

Development and innovation of a 24 Karat Gold-infused Face wash: Cosmetic efficacy, safety, and scientific validation

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Abstract

Skincare has evolved with the introduction of innovative ingredients like 24-karat gold, known for its luxurious appeal and potential dermatological benefits. Gold nanoparticles (AuNPs) are gaining attention for their antioxidant, anti-inflammatory, and antimicrobial properties, which may help protect and rejuvenate the skin. This review explores the role of gold in face washes, focusing on its interactions with the skin and mechanisms of action. Gold is believed to combat oxidative stress caused by pollution and UV exposure, which contributes to premature aging. It may also enhance blood circulation, improving oxygen and nutrient delivery to skin cells and promoting a radiant complexion. Additionally, AuNPs appear to modulate immune responses and reduce inflammation, helping soothe irritated skin. This review critically examines the current research on gold-infused skincare, highlighting both its potential and the need for further clinical studies to confirm its long-term safety and effectiveness. The goal is to provide a balanced perspective for researchers and skincare enthusiasts alike.

Key words : 24 Karat Gold-Infused Face Wash, Cosmetic Efficacy, Safety, Validation.

The global skincare industry is increasingly leaning toward luxury and natural ingredient-based innovations. Among these, the incorporation of 24 Karat gold in facial cleansers has gained attention due to its perceived dermatological benefits and luxury status. The use of gold, once reserved for elite skin rituals, is now finding modern expression in everyday skincare formulations, particularly

in face washes^{2,3,9}.

Gold in face washes is typically present as colloidal gold or gold nanoparticles (AuNPs). The ability of these particles to penetrate the stratum corneum and reach viable layers of the skin is highly dependent on their particle size, surface charge, and formulation base. Studies suggest that gold

nanoparticles smaller than 100 nm may penetrate the epidermal barrier to a limited extent, potentially interacting with skin cells and influencing oxidative stress pathways. There is limited empirical evidence supporting the clinical efficacy of gold-based skincare in improving dermatological outcomes^{7,8,12}. Most of the cosmetic benefits observed from such products are likely attributable to secondary active ingredients rather than the gold itself.

In conclusion, while 24-karat gold may enhance the luxury appeal of topical products, its bioavailability and dermatological impact in face washes remain scientifically unsubstantiated and are largely considered negligible under typical usage conditions⁷⁻⁹. This study investigates the potential of 24 karat gold nanoparticles incorporated in cosmetic formulations—specifically face washes—as agents that counteract oxidative stress in the skin. Free radicals contribute significantly to premature aging, inflammation, and skin degradation. Gold nanoparticles have shown promise in stabilizing free radicals and reducing oxidative damage due to their unique surface properties and catalytic behaviour^{4,10,11}.

Literature Survey :

Literature Survey: 24 Karat Gold Face Wash as a Point of Innovation :

This literature survey explores the emerging innovation of 24 Karat gold-infused face wash in the cosmetics industry. It analyzes historical, scientific, and commercial perspectives on gold as a functional and luxury skincare ingredient. The formulation's appeal lies in its unique combination of tradition, modern nanotechnology, and luxury branding,

positioning it as a high-value product in the premium skincare market^{2,3,7-9,12}.

The skincare and cosmetic industry is constantly evolving, driven by consumer demand for luxury, efficacy, and natural ingredients. One of the most recent innovations is the use of 24 Karat gold in skincare products, especially in face washes, which promise to combine aesthetic appeal with dermatological benefits^{1,4-6,10,11}.

Historical use of Gold in skincare :

Gold has been used since ancient times in various cultures for skincare:

Egyptian Era: Cleopatra was known to use gold masks to enhance her complexion.

Ayurveda & Traditional Chinese medicine:

- ✓ Gold is believed to have anti-inflammatory and rejuvenating properties.
- ✓ Scientific Basis of Gold in Skincare
Recent studies have examined the benefits of gold nanoparticles (AuNPs):
- ✓ Anti-inflammatory and antioxidant effects.
- ✓ Improved skin elasticity and blood circulation.
- ✓ Enhanced collagen production.

Innovation in Face Wash Formulation

Using 24K gold in face wash is novel due to: Visual luxury appeal (gold flakes/sheen). Marketing differentiation. Enhanced skin penetration through nanotechnology. Formulations often combine gold with: Botanical extracts (like saffron, *Aloe vera*); Hydrating agents (glycer).

