

University of Al-Mustaqbal

Department of Medical Instrumentation Techniques Engineering

Subject : Clinical Chemistry

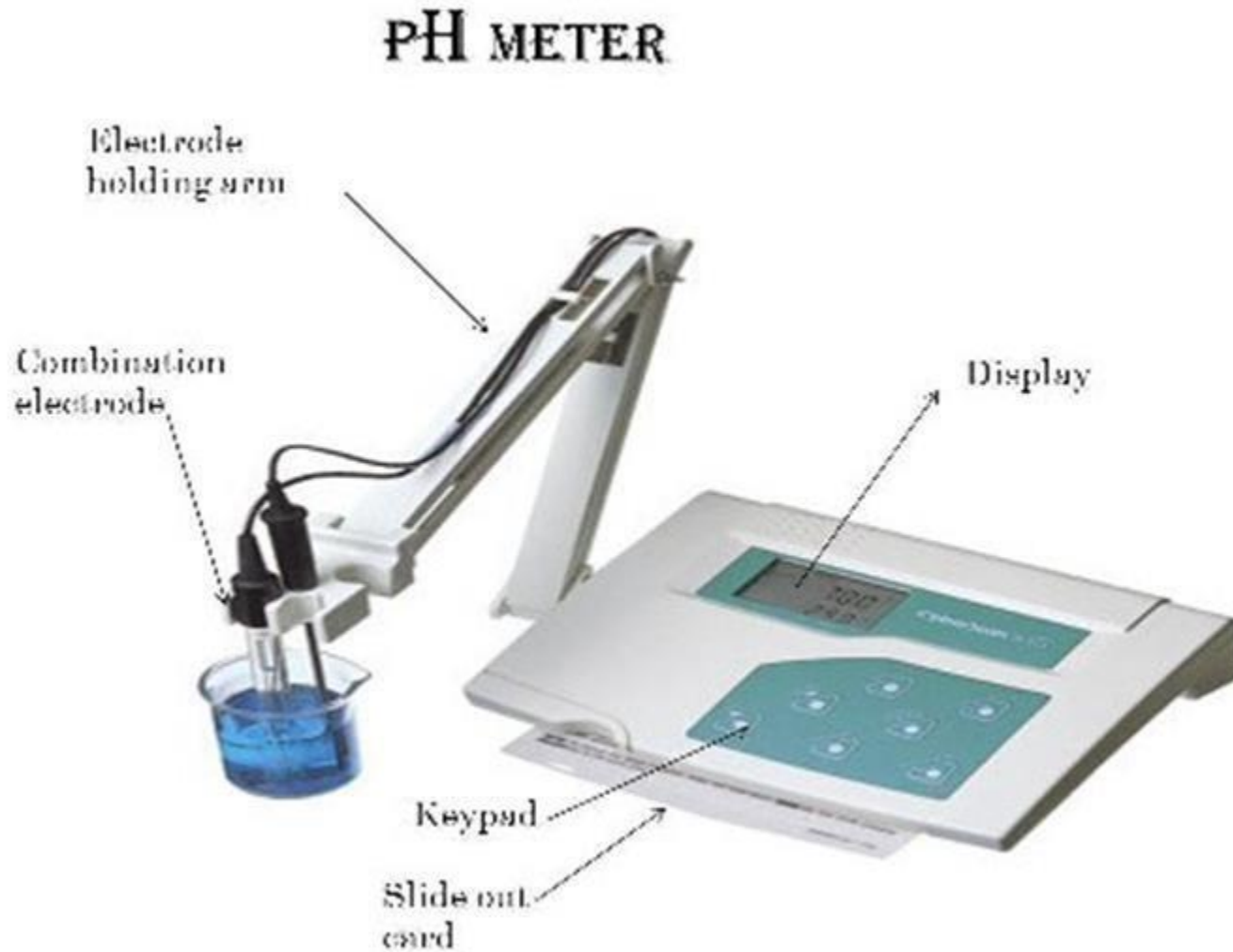
Lecture:02



CLINICAL CHEMISTRY – LAP EXPT.2: PHMETER

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PH meter :



Introduction:

- PH is define as the negative value of the
- logarithm to the base 10 of the hydrogen ion
- concentration . $\text{PH} = -\log_{10} (\text{H}^+)$, PH for
- water = 7.0 , PH for acid solution less than
- 7.0 while an alkaline solution has a PH
- greater than 7.0 . .
- The most accurate measurement of PH is
- made with a PH meter . The PH meter is
- more commonly used in clinical laboratory to
- measure.

