SCHOOL of NATURAL SKINCARE
International

natural cosmetic
FORMULATION CLUB

pH MASTERCLASS

schoolofnaturalskincare.com

SCHOOL of NATURAL SKINCARE
International

TESTING pH

TESTING pH

pH is a measure on a scale of 0-14 of how acidic or alkaline something is.

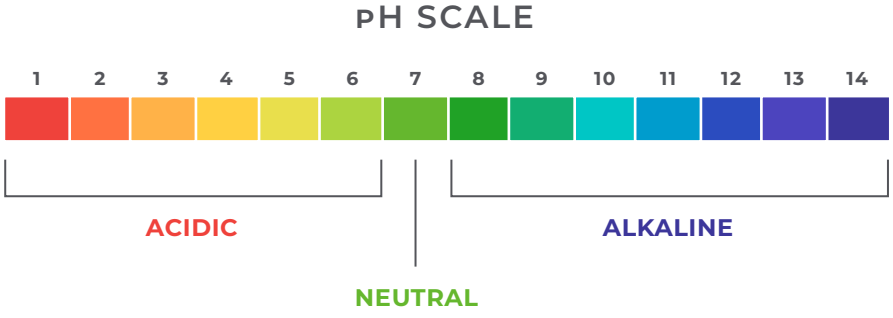
In this lesson, we will cover:

1. **What is pH?**
2. **Why and when to measure pH.**
3. **How to measure pH.**
4. **How to work with and look after a pH meter.**

WHAT IS pH?

We will start with a brief overview of pH. pH is a measure on a scale of 0-14 of how acidic or alkaline something is. A product with a pH of 7.0 is neutral, a pH of less than 7.0 is acidic, and a pH greater than 7.0 is alkaline. pH is only measurable where water is present, as it indicates the concentration of hydrogen ions.

Our skin has a specific pH value, which normally averages around pH 5.0, and varies from one body part to another and from one person to another. It even changes during the aging process. This acidic nature plays a vital role in maintaining healthy skin.



WHY AND WHEN TO MEASURE pH

It is common practice to measure the pH of cosmetic products that contain water, such as skincare (creams, lotions, milks, cleansers); body care (body washes, body scrubs); and haircare preparations (shampoo, conditioner, hair masks).

You do not need to measure the pH of anhydrous products (products that do not contain water) as a pH, by its definition, is only measured in water.

When it comes to emulsions, only O/W (oil-in-water) emulsions can have their pH measured. W/O (water-in-oil) emulsions have water droplets suspended in an oil phase, so when the pH electrode is immersed into the emulsion, it only has contact with oil, and cannot measure a pH.

The majority of typical emulsions will have a pH ranging from 4.0 to about 7.0, without any adjustments, so it is not always necessary to measure and adjust it. Our skin has a mechanism of balancing its pH; even if you wash your face with a product that has a pH of 8.0, the skin's natural pH levels will be restored over time. If the skin can survive non-optimal pH levels just fine, why even measure it?

Measuring the pH is important if you are using any pH-sensitive ingredients, like natural colorants, naturally derived preservatives or certain active ingredients. Almost all of the naturally derived preservatives (sodium benzoate, potassium sorbate and salicylic acid, for example) have very strict pH requirements to ensure they work properly, which means measuring (and adjusting) the pH is necessary when protecting your product with natural preservatives. Preservatives active at a lower pH can lose their efficiency quite quickly when the pH increases; for instance potassium sorbate is active at about 70% at pH 4.5 and at about 35% at pH 5.0. Check the manufacturer's information about pH requirements for your chosen preservatives: most natural preservatives require a pH below 5.0.

You do not need to measure the pH of anhydrous products (products that do not contain water) as a pH, by its definition, is only measured in water.

If you are using certain active ingredients, you will need to be aware of the pH of your product. AHAs (alpha hydroxy acids) need pH 4.0 or lower to be active as chemical exfoliants. Ascorbic acid (the common form of Vitamin C), requires a pH below 3.5 to be active. Niacinamide (Vitamin B3) is most stable at pH 6.0. Always check with your supplier of active ingredients what pH levels are needed for a specific ingredient.

You will also need to measure pH when creating haircare products, because hair has specific needs when it comes to pH. In order to keep hair healthy and minimize damage, haircare products should have pH in the acidic range, typically somewhere between 4.0 and 5.5. So you will need to check and adjust the pH of your haircare products. We cover haircare formulations in detail, including how to measure, test and adjust the pH of haircare products, in our Diploma in Natural Haircare Formulation.

