Alpha-Arbutin (4-hydroxyphenyl-alpha-D-glucopyranoside) is a high-performing, enzyme-related and functional active ingredient for skin lightening. Alpha-Arbutin acts faster and more efficient than do existing single components.
FOUR WEEKS SKIN LIGHTENING STUDY

Skin lightening study on 80 Chinese descent women. Four emulsions containing 1% Alpha-Arbutin, Kojic Acid, beta-Arbutin, Hydroquinone, applied twice a day for 4 weeks.

Pic. 1: Alpha-arbutin VS Kojic acid / Beta-arbutin / Hydroquinone

BEFORE and AFTER alpha arbutin

Pic. 2: Interaction curve for parameter “L”: treated zone vs control, difference M1=after one month/M0=start (%)

As shown in Alpha-Arbutin structure, alpha-glucoside bond offers higher efficacy than beta-form. This leads to a better affinity to the active site of tyrosinase than beta-Arbutin. In vitro tests show that inhibitory effect of Alpha-Arbutin on human tyrosinase is estimated to be more than ten times stronger than that of beta-Arbutin.

Table 1: IC50*1 IC50*1

\[
\begin{array}{|c|c|c|}
\hline
\text{Sample} & \text{Mushroom} & \text{Human} \\
\text{IC50} & \text{IC50} \\
\hline
\text{Alpha-Arbutin} & \text{Not detected} & 1.8 - 2.1 \text{ mM} \\
\text{Beta-Arbutin} & 8 \text{ mM} & >30 \text{ mM} \\
\hline
\end{array}
\]

Summary:
- Scientifically proven effects at low concentrations:
  - Outstanding tyrosine’s inhibition activity nine times more effective than Beta-Arbutin
  - Perfect affinity to the active site of tyrosinase leads to superior efficacy
  - Ensure an even, lighter skin tone more effective at 1.0% than Beta-Arbutin
  - Combination with UV filter lightens the skin very effective
  - Helps to minimize the appearance of liver spots
  - Reduces the degree of skin tanning after UV exposure

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Arbutin firstly extract from bearberry plant by a solid extraction, an environmentally friendly process. Beta-Arbutin is very safe skin agent for external use which does not have toxicity, stimulation, unpleasant odor or side effect such as hydroquinone. In herbal medicines, Arbutin was used as anti-inflammatory of the skin. Now it is a natural double action whitening agent, a new type of skin depigmentation and whitening agents. Arbutin has been specially developed to ensure a lighter skin tone. New manufacture approach guarantees high purity, addressing increased consumer awareness about safety and efficacy.
MECHANISM OF ACTION

Beta-Arbutin has a monophenol moiety, which act as a competing inhibitor in oxidation process of tyrosine by the action of tyrosinase.

BENEFITS OF REBTECH ARBUTIN

- High purity
- New approach extreme low HQ
- Tyrosinase activity inhibition
- Melanin formation inhibition

ARBUTIN MATERIAL INFORMATION

- Product name: Arbutin
- Preservatives: None
- Solubility: Water
- Recommended dosage: 2-7%
Kojic acid dipalmitate has an excellent property of inhibiting the activity of tyrosinase present in the human skin so as to inhibit the melanin formation. It is more efficacious than straight kojic acid. It can produce excellent effects in even toning the skin, fighting age spots, pregnancy marks, freckles as well as general skin pigmentation disorders of the face and body. Unlike kojic acid which often causes product stability problems such as color changes, it offers excellent product stability without any color instability problems.
**EFFICACY**

Compatible with almost all cosmetic ingredients, especially advantageous for use in combination with sunscreens and preservatives due to potential hydrogen bonding.

**COMPATIBILITY**

Stable between 3 and 10

Unstable when pH exceed 7

Not oxidizable

Particularly oxidizable

Not complex with metals

Chelate with metal ions (e.g. iron) and color changes occur.

No color change occur

Easily become yellow or brown

**STABILITY**

Stable in the pH range from 3 to 10

Unstable to light, especially unstable above 40°C. A cream containing 1% Kojic acid become deep yellowish brown when kept at 45°C for 4 weeks

**OXIDATION**

Particularly oxidizable

**METAL IONS**

Chelate with metal ions (e.g. iron) and color changes occur.

**COLOR STABILITY**

Easily become yellow or brown

**COSMETIC APPLICATION**

- Lightening/Whitening
- Toning/Invigorating
- Anti-aging
- Inhibit tyrosinase and melanin formation, ameliorate dermal pigmentation.

Provide excellent effects in even toning skin, fighting age spots, pregnancy marks, freckles as well as general pigmentation disorders.

