



# AC-HPR

INCI Name: Hydroxypinacolone Retinoate

 Patent Number: 202210892526.X

## THE THIRD GENERATION VITAMIN A

### DESCRIPTION

**AC-HPR** is a new generation direct acting retinol. It's one of the most bio-available forms of Vitamin A synthesized from retinoic acid and small molecule pinacol. AC-HPR widely goes into the formulation of oil-in-water, water-in-oil and other formula types, such as emulsions, serums and anhydrous systems.

**AC-HPR-S10** contains 10% of HPR in a premium delivery solvent (Dimethyl Isosorbide).

**AC-HPR-W2 SACOS** is a water-soluble HPR developed by using **cosolvency technology**, which effectively solves the application problem of HPR in aqueous system.

### SUPERIORITIES

- Non-irritating
- No convert, enhanced activity
- Low molecular weight, easy to absorb through skin
- Easy to formulate

### PRODUCT INFORMATION

Band Name	Appearance	Solubility	Advantage
AC-HPR	Powder	Oil	<b>High content</b>
AC-HPR-S10	Liquid	Oil	<b>High stability</b>
AC-HPR-W2 SACOS	Liquid	Water	<b>High water solubility</b>

### PROPERTIES

- Promote skin metabolism
- Relieve pores and acne
- Improve rough and firm skin

### APPLICATIONS



Skin care



Color cosmetic



Body care

# AC-HPR QUALITY COMPARISON

## Quality Advantage



Higher Content



Shorter Melting Range

The shorter melting process,  
the higher purity



No Retinoid Residue

## Physical and Chemical Data

### Content (HPLC)

#### AC-HPR

Content: 99.8916%

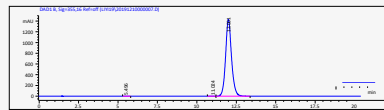
Retinoic acid residues: Not detected  
(limit of detection 0.0653 µg/ml)

#### Competitor

Content: 99.7970%

Retinoic acid residues: 0.005%

#### AC-HPR



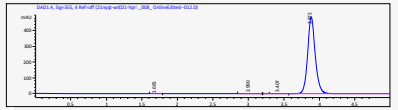
#### Area Percent Report

Sorted By : Signal  
Multiplier : 1.0000  
Dilution : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 B, Sig=355, 16 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.496	BB	0.1820	10.56078	8.92877e-1	0.0282
2	11.024	BV	0.2809	30.07043	1.61770	0.0802
3	12.001	VB	0.3931	3.74350e4	1431.40662	99.8916

#### Competitor



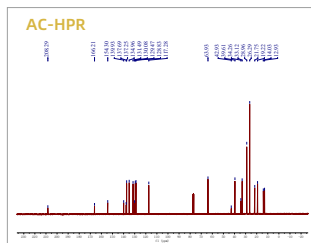
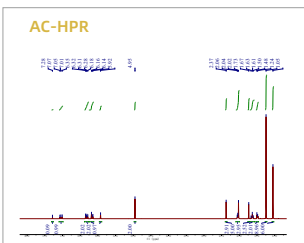
#### Area Percent Report

Sorted By : Signal  
Multiplier : 100.0000  
Dilution : 0.1000  
Sample Amount : 11.75000 [ug/ml] (not used in calc.)  
Do not use Multiplier & Dilution Factor with ISTDs

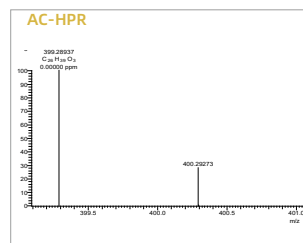
Signal 1: DAD1 A, Sig=355, 4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Area %
1	1.665	BB	0.0652	1.50726	0.0406
2	2.990	BB	0.0985	1.74078	0.0469
3	3.407	BV E	0.1027	4.29416	0.1156
4	3.872	VBAR	0.1199	3707.88574	99.7970