HOW TO MEASURE pH

The two options for measuring pH are pH strips and a pH meter, and there are pros and cons to each.

Test strips are cheap, simple to use and easily accessible. You can dip them directly into your product or smear some of the product on the strip when dealing with viscous samples such as emulsions. Their main downside is the fact that they are not very precise; they only provide rough estimates.

If you are using pH strips and want a more precise measurement, instead of using 0-14 pH strips, choose strips that cover a smaller pH scale, for example pH 3.0-6.0 or pH 4.0-7.0.

Here are some examples:

https://preclaboratories.com/product/ph-4-7-test-strip

www.aliacura.de/produkte/zubeh%C3%B6r/ph-fix-indikatorst%C3%A4bchen

When adjusting the pH, several consequent measurements are needed, so you may end up using many pH strips for one product.

To measure the pH more precisely (to one decimal point, for instance) you will need to invest in a pH meter. pH meters can give you an accurate numerical pH reading and are available to suit your laboratory space constraints – compact portable or countertop size.

However, they are expensive to purchase, need regular cleaning to avoid contamination, the probe is normally made from glass which has the potential to break or get damaged, the probes need to be stored in a specific solution to prevent them from drying, and it requires calibration before use, which can be time-consuming.

Recommended pH meter manufacturers are Ohaus and Hanna.

pH is usually measured at 20°C. You might not have control over the temperature when measuring your pH, in which case the most important thing is to note the temperature at which the pH is measured. For the same sample of product, the pH normally decreases as the temperature increases.

Check what the temperature ranges of your meter are; some meters have automatic temperature compensation and allow measurements above room temperature.

If the product is liquid (for example, toner or spritz), measure the pH by immersing the electrode into your sample. Stir the sample or keep the electrode moving while taking a reading. When it comes to measuring the pH of thicker emulsions, some manufacturers produce special electrodes that are used in semi-solid samples. Try looking for a 'cream probe' or 'emulsion probe' or 'probe for semi-solid samples'. They are more expensive than regular pH probes, but they will allow measurement directly in the sample, even if it is not liquid. Check with the manufacturer what probe would be suitable for your needs before buying.

Example of pH meters suitable for water-based products:

HI-98100 Checker Plus pH Tester

HM Digital PH-200

Examples of pH meters suitable for emulsions (and water-based products):

PH100: ExStik® pH Meter

FC200S Foodcare Kynar Body pH Electrode (just the electrode, needs a meter to attach to)

HOW TO WORK WITH AND LOOK AFTER A pH METER

pH meters require special care in order to function normally and provide reliable results. Always follow the manufacturer's instructions. The most common points to keep in mind are listed below.

1. Always keep the probe submersed in the correct storage solution (typically saturated solution of potassium chloride – KCl) when the meter is not in use. This prevents the electrode from drying out and makes sure the fluid inside the electrode does not lose electrolytes.

2. Make sure the probe never dries out – when measuring multiple samples in one go, submerse the probe in distilled water between measurements. For longer storage, use a storage solution (as described in point 1).

3. pH meters will require calibration after a certain period of time; this will ensure they are making precise measurements. Instructions on how and when to calibrate should be provided by the manufacturer. You will need calibration solutions for this task; you can find them in various lab supply shops.

4. The glass electrodes of pH meters are very fragile; work gently with them. Before and after each measurement, rinse the electrode with distilled water, do not wipe it.

5. When taking a pH reading, keep your sample agitated for the most reliable results. If you have one, the easiest way to do this is by using a magnetic stirrer which creates a vortex inside the beaker. This way, the electrode does not need to be moved around when taking a reading. If you do not have a magnetic stirrer, gently move the electrode around to stir the sample.

6. After measuring a pH, rinse your probe with distilled water.

SUMMARY

pH is a measure on a scale of 0-14 of how acidic or alkaline something is. A product with a pH of 7.0 is neutral, a pH of less than 7.0 is acidic, and a pH greater than 7.0 is alkaline. Most natural preservatives require a pH below 5.0 to be effective. pH strips and pH meters can be used to measure pH and both have advantages and disadvantages. To measure pH precisely you will need to invest in a pH meter which needs special care during and after use to function properly.

natural cosmetic
FORMULATION CLUB

www.schoolofnaturalskincare.com