**KOJIC ACID DIPALMITATE**

**FORMULATION GUIDELINES**

**Suggested concentration:**

- UP to 1-5% for face and neck preparations

**STABILITY**

- Stable in the pH range from 3 to 10

**INCI NAME**

- Kojic acid dipalmitate

**SUMMARY**

- Kojic acid dipalmitate is easy to incorporate in all type of formulations
- More efficacy skin lightening compared with kojic acid
- With Outstanding light and heat stability
- Resistant to discoloration
- Helps to minimize the appearance of liver spots
- Reduces the degree of skin tanning after UV exposure
GSH (reduced glutathione) is a tripeptide composed of the amino acids L-glutamine, L-cysteine and glycine. Glutathione is the major natural occurring antioxidant in the cell and is therefore essential to recycle vitamins E (alpha-D-tocopherol), C (ascorbic acid), and scavenges free radicals explaining its anti-aging and whitening efficacy.
**SKIN-WHITE MECHANISM**

**Role of GSH II**

- GSH NADPH → GSH
- GSSG → GSH

**Efficacy**

After 56 days of use GSH 5% compared to Kojic acid 1% reduced the melatine cells 24%.

Clinically shown skin whitening

Twice daily application of 2% GSH lotion for 10 consecutive weeks reduced melanin index value of applied subjects significantly better than placebo lotion.

**Cosmetic Application**

- Smoothens and whitens the skin all-over
- Lightens dark spots
- Anti-aging and anti-wrinkles
- Nourishes the skin

**Formulation Guidelines**

- Suggested concentration: up to 1%-5% for face and neck preparations
- pH: 5.0-8.0

**Inci Name**

- Reduced L-Glutathione

**Summary**

- Aqueous stable glutathione
- Very stable against light and heat
- Generally regulates melanin production within the living body as reduced type of glutathione
- Has a significant effect on skin whitening of human skin

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**Melanin production pathway**

- Tyrosinase → Tyrosine → 3,4-dihydroxyphenylalanine → Dopaquinone → White dopa chromium → Hydroxy-5,6-bis-indole → Indole-5,6-quinone → Melanin chrome → Normal melanin
Phenylethyl Resorcinol (PER) is an antioxidant that is considered effective in influencing the formation of pigmentation, and therefore able to lighten the skin. It is a synthetic compound that is partially derived from natural lightening compounds found in scotch pine bark, and is considered a reliable whitening agent.

Phenylethyl resorcinol has an excellent skin whitening effect, its main role is to inhibit the rate-limiting enzyme tyrosinase, one of the highest reported activity of tyrosinase inhibitors.
**TYROSINASE INHIBITION**

Phenylethyl Resorcinol exhibit the most mushroom tyrosinase inhibitory activity within active compound. It shown an IC₅₀ of 0.50 μM, 22 times more effectively than Kojic acid with an IC₅₀ = 11.05 μM under identical test conditions. In the cellular lightening assay on B16V mouse melanoma cells, a pronounced efficacy of 4-(1-phenylethyl)-1,3-benzenediol was found. It was by far the most potent inhibitor of melanin synthesis with an IC₅₀ of 2.1 μM, whereas the IC₅₀ of beta-arbutin and Kojic acid was 67 μM and 440 μM, respectively under identical test conditions, approx. 200 times stronger than kojic acid.

**AGE SPOT**

The combination of Phenylethyl Resorcinol and kojic, azelaic acid and lactic acid helps to encourage an even skin tone, while the ingredient hydroquinone lightens and inhibits hyperpigmentation and age spots.

**BEFORE**

Condition: Post-inflammatory hyperpigmentation

**AFTER**

Solution: Applied pigment Gel with combination as aboded twice daily over a four –month period.

**COSMETIC APPLICATION**

- Skin whitening
- Increase skin elasticity
- Reduce UV-induced pigmentation
- Reduce the pigmentation

**STABILITY**

- Stable in the pH range from 4 to 5, avoid heat, light and moisture.

**INCI NAME**

- Phenylethyl Resorcinol
- CAS: 85-27-8
- Formula: \( C_{14}H_{14}O_2 \)
- M. W.: 214.27
- Assay (HPLC) : ≥ 99.0%
- Heavy Metal: ≤ 10ppm

**FORMULATION GUIDELINES**

- Suggested concentration: UP to 0.1 -1% for preparations
- In vivo test on Asian subjects proved that Phenylethyl Resorcinol more efficiently lightens human skin at 0.5% dosage with low oil content.
- Solubility with 1% of the Glycols family, Propylene glycol, butylene glycol, dipropylene glycol, ethanol and so on. After dissolving, solution is pale pink; it does not affect the usage.
- Thickener: Not recommended to use carbomer (since carbomer require pH > 5.5 will be a better thickening efficiency), instead of Ammonium Acryloyldimethyltaurate / VP Copolymer, Xanthan Gum and HPMC etc., which can be stable in a low pH value.
- To be used in the recipe must be a chelating agent EDTA, and together with sunscreen ingredients like Benzophenone 3 or Benzophenone 4.