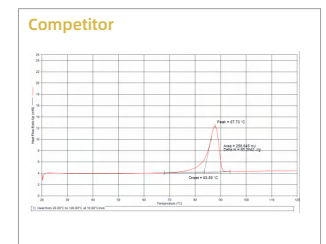
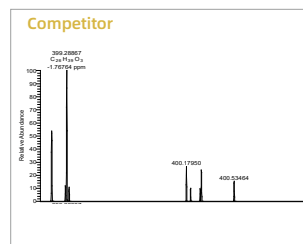
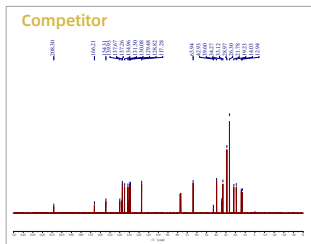
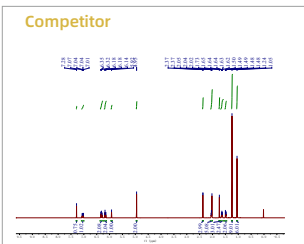
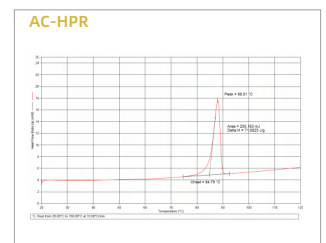
### NMR spectra



### MS



### Melting point



<sup>1</sup>H NMR Spectra

<sup>13</sup>C NMR Spectra

# AC-HPR-S10 STABILITY COMPARISON

## Stability Comparison with Competitors

### ✓ Product (content and retinoic acid residues)

Comparison with Competitor:

Sample 1 - Competitor, Sample 2 - AC-HPR-S10

**Conclusion:** AC-HPR-S10 is at the **same level** as the competitor, and **no retinoic acid is detected**.

Test Results:				
Inspection Item	Measuring Unit	Result		
		Sample 1	Sample 2 (240428AC10B)	
HPR-S10	%	9.95	9.94	

Test Results:				
Inspection Item	Measuring Unit	Result		Minimum Detectable Concentration
		Sample 1	Sample 2 (240428AC10B)	
Retinoic Acid	%	Not detected	Not detected	0.77 µg/g

### ✓ Stability (content and retinoic acid residues)

Thermal stability (50°C) and light stability tests (2188 LUX) were examined for 14 days on AC-HPR-S10 and competing products with essentially the same content.

**Conclusion:** AC-HPR-S10 is **superior** to the competitor in terms of **thermal stability**.

Test Results:				
Inspection Item	Measuring Unit	Result		
		Sample 1	Sample 2 (240428AC10B)	
HPR-S10	%	9.95	9.94	

Test Results:					
Inspection Item	Measuring Unit	Result			
		Sample 1 (Heat 50°C)	Sample2 (240428AC10B Heat 50°C)	Sample 1 (Light)	Sample2 (240428AC10B)
HPR-S10	%	7.09	7.83	2.86	2.82

## Stability of HPR in Formulations

### ✓ Stability of formulations

Six-month stability study of serums and creams containing 1% AC-HPR-S10

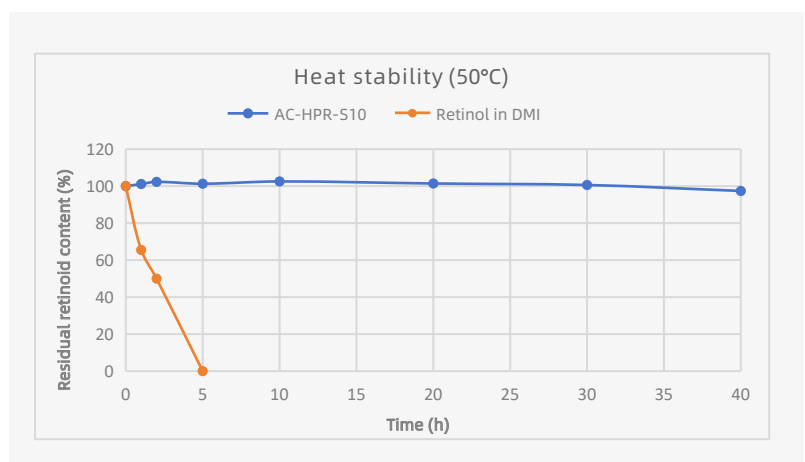
**Conclusion:** AC-HPR-S10 is a **stable formulation with no retinoid residue** after six months.

