Principles of Cosmetic Evaluation

Sebumeter

Purpose:

- Measures the **amount of sebum (oil)** present on the surface of the skin.
- **Used to evaluate:**
  - Oil-control efficacy of cosmetics (e.g., mattifying creams, cleansers)
  - Skin type classification (oily, dry, combination)
  - Impact of acne or sebaceous activity

Instrument Name:



- Sebumeter (commonly from manufacturer **Courage + Khazaka**, Germany)

Principle:

- The Sebumeter works on a photometric method, based on the transparency of a special tape (sebum-absorbing film) after contact with sebum.

Step-by-Step Principle:

1. A special **plastic strip or tape** is pressed against the skin for a fixed duration (usually 30 seconds).
2. **Sebum** from the skin transfers onto the strip.
3. The strip is then inserted into the device.
4. The **optical density** (transparency) of the strip is measured using a **photodetector**.
5. The **more sebum**, the **more transparent** the strip becomes, as oil alters light transmission.
6. The device calculates the **sebum amount in µg/cm^2**.

Applications:

- Testing oiliness of face, scalp, or back
- Evaluating anti-sebum or mattifying products
- Skin diagnostics in dermatology

Corneometer

Purpose:

- Measures the **hydration level of the stratum corneum** (outermost skin layer). Used to:
  - Assess moisturizing properties of creams and lotions

- Diagnose dry skin conditions
- Monitor skin barrier function

Instrument Name:

- Corneometer (e.g., **Corneometer CM 825**)



Principle:

- Based on capacitance measurement – it detects changes in the dielectric constant of the skin due to water content.

Step-by-Step Principle:

1. The probe of the Corneometer contains a capacitive sensor.
2. When the sensor touches the skin, the dielectric constant is affected by the moisture in the skin.
3. Since water has a high dielectric constant (~80) and skin has a much lower one, any change in water content affects the sensor reading.
4. The device then converts this dielectric variation into arbitrary units (A.U.) representing hydration levels.
5. Higher values = **more hydrated skin**.

Applications:

- Testing moisturizing effects of skin creams or serums
- Evaluating skin dryness in clinical or research settings
- Tracking skin recovery in dermatological treatments

Measurement of TEWL (Trans epidermal Water Loss)

Definition:

- TEWL is the amount of water that passively evaporates through the skin to the external environment.
- It's an indicator of the skin barrier function.

Purpose:

- Evaluate the integrity of the stratum corneum
- Assess the effectiveness of moisturizers, barrier creams
- Monitor skin damage due to irritation, dehydration, or disease

Instruments:

- **Tewa meter®** (e.g., TM 300 by Courage + Khazaka)

Principle:

- Based on Fick's law of diffusion
- The instrument uses an open-chamber diffusion method
- It measures water vapor pressure gradient between two sensors placed at a fixed distance from the skin

How It Works:

1. The probe has two humidity and temperature sensors placed at fixed distances.
2. Water vapor evaporates from the skin and forms a vapor gradient.
3. The sensors record humidity at two different points in the chamber.
4. TEWL is calculated using Fick's law of diffusion.

Output:

- Measured in **$g/m^2/h$** (grams per square meter per hour)

Applications:

- Evaluating moisturizers, barrier creams, sunscreens
- Studying atopic dermatitis, eczema, skin irritation

Measurement of Skin Colour

Purpose:

- **Used in:**
  - Whitening/brightening product evaluation
  - Assessing pigmentation disorders
  - Sun protection efficacy

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