

HUMMING PROBE

Glass electrode

Test paper

You don't need to calibrate your pH meter any more after you read this article

When do you need to calibrate your pH meter?

The precision and the lifetime of the pH meter depends on the pH electrode. Sometimes, the pH measurement is inaccurate when using inappropriately. After a period of use, the membrane of the pH glass electrode may be block or be scratched, causing the potential to shift, and needed to be calibrated for each time of use. In addition, the pH glass electrode needs to be calibrated for the following situations:

1. Change a new pH glass electrode.
2. After measuring the strong acid (pH < 2) or a strong alkaline (pH>12) solution.
3. After measuring the sample contain Fluoride or organic compound.
4. The temperature different between the sample solution and the room temperature or the standard solution is too much.

The principle and the procedure of pH meter calibration

pH value test is the measurement of the concentration of the activity of the hydrogen ion which lead to acid, base or neutral of the solution. pH test Using potentiometry to measure the pH value, pH glass electrode is constructed with the glass working electrode and the reference electrode. The glass working electrode is sensitive in potential toward pH value while the reference electrode provides a stable reference potential. By combining these two electrodes together and immersing into the solution, the potential output of the electrode is linear to the pH value at the consistent temperature. Because the situation mentioned above can cause bias of the linearity, the glass electrode needs to be calibrated with standard solution after using a period.

Two-point or three-point method for pH meter and eletrode calibration?

- Two-point, which include pH 4 and pH 7.
- Three-point, which include pH 4, pH 7 and pH 10.

Both these two types of calibration need to start from pH 7 to make the zero potential calibration. Two-point type calibration is sufficient for most situation and three-point type calibration is for more precise measurement.



If you don't want to calibrate pH meter, maybe you can choose calibration-free pH measurement system.

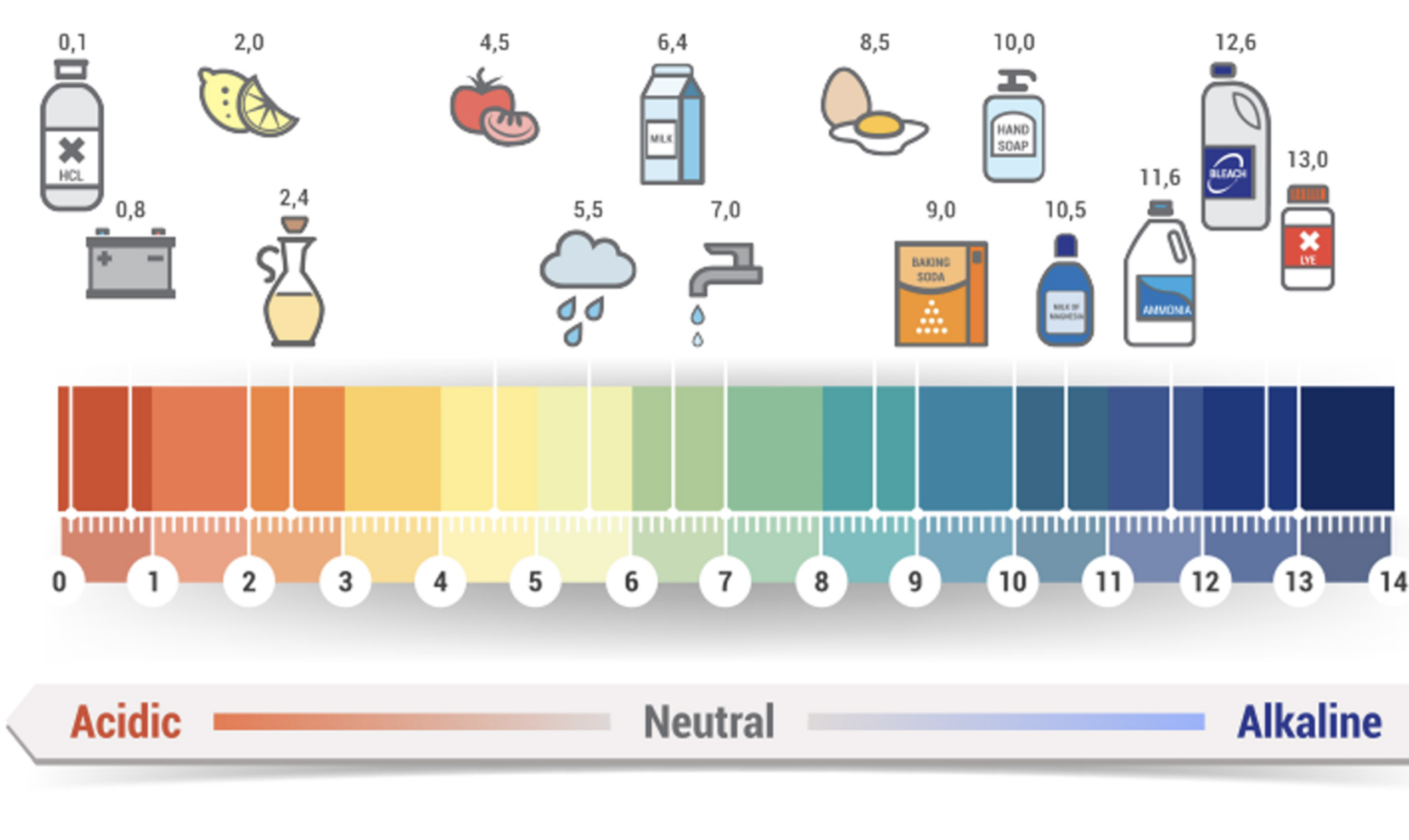
For precise pH measurement everyday or having no standard solution, there are calibration-free type pH electrode available. The principle of calibration-free pH measurement system is similar to pH glass electrode. By measuring the potential different, the concentration of the hydrogen ion can be measured and transfer to pH value via Nernst Equation. Another feature of calibration-free system is disposable, no cross-contamination for the sample. Through seriously controlling the process of auto manufacturing, the strip electrodes have been calibrated in the factory and the information of calibration is labelled on the package. User only needs to input the information to the pH meter for the first time and needs no calibration afterward. Moreover, strip electrode only needs micro-volume sample to perform the measurement due to its microfluidic design. Many experiments, which have limited amount of sample, can use directly without other procedure, especially in bio-experiment. And the sample will not be contaminated by other sample due to the disposable design. For an outdoor experiment, only the meter and the strip are needed, which is more convenient to operate without carrying the standard solution and other component.