Sample	Unit	Retinoic acid content	Instrument detection limit
HPR Serum	µg/mL	not detected	0.0653
HPR Cream	µg/mL	not detected	0.0653

### ✓ Comparison of the thermal stability of AC-HPR-S10 and Retinol in DMI

AC-HPR-S10 and Retinol in DMI were converted to the same additive amount and added to the formulations to examine their thermal stability in the formulations (50°C):

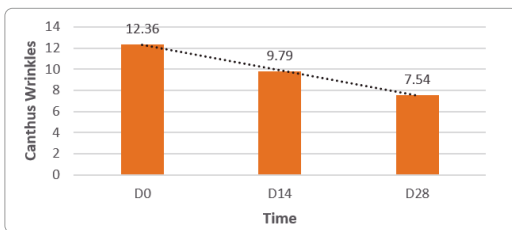
**Conclusion:** Residual rate of retinol is almost 0 after 5 h. Compared to retinol, the content of HPR remains almost unchanged for 40 h. **The retinol content of HPR remains almost unchanged for 40 h.**



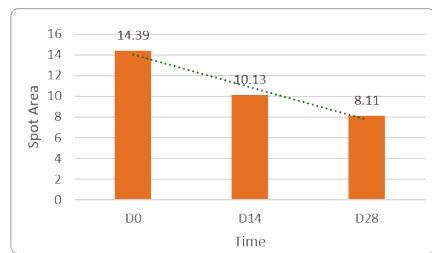
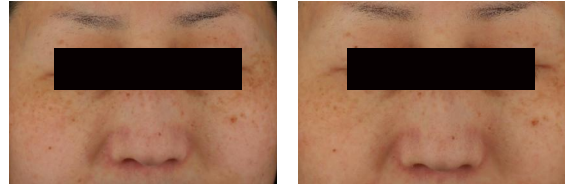
# SAFETY AND EFFICACY EVALUATION

## HPR Emulsion Efficacy Data

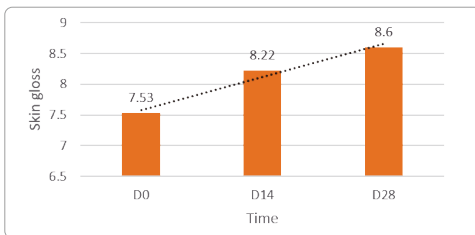
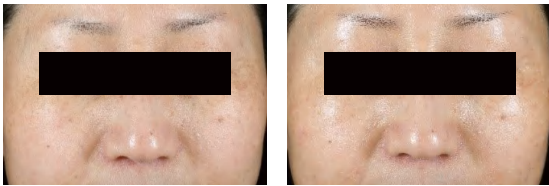
### Reduce canthus wrinkles



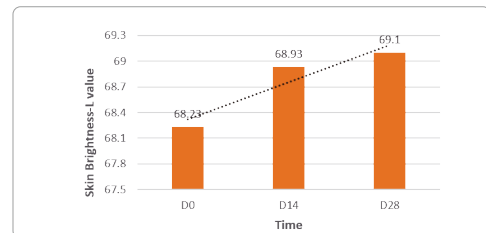
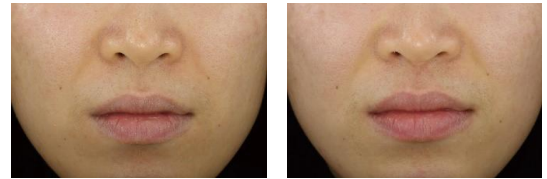
### Reduce spot area



### Improve skin gloss



### Brighten the skin



After 28 days, 100% of subjects had no adverse reactions,  
28 days questionnaire summary: 80% panelist agreed significantly with

