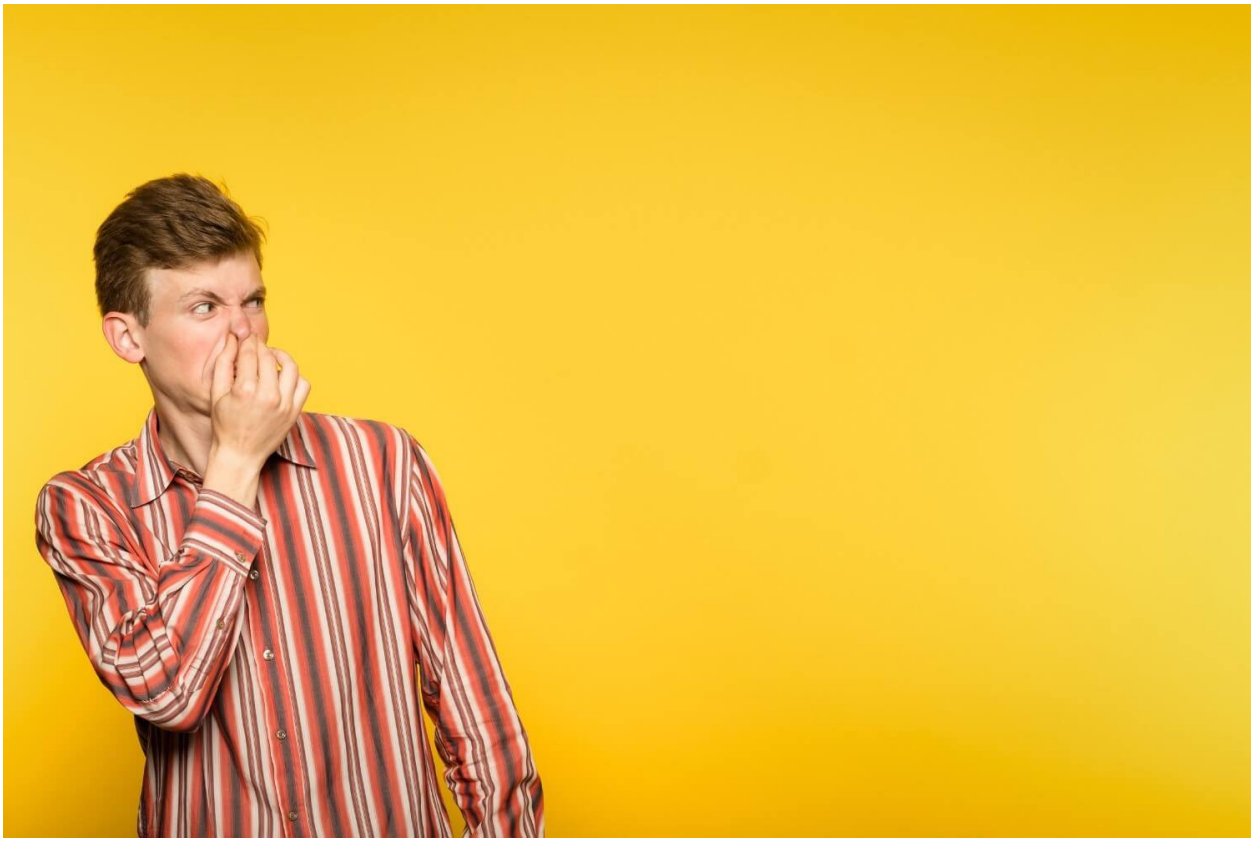


Chelation – Is your water tainted?

October 17, 2024 Aiden van Wyk

When it comes to shelf life we often run first towards preservatives. This is valid and effective - but did you know that there may be a silent saboteur already lurking in your formulation - and you don't know how to stop it. Well... not yet :)

What is Chelation?

Chelation is a chemical process where a chelating agent binds to metal ions, preventing said metal ions from interacting with your formulation's other ingredients.

When do we need Chelation?

Chelation is particularly necessary in formulations using water.

Your water could have high concentrations of metal ions. This type of water is called hard water and typically contains high levels of calcium, magnesium, along with other metal ions

What happens if chelating agents are not used?