Basic parts :

- The PH meter consist of three basic parts :
- 1-A glass bulb electrode , contain a solution
- of a certain fixed PH or hydrogen ion concentration
- 2-A reference electrode , which is usually a calomel electrode
- 3-A sensitive meter or measure device .

Principle :

Electrode potential is produced between them that depends on the hydrogen ion concentration of the solution compared to the fixed concentration of the solution the potential of the PH electrode (the glass of bulb electrode) and is measured by means of a meter. The meter is an electronic voltmeter that measures millivolts(mv) •

PH units or from a millivolt scale . A 14-0 Results read from an arbitrary scale of . 7.0 is equivalent to PH of 0

***When the glass bulb and reference electrode are housed together, the resulting unit is called a combination electrode**

The glass electrode is manufactured by sealing a thin PH sensitive glass tip to the end of a heavy – walled glass tubing. The type of the thin glass is important resistance the bulb is filled with a solution of HCL acid that is saturated with silver chloride. A silver wire is immersed in solution and is connected via external lead to one terminal of a potential measure device. The calomel electrode is connected to other terminal. In fact it is the membrane at the tip of electrode that responds to PH changes

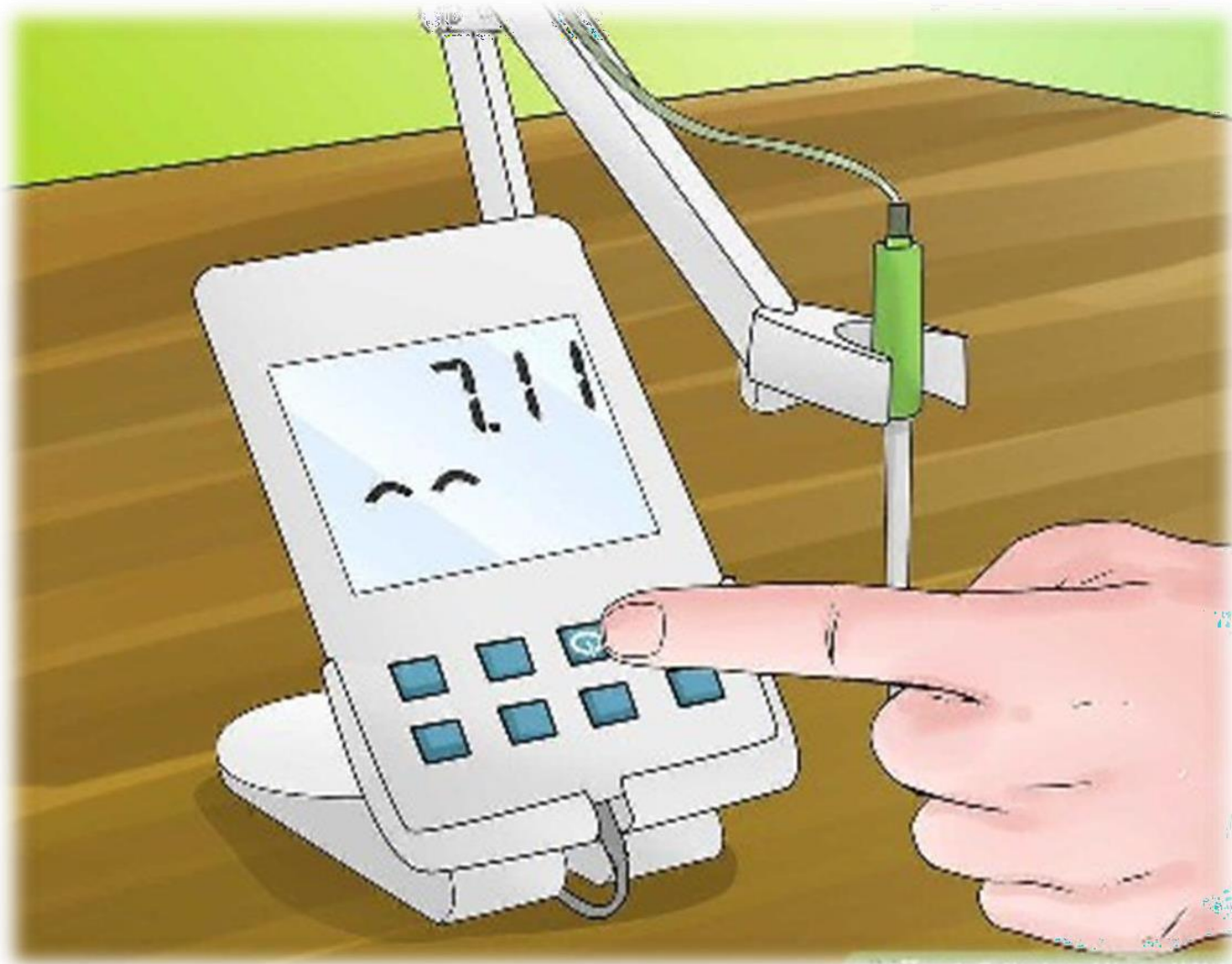
Factors effecting the PH measurement

- 1-The molar concentration of hydrogen ions
- 2-The temperature
- 3-The dissociation constant of the acid .

Calibration or standardization of the PH meter:

This is done by immersing the electrodes in a buffer solution of known PH at a particular temperature and then adjusting the instrument with the calibration knob to the correct value.