- Improving skin moisture and elasticity
- Improving skin color and gloss
- Reducing roughness, wrinkles and fading spots
- Improving skin's overall appearance

# SAFETY AND EFFICACY EVALUATION

## Safety Data

**Patch test (24h): 0.5% HPR powder** concentration test substance, 0 stimulus response.

**Phototoxicity: 10% HPR powder in DMSO** concentration test substance, **no phototoxicity.** (3T3 neutral red)

IC <sub>50</sub>	-lrr	> 1000µg/mL
	+lrr	> 1000µg/mL
MPF		-0.0380
PIF		1.000
Anticipate		Non-phototoxic

## REGULATORY TRENDS AND EQUIVALENCE COMPARISON

### Regulatory Trends

In 2023, the EU's submission to the WTO limited the concentration of A-alcohols to less than **0.3% for resident and shower** products, and **0.05% for body lotion** products.

Reference number	Substance identification				Conditions			Wordings of conditions of use and warnings
	Chemical name/INN	Name of Common Ingredients Glossary	CAS number	EC number	Product type, body parts	Maximum concentration in ready use preparation	Other	
a	b	c	d	e	f	g	h	i
X [OP, please replace with the next consecutive number]	(2E,4E,6E,8E)-3,7-dimethyl-9-(2,6,6-trimethylcyclohexyl)nona-2,4,6,8-tetraenyl-1-ol**	Retinol	11103-57-4/ 68-26-8	234-328-2/ 200-683-7	(a) Body lotion  (b) other leave-on and rinse-off products	(a) 0.05 % Retinol Equivalent (RE)  (b) 0.3 % RE		For any cosmetic product containing Retinol, Retinyl Acetate or Retinyl Palmitate the following labelling is obligatory: <i>'Contains Vitamin A-related compounds, which contribute to your daily intake of Vitamin A.'</i>
	[(2E,4E,6E,8E)-3,7-dimethyl-9-(2,6,6-trimethylcyclohexyl)nona-2,4,6,8-tetraenyl] acetate**	Retinyl Acetate	127-47-9	204-844-2				
	[(2E,4E,6E,8E)-3,7-dimethyl-9-(2,6,6-trimethylcyclohexyl)nona-2,4,6,8-tetraenyl] hexadecanoate**	Retinyl Palmitate	79-81-2	201-228-5				

### Equivalence Comparisons

Take the maximum concentration of 0.3% of facial A-alcohol restricted by the European Union as an example:

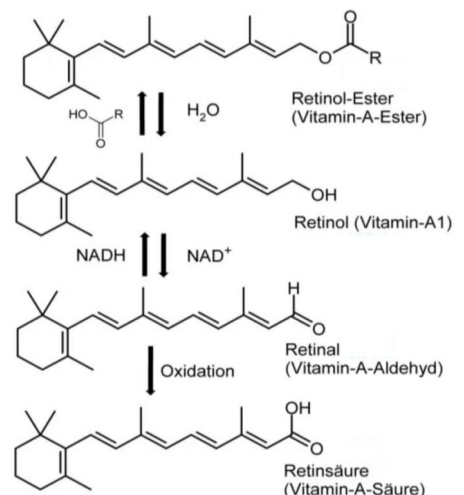
Comparison of conversion rates of other retinol derivatives:

1% retinyl palmitate = 0.3% retinol = 0.04% HPR

1% retinyl propionate = 0.84% retinol = 0.112% HPR

1% retinyl acetate = 0.87% retinol = 0.116% HPR

0.04% HPR (according to the structure of 0.03% retinoic acid direct action) can be equivalent to 0.3% retinol.