Sometimes chelating agents are necessary. In these circumstances, if a chelating agent is not used, some problems could arise:

- Instability: Metal ions can destabilize your product and cause changes in texture, colour and scent.
- Reduced Potency: Occasionally the formulation actives could interact with the metal ions instead of working towards your formulation's intended purpose.
- Shorter Shelf Life: Metal ions can speed up the oxidation process, causing the product to spoil more quickly.
- Unintended Reactivity: In high enough concentrations metal ions themselves can cause skin irritation or reactions.

Are Chelating Agents Toxic?

Chelating agents are generally safe for personal use. You will find that chelating agents are applied in low concentrations and are nontoxic when applied to your skin.

You may however still want to conduct a quick and simple patch test as one would with any new product - particularly if you have sensitive skin.

What is Chelating Shampoo?

The minerals in hard water does not only impact your formulations, but also could cause buildup and heaviness in your hair. A chelating shampoo would work against said buildup, maintaining clean and light hair.

Chelating shampoos would then restore your hairs natural shine, enhance the effectiveness of your other products and boost coloured hair to seem more vibrant.

If you live in an area with hard water, swim in chlorinated pools, or use a lot of styling products, using a chelating shampoo once or twice a month can help remove buildup and restore the health and appearance of your hair.

How do I know if I have hard water?

The best way is to have your water professionally tested, but here are a few alternative indicators that can help you sniff out whether you have hard water:

Mineral Buildup

Hard water can leave behind white buildup around faucets, shower heads, drains, sinks, tiles or appliances exposed to the water over time.

Not Soapy

Hard water doesn't lather easily with soap. Instead of lathering, the soap tends to react with the minerals and creates scum.

Odd to the senses

The water smells and tastes... weird. Some say it tastes slightly bitter towards a salty flavour - with a rotten egg like odor.