SKIN WHITENING
ANTI-PHOTOAGEING
ANTI-ACNE

VITAMIN A ACID

Retinoic acid or Tretinoin, is a kind of Vitamin A derivatives, used as treatment of severe types of acne and other skin diseases for its positive action on cell proliferation and keratinization of the skin, as well as for decreasing sebum secretion and inflammation.
Anti-aging

Acne treatment

Photoaging treatment

Remove wrinkles

COSMETIC APPLICATION

- Anti-aging
- Acne treatment
- Photoaging treatment
- Remove wrinkles

STABILITY

- Retinoic acid is unstable and easily gets degraded to biological inactive forms when exposed to light.

FORMULATION GUIDELINES

**Suggested concentration:**
- Oral, 10mg/ times
- Cream or ointment, 0.05% to 0.1%

INCI NAME

- Vitamin A Acid
- **CAS:** 302-79-4
- **Formula:** C₂₀H₂₈O₂
- **M. W.:** 300.44
- **Assay (HPLC):** ≥ 99.0%
- **Limit of isotretinoin:** ≤5.0%

**Efficacy**

**Anti-PhotoAgeing**

**Anti-Acne**

Retinoic acid is most commonly used for acne treatment since 1962, and still in use today. As shown in Fig., after 3 months experiment RA-CD-HB/MB gain significant high score in acne improvement compare to commercial preparation.

**Compare to Retinol**

Research shown Clinical Efficacy Comparison of Retinoic Acid vs. Retinol as the Final Step of a Chemical Peel Procedure, in 95% of subjects, both the Investigator and Subject assessments demonstrated no differences in efficacy, peeling and tolerability between the retinol solution and retinoic acid 0.3% treated facial sides.

**Improvement**

Acne improvement at the end of months 1 and 3 of treatment.

European Academy of Dermatology and Venereology JEADV (2004) 18, 416-421

**Before and After Usage of Retinoic Acid**

Physicians’ ( ) and patients’ ( ) global assessment of treatment with topical Retinoic acid for 6 months in 72 patients completing treatment.

Deoxyarbutin (4-[[Tetrahydro-2H-pyran-2-yl]oxy]phenol, DA) a promising ingredient for reducing skin hyperpigmentation. It is a synthetic form of arbutin, synthesized without the hydroxyl moiety.

DA shows reversible inhibition of tyrosinase activity with associated skin lightening in both a hairless guinea pig model system and in human skin.

**MECHANISM**

Company Website  
Alibaba Shop  
Contact us
Comparison chart of whitening effect

The effect for inhibition of tyrosinase is 10 times compare with hydroquinone, 150 times compare with kojic acid, 350 times compare with beta-arbutin, 38.5 times with alpha-arbutin.

SAFETY

DA is very safe skin agent for external use which does not have toxicity, stimulation, unpleasant odor or side effect such as Hydroquinone. The safety demonstrated by the viability loss of normal human keratinocytes. As shown in figure below. human keratinocytes barely survived when treated with HQ, but still high viability when treated with DA.

Effect of DA and HQ on viability of normal human keratinocytes. Significant difference between the DA-(d) and HQ-treated (e) groups at the same concentration vs. only vehicle treated control(c).

COSMETIC APPLICATION

- Deoxyarbutin used in cosmetic industry whitening ingredients
- Deoxyarbutin protect the skin against damage caused by free radicals

FORMULATION GUIDELINES

Suggested concentration
- Cosmetic product: 0.5-3.0%

STABILITY

- It is very delicate material which is easily oxidized. In order to prevent the oxidation of deoxyarbutin and keep the formula effective, the use of antioxidant agent is highly recommended Anti-oxidant, Sodium metabisulfite (0.01-1.0 %).

INCI NAME

- Deoxy–Arbutin
- CAS: 53936-56-4
- Formula: C_{11}H_{14}O_{3}
- M. W.: 194.23
- Assay (HPLC): ≥ 99.0%
PEPTIDE

Peptides are chains of at least two amino acids linked by the eponymous “peptide bond” between the carboxyl group of one and the amide group of the following amino acid. Oligopeptides are chains generally understood to be composed of less than approximately 20 amino acids. When amino acid chain gets more than 50, it turns into a protein. Peptides and proteins represent a wide world of possibilities.