Comparison of pH test paper, glass electrode and calibration-free Humming Probe strip electrode

1. pH test paper

There are different chemical reagents, like Methyl red, change at the range of pH 4.2 (red) – pH 6.2 (yellow), Bromocresol green, change at the range of pH 3.6 (yellow) – pH 5.4 (green), and Thymol blue, change at the range of pH 6.7 (yellow) – pH 7.5 (blue), have different color at different pH range. Immersing white paper into the solution that have a proper ratio of these reagents, the pH test paper is produced. The pH test paper is more convenient to use and the price is lower compare to the glass electrode. But the pH test paper use visualize color to measure the pH which is not accurate because of the personal error. And pH test paper can not be used to constantly monitor and record pH value change .



2. pH glass electrode

The pH glass electrode performs an accurate measurement. Because of the character of the glass electrode, it needs to be calibrated with pH 4, 7, 10 standard solution every time before use. The calibration, which takes 5 – 10 minutes, is complicate and needs to be operated with cautions. To maintain the glass electrode, the electrode should be cleaned and dried tenderly and kept in the stock solution after using. Any incorrect operatione can cause the glass membrane being scratched and damaged . In addition, the maintenance and preservation of the glass electrode also has many points need to be noticed. You should avoide the pH glass electrode membrane from dryness. So the pH glass electrode needs to be properly stored in preserving fluid, otherwise it will affect the accuracy and precision of pH test. According to all the procedures mentioned above, the pH glass electrode should be used carefully with the person who has been professionally trained . Moreover, the price of pH glass electrode is between 100 – 1,000 USD, which is higher than other pH measurement method.



3. Micro disposable Calibration-free Humming Probe strip pH electrode

The Humming Probe pH measurement system provides by UltraE Co., Ltd. gives user a convenient way to measure and monitor pH value. User only needs to take out the strip electrode from the vial and just few procedures to measure the pH value without calibration and maintaining the electrode. The principle of calibration-free pH measurement system is similar to pH glass electrode. By measuring the potential different, the concentration of the hydrogen ion can be measured and transfer to pH value via Nernst Equation. The feature of calibration-free system is disposable, no cross-contamination for the sample. Through seriously controlling the process of auto manufacturing, the strip electrode is calibrated within the factory and the information of calibration is labelled on the package. User only needs to input the information via the QR code to the meter for the first time and needs no calibration afterward. Moreover, strip electrode only needs micro-volume sample to perform the measurement due to its microfluidic design. Many experiments, which have limited amount of sample, can use directly without other procedure, especially in bio-experiment. And the sample will not be contaminated by other sample due to the disposable design. For an outdoor experiment, only the meter and the strip are needed, which is more convenient to operate without carrying the standard solution and other component. Moreover, the price of the stripe is around 1 USD, much lower than the glass electrode.

	Glass electrode	HUMMING PROBE	Test Paper
Product/Item			
Operability	Difficult	Easy	Easy
Accuracy	High	High	Low
calibration	Needed	No Needed	No Needed
Sample volume	More(5~10 mL)	Less(1~20 μL)	Less(50~100 ML)
Maintenance	Difficult	Easy	Easy
Price	High	Low	Low
Cross-contamination	Possible	Disposable	Disposable



Video link : <https://www.ultraehp.com/EN/Download.html>