butyroparum Parkii (Shea) Butter, Phenoxyethanol, C10-18 Triglycerides, Methyl Methacrylate/Glycol Dimethacrylate Crosspolymer, Carbomer, Steareth-2, Chlorophyllin, Sodium Hyaluronate, Retinol, Polysorbate 20, Disodium EDTA, Ethylhexylglycerin, Pyrus Malus (Apple) Fruit Extract, Acrylamide/Sodium Acryloyldimethyl Taurate Copolymer, Isohexadecane, Polysorbate 80, Sodium Hydroxide, BHT, Propyl Gallate

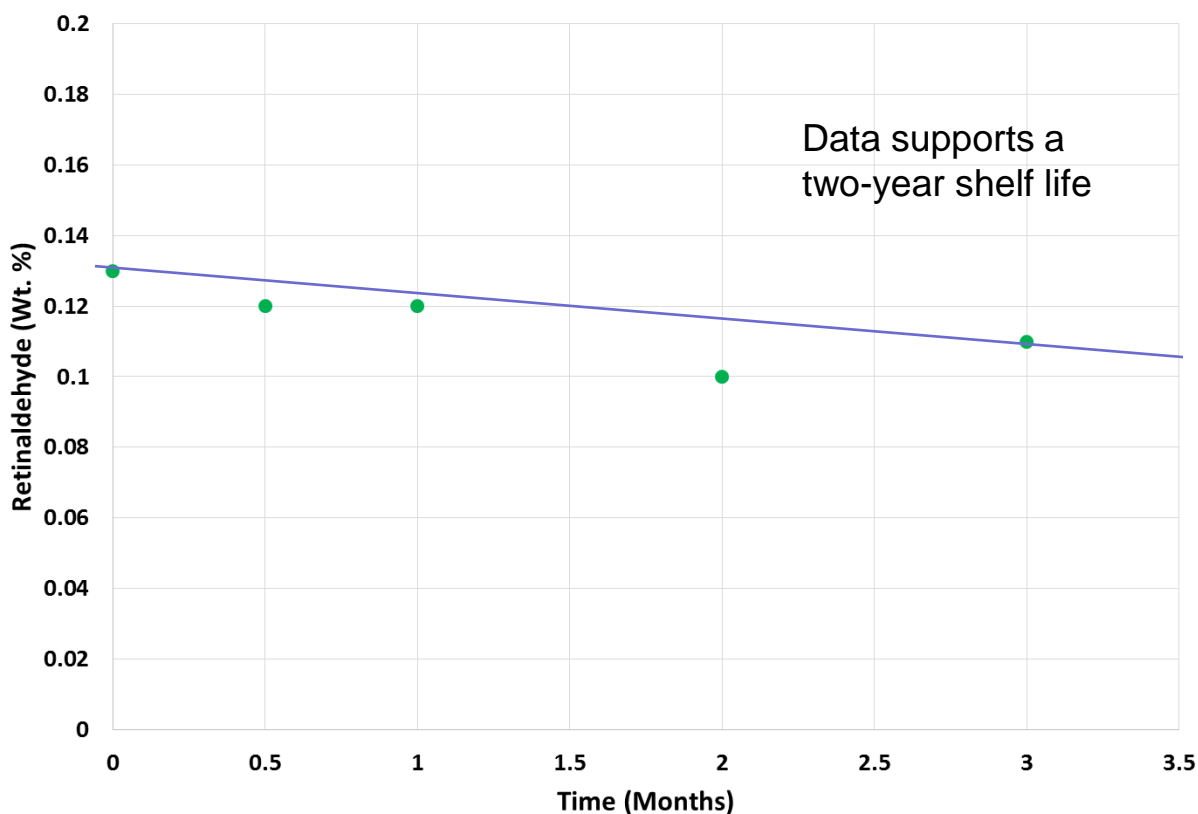
Retinaldehyde Cream - Stability

Laminate tubes at 40 C / 75 % RH

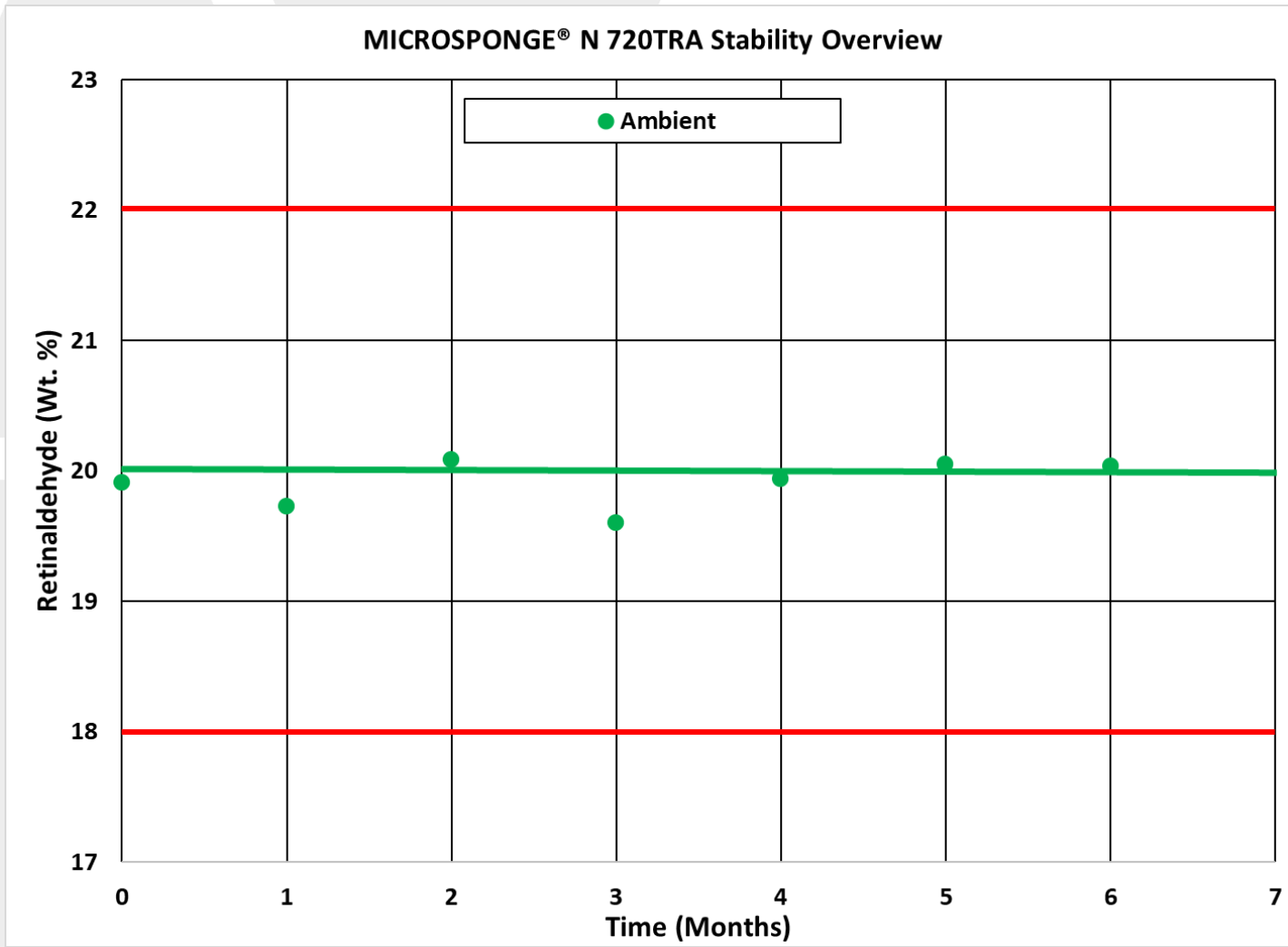
INCI Declaration

Water, Caprylic/Capric Triglyceride, Glycerin, Ceteraryl Alcohol, C10-30 Cholesterol/Lanosterol Esters, Dimethicone, Cetyl Ricinoleate, Cetyl Alcohol, Polysorbate 60, Phenoxyethanol, Stearic Acid, Cyclopentasiloxane, PEG-10 Soy Sterol, Magnesium Aluminum Silicate, Methyl Methacrylate/Glycol Dimethacrylate Copolymer., Cyclohexasiloxane, Chlorphenesin, Disodium EDTA, Xanthan Gum, Retinaldehyde, BHT, Tocopheryl Acetate, Ethylhexylglycerin, Bisabolol, Sodium Hydroxide, Ascorbyl Palmitate

Retinaldehyde Lotion Accelerated Stability



MICROSPONGE[®] N 720TRA - Stability



Lab produced product stored in aluminum foil pouches at ambient temperature
– no change in retinaldehyde concentration after six months