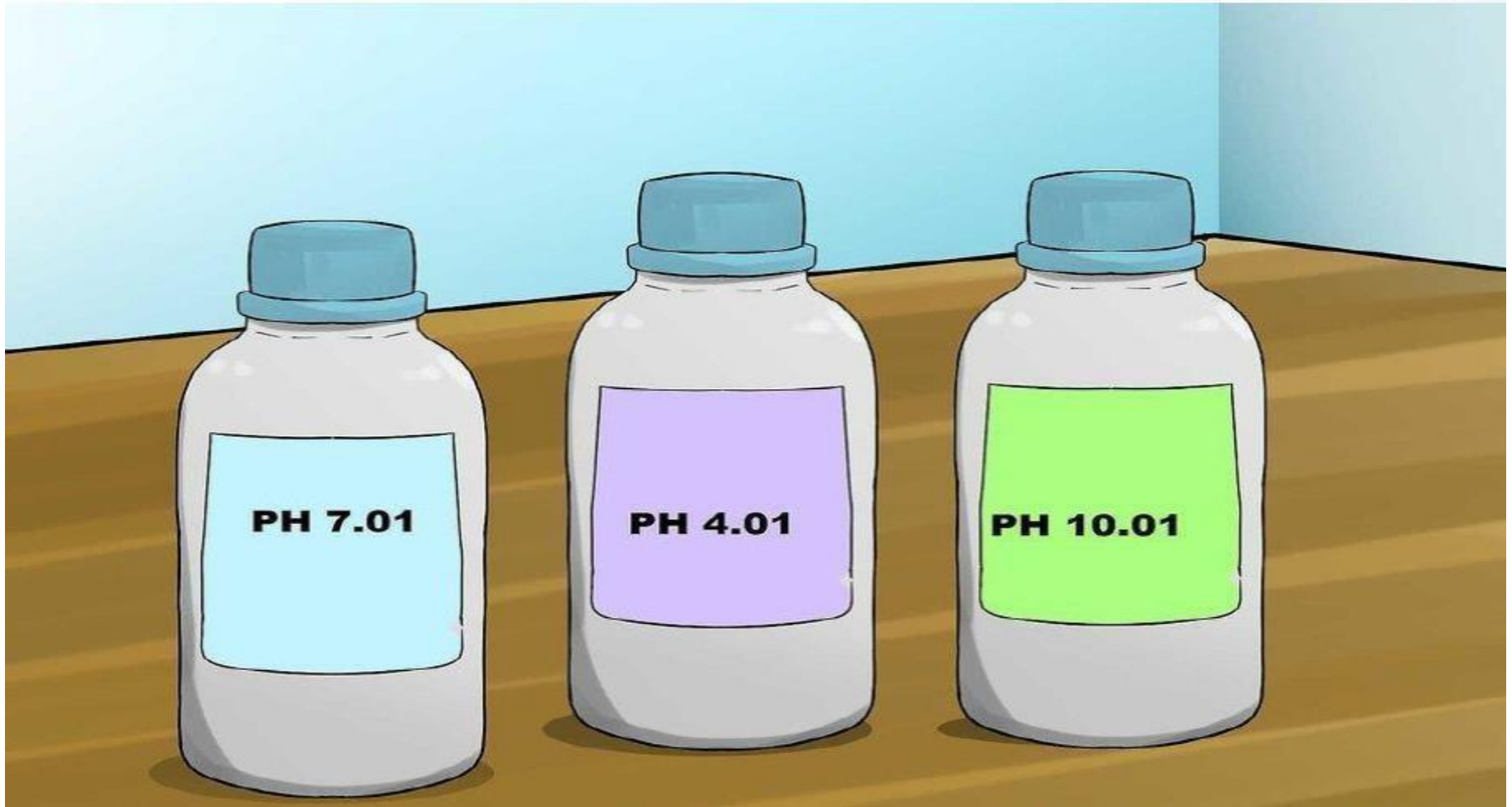
* Turn on your pH meter



** Clean your