pH in Brewing 

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SOUTH AUSTRALIAN BREWING CLUB

Scope: pH

- What it is...
- Why you should care…
- How to measure it and look after your probe.

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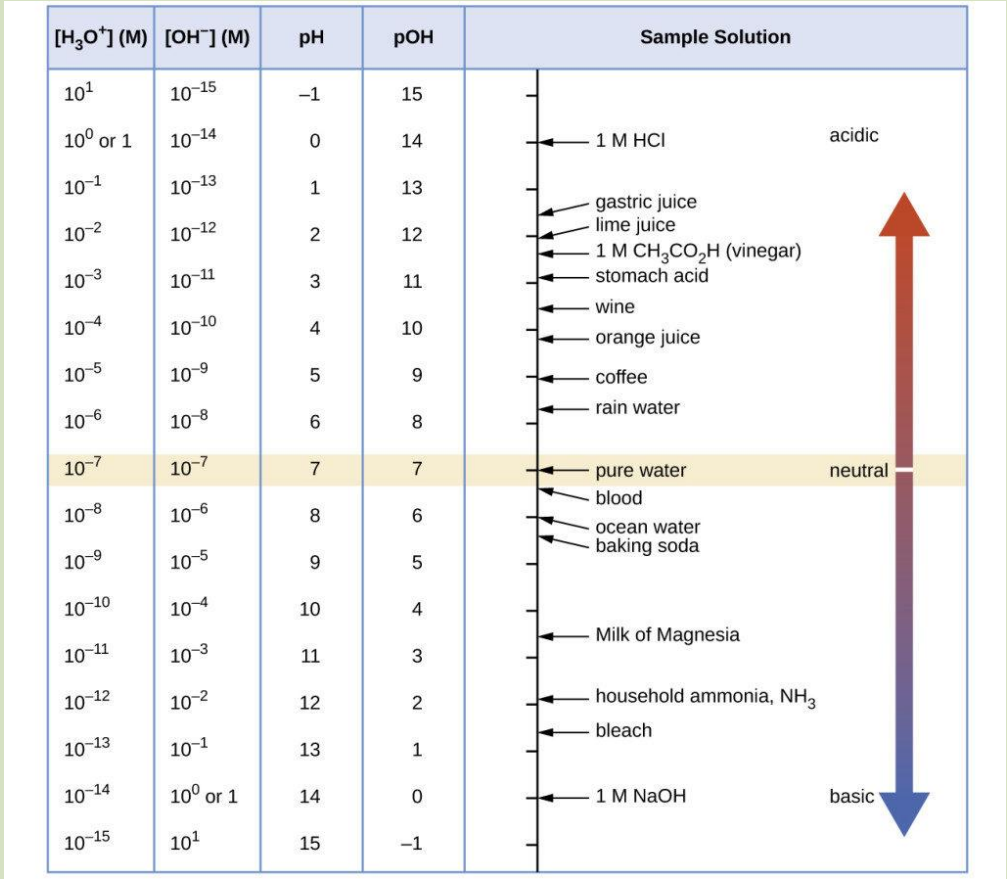
What is pH?

- $pH = -\log_{10}([H^+]) = -\log_{10}([H_3O^+])$
- In range 1-14
- Neutral pH = 7
- Basic (more OH- than H+) range 7 – 14
- Acidic (more H+ than OH-) range 7 – 1
- Critical to note the log scale!



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Why you should care! #1

pH in the mash: Ideal mash pH range (5.2-5.6) for optimal enzyme activity.

Beta-Amylase	131°-150°F	5.0-5.6	This rest works well at 153°F as a compromise for beta and alpha rests. Creates small sugar chainsthat are highly fermentable and leaves the lowest finished gravity and lightest body. One of the diastaticenzymes required for saccharification.
Alpha-Amylase	149°-162°F	5.3-5.8	Produces glucose, maltose and un-fermentable dextrins. Leaves the highest finished gravity and fullerbody. Can be slower to work than beta-amylase. Most active at 158°F.

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https://www.homebrewersassociation.org/how-to-brew/enzymes-in-beer-whats-happening-in-the-mash/

Why you should care! #2

pH in the kettle

- pH influences hop bitterness extraction.
- Impact on protein coagulation and therefore beer clarity.
- Impacts flavour balance and mouthfeel.

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Why you should care! #3

pH During Fermentation

- Yeast thrives in a slightly acidic environment (pH 4.0-4.5).
- Impact on yeast health and fermentation efficiency.
- Affects final beer stability and microbial resistance.

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Why you should care! #4

pH in Finished Beer

- Typical pH ranges for different beer styles
  - Sour beers ~3.0
  - Lagers ~4.2 – 4.6
  - Ales ~ 3.8 – 4.6
- Affects taste, mouthfeel, and foam stability.
- Consistency in brewing.