Peptide with defined sequence and structure possessing specific biological activity, affect the organism many important physiological and biochemical functions. Peptide participate in receptor mediated signal transduction, as a neurotransmitter, neuregulins, and hormones. More than 100 kinds of active peptide plays a vital role in the central and peripheral nervous system, heart blood vessel system, immune system, digestive system. Through interactions with the receptor, peptide also affect the information exchange between the cells, involving many biological processes, such as metabolism, pain, regeneration and immune response, etc.

Skin-care process like many other chemical, bio-chemical processes in human body, controlled by specific amino acid sequences. Peptides for skin-care synthesized with specific amino acid sequences according to the skin-care mechanism, applied in the process of anti-aging, skin whitening, hair growth for its specific biological activity, safety.

REB-TECH PEPTIDE

Argireline
Argireline, the most trusted anti-aging peptide, is one of the most widely used and reputable anti-wrinkle ingredients in the skin care industry today. The efficacy of Argireline can compete with Botulinum Toxin A but leaves aside the risks, the injections and the high cost.

GHK-Cu
Copper peptide GHK-Cu is a naturally occurring copper complex of a glycyl-L-histidyl-L-lysine peptide. The GHK-Cu tripeptide has strong affinity for copper(II) and was first isolated from human plasma. It is widely used in anti-wrinkle, skin whitening, Sun-protective cosmetics.

AHK-Cu
Tripeptide copper complex L-Alanyl-L-histidyl-L-lysine Cu2+ (AHK-Cu) is a growth factor for many kinds of cells, especially for hair follicles.
<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>Mechanism</th>
<th>Application</th>
<th>Suggest concentration</th>
<th>Storage and Stability</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Argireline</strong></td>
<td>Argireline is a mimic of the N-terminal end of SNAP-25 which competes with the SNARE complex, thereby, modulating its formation. If the SNARE complex is slightly destabilized, the vesicle cannot dock and release neurotransmitters efficiently and therefore muscle contraction is attenuated, preventing the formation of lines and wrinkles.</td>
<td>A safer, cheaper, and mild Botox alternative, in a special way for the wrinkle formation mechanism of local action. Argireline can be incorporated in cosmetics bases such as gels, emulsions, and sera where removal of the deep lines or wrinkles in the forehead or around the eyes area is desired.</td>
<td>Argireline can be incorporated at the final stage of the manufacturing product, provided the temperature is below 40°C. The concentration of Argireline recommend at 3%~10%.</td>
<td>Store in a cool, dark and clean place, at least 12 months of shelf life. For long-term storage, store at 4°C, the shelf life can be extended to at least 18 months.</td>
<td>Acetyl Hexapeptide-8</td>
</tr>
<tr>
<td><strong>GHK-Cu</strong></td>
<td>GHK-Cu is a natural skin wellness molecule that exhibits a broad range of skin whitening, anti-aging, and protective actions. By regulating processes of skin renewal and repair, it ensures not only fast healing of dermal wounds, but also exhibits rejuvenating action by increasing water-holding molecules in dermal matrix, stimulating collagen synthesis, balancing the action of skin proteases and reducing oxidative damage. Particularly interesting is its ability to maintain epidermal stem cells as well as to restores viability of damaged skin cells such as irradiated fibroblasts. Since fibroblasts and adult stem cells play a crucial role in skin renewal and wound healing process, GHK-Cu presents itself as a natural skin renewing, repairing and rejuvenating ingredient.</td>
<td>1. Skin whitening 2. Anti-aging reducing wrinkles 3. speeding up skin healing 4. reducing inflammation 5. Sun-protective formulations.</td>
<td>Argireline can be incorporated at the final stage of the manufacturing product, provided the temperature is below 40°C. Recommend concentration 0.01%~0.5%.</td>
<td>Store in a cool, dark and clean place, at least 12 months of shelf life. For long-term storage, store at 4°C, the shelf life can be extended to at least 24 months.</td>
<td>INCI: Copper peptide GHK-Cu CAS#: 130120-57-9 Purity: &gt;95% Sequence: L-glycyl-L-histidyl-L-lysine Cu2+ Appearance: Blue powder</td>
</tr>
<tr>
<td><strong>AHK-Cu</strong></td>
<td>AHK-Cu promotes hair regeneration by stimulating growth of dermal papilla cells and preventing their apoptosis, expanding hair follicles to accelerate hair growth and inhibiting hair loss phenomenon. The arrow indicates the delivery of copper peptides to the dermal papilla, where it can stimulate cells responsible for substances needed for healthy hair growth.</td>
<td>Hair growth Anti-wrinkle</td>
<td>The recommended percentage of AHK-Cu Copper Tri-Peptides to use within your custom formula is 2.5 to 5%.</td>
<td>Store in cool(2-8°C), dark and clean place.</td>
<td>INCI: Copper peptide AHK-Cu Purity: &gt;98% Sequence: Ala-His-Lys-Cu Appearance: Blue powder</td>
</tr>
</tbody>
</table>
Biotin also known as vitamin H or coenzyme R is a water-soluble vitamin B7. (Vitamin H), often recommended for healthy hair. Since biotin deficiency can lead to thinning of the hair, proponents claim that washing your hair with biotin-enriched shampoo can thicken the hair and stimulate hair growth.
**FORMULATION GUIDELINES**