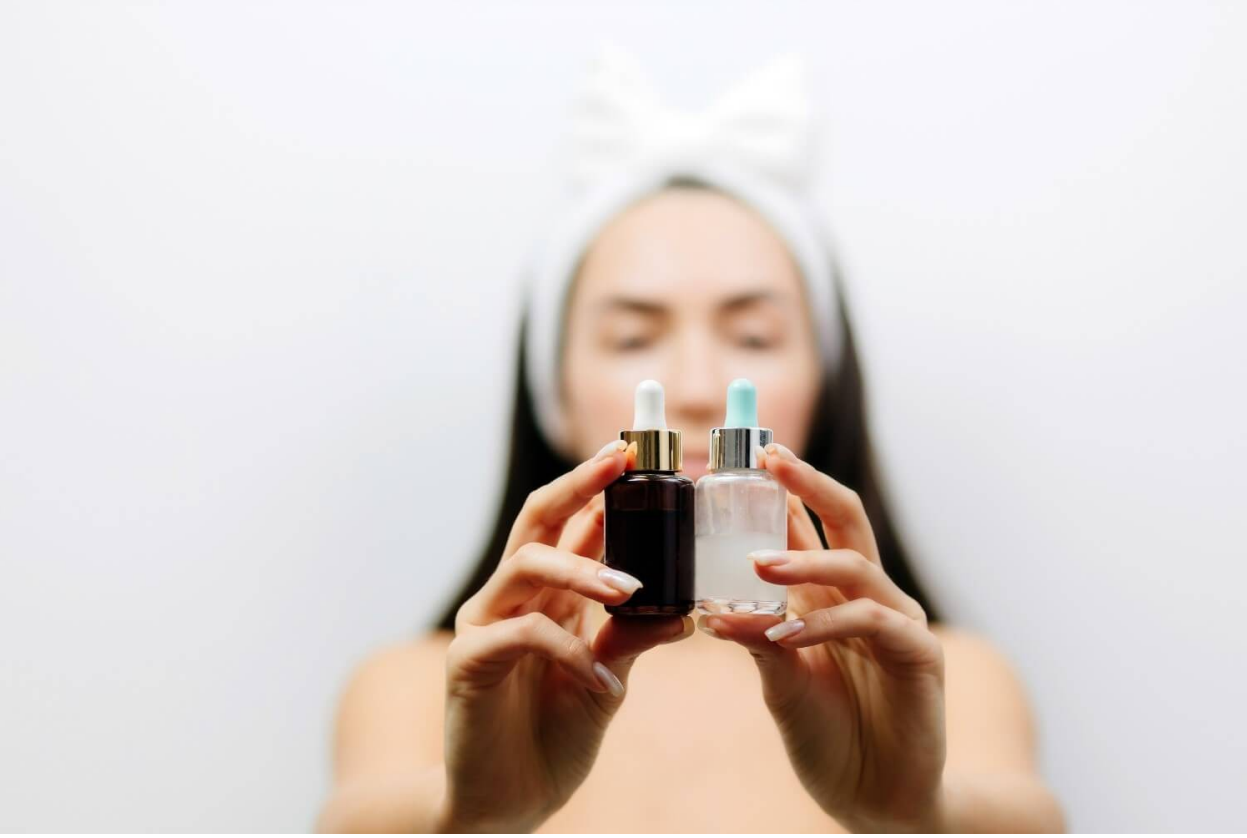
Itchy/Dry Skin

The metal ions can build up and react on your skin, clogging pores and drying out your skin.

When do you not need a chelating agent?

Chelating agents aren't necessary for all formulations. In some circumstances one would not need to consider the presence of metal ions at all.

- Oil-Based formulations - there is no water for metals to dissolve into.
- Soft Water - If you know that you are using water that does not contain any minerals (or a low concentration) the presence of metal ions need not be too much of a concern.
- Intentionally Short Shelf-Life: If your formulation is going to be used up quickly, there wouldn't be enough time for sufficient oxidation to occur.
- Low pH: Metal ions are less reactive in acidic environments, so chelating agents may not be as necessary in formulations with a pH below 4.0.



:Formulating with Chelating agents

Concentration of Chelating Agents:

This depends on the potency of the chelating agent:

- Sodium Gluconate: between 0.75% and 0.1%
- Zinc Ricinoleate Complex: between 1% and 3%
- Sodium Phytate: Between 0.1% and 0.5%

Optimal pH for Chelating Agents:

Chelating agents function best in slightly acidic to neutral pH levels, usually within the range of 4 to 8.

Great Pairings with Chelating Agents:

- Surfactants: Enhances the washing away of mineral buildup and prevents the surfactants from binding with the ions in the water
- Preservatives: This is combined for optimal stability in any product
- Actives: Chelating agents can be combined with active ingredients (like Vitamin C, Niacinamide, or Salicylic Acid) to ensure the functionality of the active is maintained.

Chelating Clarifying Shampoo Recipe

This is ideal for those dealing with hard water or mineral buildup on their hair; preventing dullness, buildup, and can help restore softness and shine to your hair.

Ingredients:

- 66% Water Base (distilled water, hydrosol, infusion, or a combination)
- 1% sodium gluconate

- 2% xanthan gum
- 5% vegetable glycerine
- 2% D-panthenol (optional but recommended)
- 1% Geogard 221
- 8% Decyl glucoside
- 5% coco glucoside
- 8% cocamidopropyl betaine
- 1% essential oils of choice
- 1% Additional water (for adjusting consistency)
- Citric acid solution (as needed for pH adjustment, not counted in percentage)

Optional:

- PH testing strips
- Serum Bottle

Method:

1. Weigh and dissolve the sodium gluconate in your water base.
2. In a separate beaker, blend xanthan gum with glycerine.
3. Add D-panthenol and preservative to the water and chelating agent mixture.
4. Gradually stir in the xanthan gum and glycerine blend to form a smooth gel consistency.
5. Weigh and mix decyl glucoside and coco glucoside together. If you find they're having difficulty mixing, heat the mixture slightly (to about 40°C)
6. Slowly add the surfactant mixture into Phase A, blending thoroughly.
7. Weigh and add cocamidopropyl betaine, followed by essential oils, and stir to combine.
8. Add the remaining water to achieve the desired consistency.
9. Test the pH and adjust to around pH 5 using a citric acid solution if necessary.
10. Ensure all ingredients are well incorporated and the consistency is as desired..

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