## NEW PRODUCTS/SIMILAR RECOMMENDATIONS

### Bakuchiol

INCI: Bakuchiol

#### BENEFITS

- Natural Alternatives to Retinol
- High efficiency
- Natural origin and high safety
- Easy to formulate

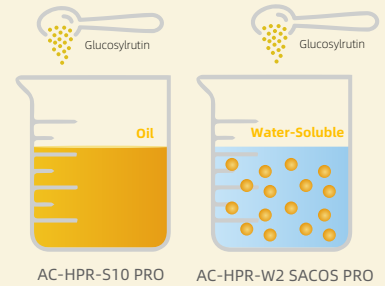


### AC-HPR-S10 PRO

INCI Name: Hydroxypinacolone Retinoate & Dimethyl Isosorbide & Glucosylrutin

### AC-HPR-W2 SACOS PRO

INCI: Hydroxypinacolone Retinoate & Glucosylrutin



AC-HPR-S10 PRO

AC-HPR-W2 SACOS PRO

#### BENEFITS

- More stable retinol replacement
- Reduction of oxidative mechanisms induced by photoaging
- Water soluble dosage form for easy incorporation into formulations

## HPR FORMULATION

### Anti-Aging Emulsion

	Product Name / INCI Name	w/w(%)	Function
A	Hydroxyethyl Acrylate/Sodium Acryloyldimethyl Taurate Copolymer	0.30	Thickener
	Coco-Caprylate/Caprate	1.20	Emollient
	Simmondsia Chinensis (Jojoba) Seed Oil	0.60	Emollient
	AC-200 / Dimethicone	0.80	Tactile Enhancers
	AC-HPR-S10 / Hydroxypinacolone Retinoate & Dimethyl Isosorbide	2.00	Antioxidant
	C20-22 Alkyl Phosphate & C20-22 Alcohols	0.50	Viscosity Controlling
B	Polyacrylate Crosspolymer-6	0.10	Emulsion Stabilizer
	Butylene Glycol	3.00	Humectant
	Glycereth-26	3.00	Humectant
	Xanthan Gum	0.10	Stabilizer
	Triethanolamine	0.05	Buffering Agent
	Water	To 100	Solvent
	Disodium EDTA	0.10	Chelating Agent
C	Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer & C15-19 Alkane & Polyglyceryl-6 Laurate & Polyglycerin-6	0.30	Stabilizer
D	Caprylyl Glycol & Ethylhexylglycerin	0.50	Preservative

#### Procedure:

1. Mix part A and heat to 80°C, stirring until completely dissolved;
2. Mix part B components and stir well;
3. Mix A and B, homogenize for 2 min;
4. Disperse the part C and cool the base below 60 °C, then add part C,
5. Cool the base below 45 °C, then add part D, stirring until room temperature.

### Antioxidant Essence

	Product Name / INCI Name	w/w(%)	Function
A	Steareth -20	0.20	Emulsifier
	Cetearyl Glucoside & Cetearyl Alcohol	0.05	Emulsifier
	Glyceryl Stearate	0.05	Emulsifier
	Squalane	1.00	Emollient
	AC-200 / Dimethicone	1.00	Tactile Enhancers
	AC-HPR-S10 / Hydroxypinacolone Retinoate & Dimethyl Isosorbide	2.00	Antioxidant
	Tocopheryl Acetate	0.50	Antioxidant
B	Hydroxyethyl acrylate/sodium acryloyldimethyl taurate copolymer	0.40	Stabilizer
	Butylene Glycol	2.00	Humectant
	AC-GG / Glyceryl Glucoside	3.00	Humectant
	Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.10	Stabilizer
	Water	To 100	Stabilizer
	Cyclodextrin	0.10	
	Disodium EDTA	0.10	Chelating Agent
AC-AT / Allantoin	0.10	Soothing	
C	Triethanolamine	0.10	Buffering agent
D	AC-VB5 / Panthenol	1.00	Humectant
	Phenoxyethanol&Ethylhexylglycerin	0.70	Preservative
	Fragrance	0.10	Fragrance

#### Procedure:

1. Mix part A and heat to 80°C, stirring until completely dissolved.
2. Mix part B components and stir well.
3. Mix A and B, homogenize for 2 min.
4. Cool the base below 60 °C, then add part C, stirring until completely dissolved.
5. Cool the base below 45 °C, then add part D, stirring until room temperature.