- Suggested concentration: Up to 1-2% for hair growth
- Choose nonionic emulsifier
- Addition with 1-10% urea is good efficacy for active penetration
- Suggestion addition with 0.01% glycerol triacetate to make urea stable
- Avoid contact with oxidizing agents, formaldehyde-containing substances, strong acids or alkali, biotin is not compatible with these substances
- Storage in room temperature (15-25°C) with tightly closed, dry and protected from light

**COSMETIC APPLICATION**

- Thicken hair
- Increase fullness and add shine

**STABILITY**

- Stable in the pH range from 6.5 to 7.0

**WHAT BRAND ARE USING ACTIVE INGREDIENT BIOTIN**

**BIOTIN IN HUMAN SKIN PENETRATION TEST**

- **Formula**
  - O/W Emulsion (DAB10) + 0.1%Biotin / + 10% Urea
  - O/W Emulsion (DAB9) + 0.1%Biotin / + 10% Urea
- **Application**
  - 20mg/3.14cm²
- **Time**
  - Test in 30Minutes and 300Minutes respectively
- **Skin pre-treating**
  - Removal of epidermal keratinocytes with tapes
- **Detective**
  - Identify Biotin by radiation and content with HPLC-MS

**FRANZ DIFFUSION CELL**

- **Formulas**
  - O/W Emulsion (DAB10) + 0.1%Biotin / + 10% Urea
  - O/W Emulsion (DAB9) + 0.1%Biotin / + 10% Urea
- **Application**
  - 20mg/3.14cm²
- **Time**
  - Test in 30Minutes and 300Minutes respectively
- **Skin pre-treating**
  - Removal of epidermal keratinocytes with tapes
- **Detective**
  - Identify Biotin by radiation and content with HPLC-MS

**INCI NAME**

- Biotin
- CAS: 58-85-5
- Formula: C10H16N2O3S
- M. W.: 244.30
- Assay (HPLC): ≥ 98.0%
- Individual Impurity ≤ 1.0%

**FRANZ DIFFUSION CELL**

- **Formula**
  - O/W Emulsion (DAB10) + 0.1%Biotin / + 10% Urea
  - O/W Emulsion (DAB9) + 0.1%Biotin / + 10% Urea
- **Application**
  - 20mg/3.14cm²
- **Time**
  - Test in 30Minutes and 300Minutes respectively
- **Skin pre-treating**
  - Removal of epidermal keratinocytes with tapes
- **Detective**
  - Identify Biotin by radiation and content with HPLC-MS

**WHAT BRAND ARE USING ACTIVE INGREDIENT BIOTIN**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Product</th>
<th>Image</th>
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</thead>
<tbody>
<tr>
<td>Nioxin</td>
<td>Shampoo</td>
<td><img src="image1.png" alt="Nioxin Shampoo" /></td>
</tr>
<tr>
<td>Men's Club</td>
<td>Treatment</td>
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</tr>
<tr>
<td>Desenred</td>
<td>Treatment</td>
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<tr>
<td>L'Oreal</td>
<td>Leave-in</td>
<td><img src="image4.png" alt="L'Oreal Leave-in" /></td>
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<tr>
<td>Keratin Research</td>
<td>Treatment</td>
<td><img src="image5.png" alt="Keratin Research Treatment" /></td>
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<tr>
<td>Bio-Oil</td>
<td>Oil</td>
<td><img src="image6.png" alt="Bio-Oil Oil" /></td>
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<tr>
<td>Bio-Oil</td>
<td>Cream</td>
<td><img src="image7.png" alt="Bio-Oil Cream" /></td>
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