Clinical Study – In Progress

- Commissioned a placebo controlled, double blinded clinical study to compare the antiaging efficacy of
 - MICROSPONGE[®] N 720TRE Retinol and MICROSPONGE[®] N 720TRA Retinaldehyde
- Clinical study completed in early May

Retinoid Market Trend - Stabilizers

➤ Retinoid Stabilizers

- BHA is listed on Prop 65 – all HBS products are BHA-Free
 - BHT is coming under increased pressure in the EU market so globally formulated products are looking to remove BHT as well
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- HBS has a full line of products that use tocopherol as an antioxidant stabilizer (BHT-Free)
 - POLY-PORE® 120TRE - 20 % Retinol
 - MICROSPONGE® N 720TRE – 20 % Retinol
 - MICROSPONGE® N 720TRA – 20% Retinal
 - Retinol CT 50 – 50 % Retinol

Final Comments

- Retinaldehyde is one step closer to retinoic acid
 - Potential for quicker and improved performance
- MICROSPONGE[®] **N** (cellulose-based) delivery systems can provide
 - Sustained release of actives
 - Lower irritation
 - Clinical efficacy
- Tocopherol stabilized retinoids reduce global regulatory concerns



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Brenntag Personal Care Applications Laboratory Services

- Partner with customers for new formulation development to increase speed to market
- Create on-trend innovative prototype examples for skin care, hair care, and color cosmetics
 - Hot Pours
 - Loose Powders
 - Emulsions
 - Gels / Serums
 - Non-Aerosol Sprays
- Technical presentations
 - Rheology Modifiers
 - Cosmetic powders
 - Silicone alternatives
- New testing capabilities coming soon!
 - Texture analyzer
 - Corneometer



New Retinoid Formulations from the Brenntag Personal Care Applications Laboratory



Youthful Eyes Retinal Stick 05-038

LUXURIOUS AND MOISTURIZING BALM GLIDES EASILY AROUND THE EYES TO DELIVER POWERFUL ACTIVES RETINAL AND SERENITYL™ TO HELP MINIMIZE THE SIGNS OF AGING AND IMPROVE SKIN WELLNESS.

•Featuring Microsponge® N 720TRA



Retinal Glow Stick 05-040

EASY-TO-USE, FINANCIALLY INCLUSIVE RETINAL BALM DESIGNED TO HELP COMBAT SIGNS OF AGING AND TRANSFORM THE SKIN'S APPEARANCE FOR GLOWING, VIBRANT SKIN. CAN BE USED AROUND THE EYES OR WHEREVER BENEFITS ARE DESIRED.

•Featuring Microsponge® 520RA



Age Defy Nourishing Lip Balm 05-036

INSPIRED BY NATURE, THIS RICH AND LUXURIOUS LIP BALM CONTAINS BHA- AND BHT-FREE RETINOL TO HELP MINIMIZE THE APPEARANCE OF FINE LINES AND WRINKLES AROUND THE MOUTH.

•Featuring Retinol CT50