Aim, need and objectives :

Develop a scientifically formulated 24K gold face wash with proven cosmetic benefits. Investigate the dermatological and molecular effects of gold nanoparticles in skincare. Innovate in delivery systems (e.g., Nano emulsions, microcapsules) for improved skin absorption. Publish findings in cosmetic science, dermatology, and material science journals.

*Phases of work :**Phase 1: Literature Review & Innovation Benchmarking (Month 1) :*

- ✓ Review current gold-based skincare products and research.
- ✓ Identify innovation gaps : e.g., bioavailability, stability, skin penetration.
- ✓ Study traditional uses of gold in Ayurveda/ Unani medicine.

Deliverables :

- ✓ White paper on gold in skincare. Innovation landscape report.

Phase 2: Formulation Development (Month 2–3):

Develop face wash prototype containing colloidal or Nano 24K gold. Use mild surfactants and natural extracts (e.g., aloe Vera, chamomile). Ensure safety, stability, and suitable pH for facial skin.

Deliverables :

2–3 prototype formulations; Initial stability and safety report.

Phase 3: Characterization & Efficacy Testing (Month 4–6) :

Use analytical tools: SEM/TEM for nanoparticle size, UV-Vis for absorption, FTIR for bonding. *In-vitro* tests: skin hydration, collagen production, anti-inflammatory assays.

Ex-vivo/permeation studies using Franz diffusion cell :

Deliverables: Technical dossier; Skin efficacy data; Results for first scientific manuscript.

Phase 4: Clinical/Consumer Testing (Month 6–8) :

Small-scale dermatological testing on human volunteers (ethics approval required). Record changes in skin glow, elasticity, acne reduction, etc

Collect user feedback for sensory properties and satisfaction.

Deliverables: Dermatological safety report; Consumer preference report; Scientific manuscript.

Phase 5: IP, Scale-Up & Publication (Month 9–12) :

File a patent for the gold face wash delivery system/formulation.

Scale-up formulation for market readiness.

Publish results in 1–2 peer-reviewed journals.

Deliverables: Patent filing; Scientific publications; Tech transfer or commercialization report.

Key Innovation points :

Use of green synthesis for gold nanoparticles.

Bioactive carriers to enhance skin penetration. Dual benefit: cosmetic glow + anti-aging from gold's antioxidant properties.

Transparent clinical validation—uncommon in luxury skincare.

Key Ingredient :

Infused with pure gold particles (24K) Basic surfactants, glycerin, botanicals, etc. Skin Benefit Claims to boost skin radiance: Anti-aging & firming, Reduces inflammation, Brightening effect, cleansing, oil control, Acne treatment, moisturizing.

Step 1: Prepare the Aqueous Phase (Phase A) :

In a clean mixing vessel, add water and begin gentle stirring. Sprinkle in xanthan gum to hydrate, then add glycerin, propylene glycol, and mix until smooth. Incorporate disodium EDTA, followed by the gradual addition of surfactants (sodium laureth sulfate, cocamidopropyl betaine, sodium cocoyl glycinate) to avoid foaming. Adjust viscosity with sodium chloride. If needed, gently heat to ~40°C to dissolve any lumps, then cool to room temperature.

Step 2: Prepare Phase B (Botanical & Active Phase) :

In a separate beaker, mix aloe vera gel, rose water, saffron extract, salicylic acid, allantoin, sodium lactate, jojoba oil, and almond oil into a smooth blend. Gradually add gold dust,

Table-1. Estimated Formula (for 100 g batch): Ingredient % w/w Function

Sr.No.		Ingredients
1.	Phase A – Aqueous Phase	Phase B (Botanical & Active Phase)
2.		Soothing Agent Aloe Vera Gel (concentrated or reconstituted) 5.0
3.	Solvent: Aqua (Water)	Fragrance / Toning Rose Water
4.	Sodium Laureth Sulfate	Brightening Agent Saffron Extract
5.	Primary Surfactant Cocamido propyl Betaine	Visual/Aesthetic: Gold Dust (cosmetic grade)
6.	Secondary Surfactant: Sodium Cocoyl Glycinate	Film Former: Acrylates Copolymer
7.	Mild Surfactant: Propylene Glycol	Conditioning Agent: Polyquaternium 3
8.	Humectant: Glycerin, Xanthan Gum	BHA/ Exfoliate: Salicylic Acid
9.	Thickener: Disodium EDTA	Moisturizer: Sodium Lactate
10.	Chelating Agent: Sodium Chloride	Skin Soothing: Allantoin Almond Oil
11.	Viscosity Adjuster: Citric Acid	Essential Oil: Geranium Oil
12.	pH Adjuster: (to ~5.5) Hydrochloric Acid (for pH adjust if needed)	(Fragrance/Benefit) Fragrance
13.		Preservative (e.g., Phenoxyethanol / Paraben-free blend)

polyquaternium-39, and acrylates copolymer, stirring gently to ensure even dispersion. Finish by incorporating geranium oil, your chosen fragrance, and a preservative for a balanced scent and extended shelf life.