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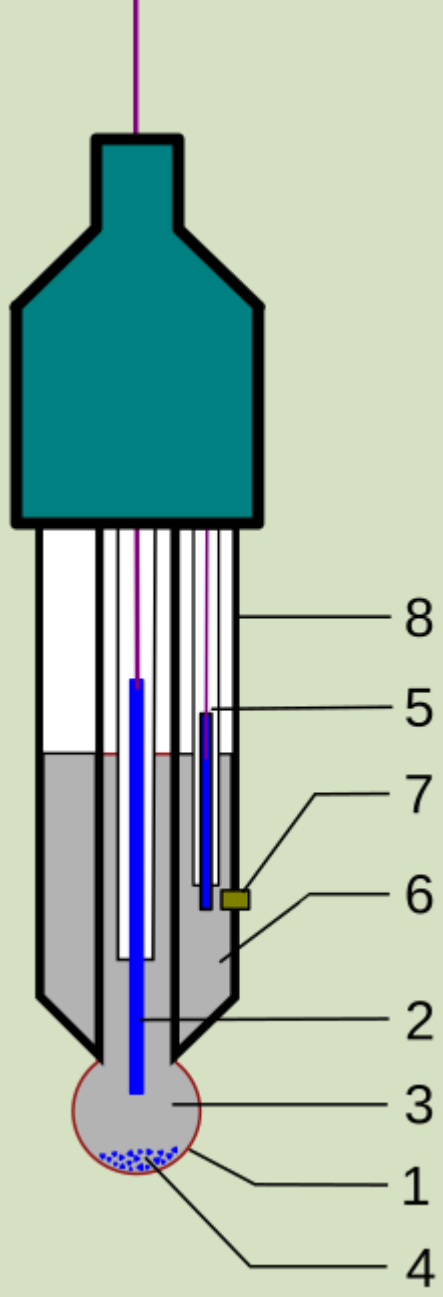
https://byo.com/article/the-principles-of-ph/

What does my pH probe do?

- Measures electrical potential (voltage) between electrodes (2,5) on different sides of a (fragile) glass membrane (1)
- The voltage depends on:
  - H+ activity in sample
  - Age / depletion of electrolyte (3)
  - Junction potential – grime (7)
- Includes a temperature probe for Automatic Temperature Compensation (ATC)



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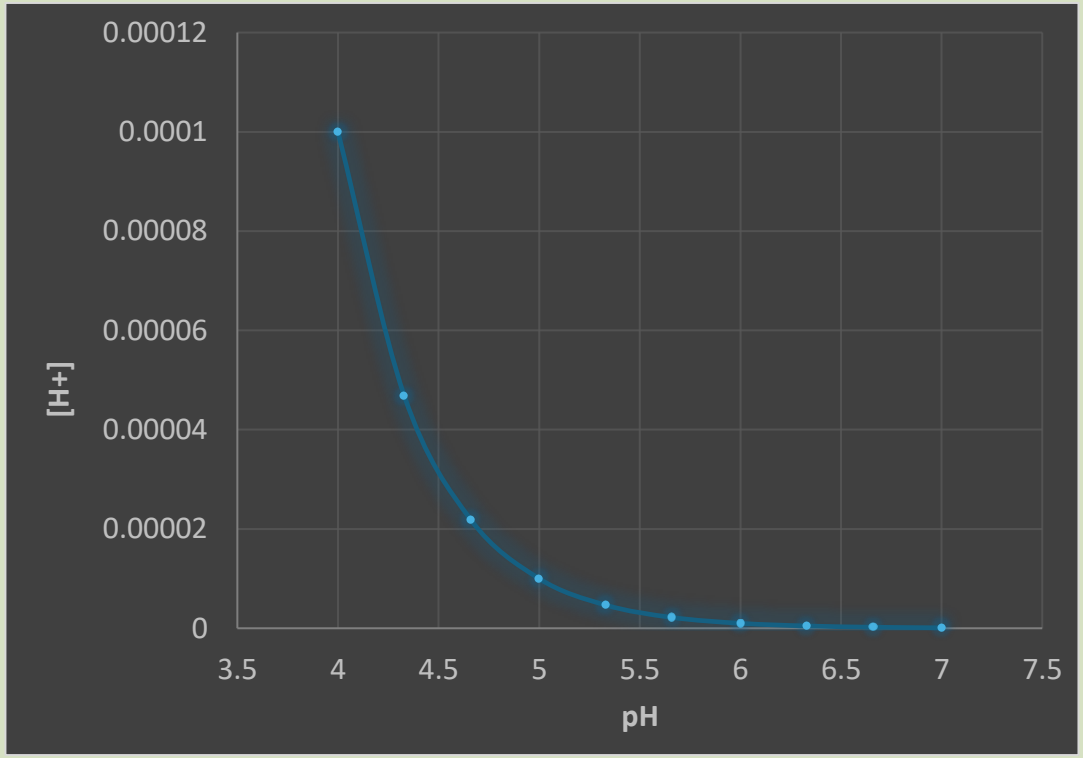
How do I use it and care for it?

- Before calibration
  - Check in pH = 4.0 buffer
  - Check in pH = 7.0 buffer
- IF required, calibrate with 7.0 and 4.0
- Cool your sample!
  - Accurate readings
  - Care for your membrane
- Remove and rinse, ASAP
- Blot to dry, no tapping, or shaking!
- Store moist or in ‘storage solution’ (3M KCl)



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Is my probe broken?

- Did it dry out completely?
- Is it refillable?
- Did you drop it?
- Is your junction blocked up?

➔Junction potential test!

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