Step 3: Combine Phases :

Slowly add Phase B to Phase A with continuous stirring to ensure a smooth blend. Check and adjust the pH to 5.5–6.0 using citric or hydrochloric acid as needed. Stir gently to maintain texture and minimize air bubbles.

Step 4: Final Adjustments :

Check the viscosity and adjust with xanthan gum or sodium chloride as needed. Let the mixture rest for 12–24 hours to release air bubbles, then package into desired containers for a polished final product.

Evaluation parameters :

Brand Differentiation: Offers a USP (Unique Selling Proposition) in a crowded market.

The bioavailability of 24 karat gold in face wash refers to how much of the gold can be absorbed and used by the skin or body when applied topically. Here's a breakdown:

1. *Gold in Face wash – what does it mean?*

24 karat gold used in face washes is typically in the form of colloidal gold or gold nanoparticles.

These are suspended in a solution and included for their purported skincare benefits: anti-aging, anti-inflammatory, and skin-brightening effects.

2. *Bioavailability – Is It Absorbed?*

The skin is a strong barrier, and large

particles like pure gold (Au) don't easily penetrate it.

However, gold nanoparticles (smaller than 100 nm) can be absorbed into the upper layers of the skin, and some may reach deeper levels depending on their size, shape, and formulation.

3. *Scientific evidence :*

Limited and inconclusive: While some lab studies suggest gold nanoparticles might interact with skin cells and reduce inflammation or oxidative stress, clinical evidence in humans is sparse. Pure gold (24k) in non-nano form likely has negligible bioavailability when used in face washes due to poor skin penetration.

4. *Practical consideration :*

While 24-karat gold is widely used in cosmetic face washes for its luxury appeal, its actual bioavailability in non-nanoparticle form is extremely low. Any perceived benefits are largely aesthetic and typically result from other active ingredients such as hyaluronic acid, glycerin, or botanical extracts. In formulations utilizing gold nanoparticles, some interaction with reactive oxygen species (ROS) and potential synergistic antioxidant effects may occur; however, these benefits are modest and require further clinical validation.

Key concepts to include: Free radical theory of aging. Role of antioxidants in skincare.

Nanoparticle behavior of gold in cosmetic applications. In vitro or in vivo testing methodologies. Consumer safety and absorption rate

Innovative Application of 24 Karat Gold in Face Wash Formulations: A Novel Approach to Combat Free Radical-Induced

Skin Damage.

Innovation Statement / Point of Publication:

The integration of 24 karat gold nanoparticles into facial cleansers represents a novel skincare innovation aimed at mitigating the effects of free radicals on the skin. Unlike conventional antioxidants, gold nanoparticles possess unique surface Plasmon resonance and catalytic properties, enabling them to neutralize reactive oxygen species (ROS) more efficiently and at a deeper cellular level.

This innovative formulation offers:

Targeted antioxidant delivery via Nano-sized particles that penetrate the epidermis Dual-function cleansing and treatment, combining surface impurity removal with antioxidant action Synergistic formulation with vitamins and botanical extracts to enhance free radical scavenging Stability of gold, reducing the risk of irritation compared to some synthetic antioxidants.

This innovation offers a paradigm shift in cosmetic science, where luxury metals like 24K gold serve functional roles beyond aesthetics, aligning with consumer demand for effective, scientifically validated skincare.

Skin Benefits of 24 Karat Gold Face Wash

Anti-aging properties :

Gold is known to stimulate collagen production, which helps maintain skin elasticity and reduce wrinkles and fine lines. Using a 24-karat gold face wash can lead to firmer, younger-looking skin.

In conclusion, the 24-karat gold face wash is more than just a cleansing product; it is a blend of tradition, luxury, and cutting-edge

skincare science. While current products showcase promising benefits, the path ahead lies in deeper scientific validation, sustainable practices, personalized solutions, and technological integration. These innovations will define the next generation of gold-infused skincare products, ensuring they remain relevant, effective, and desirable in an increasingly competitive market.

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