electrode



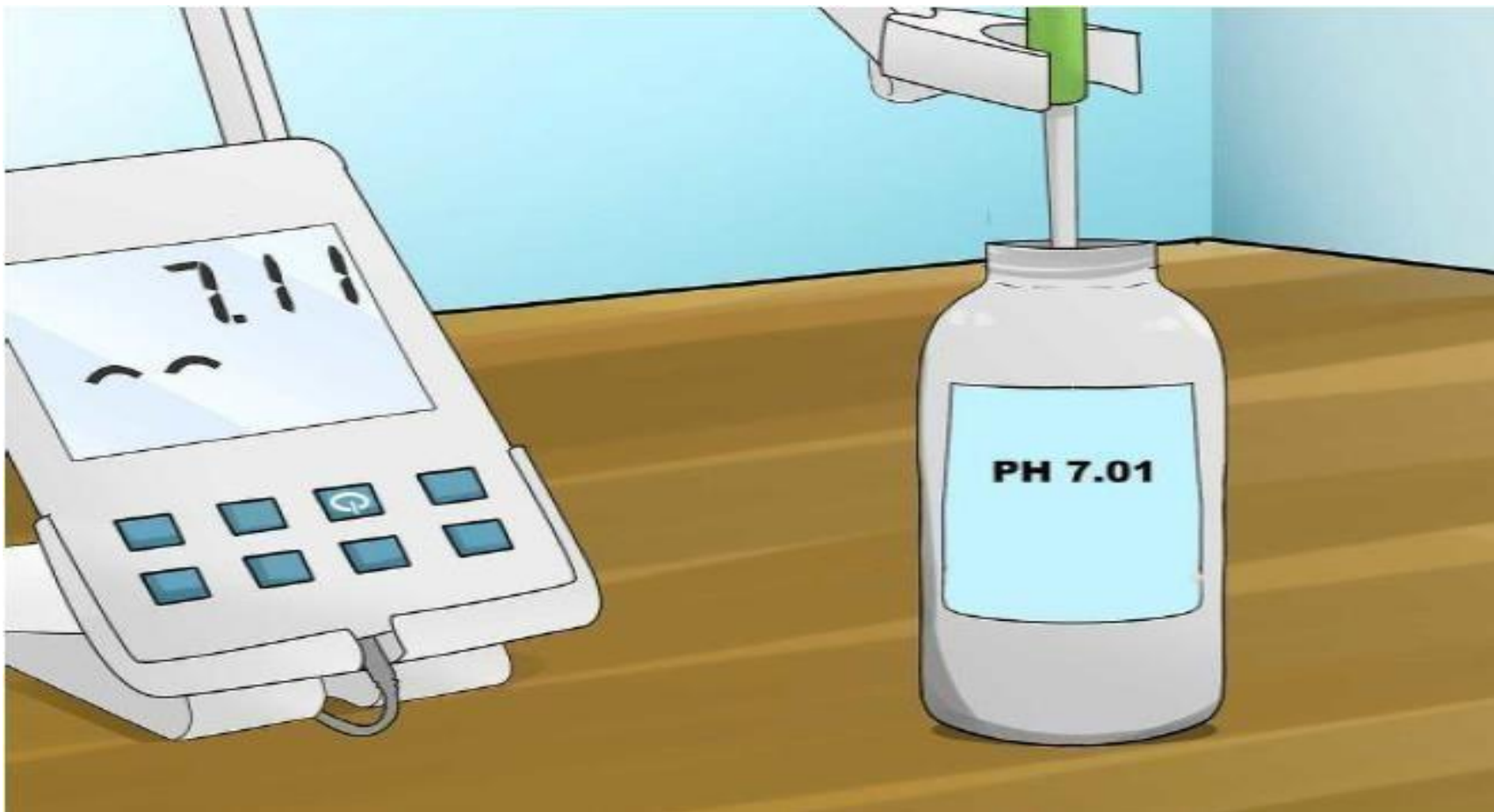
*** Prepare your buffers



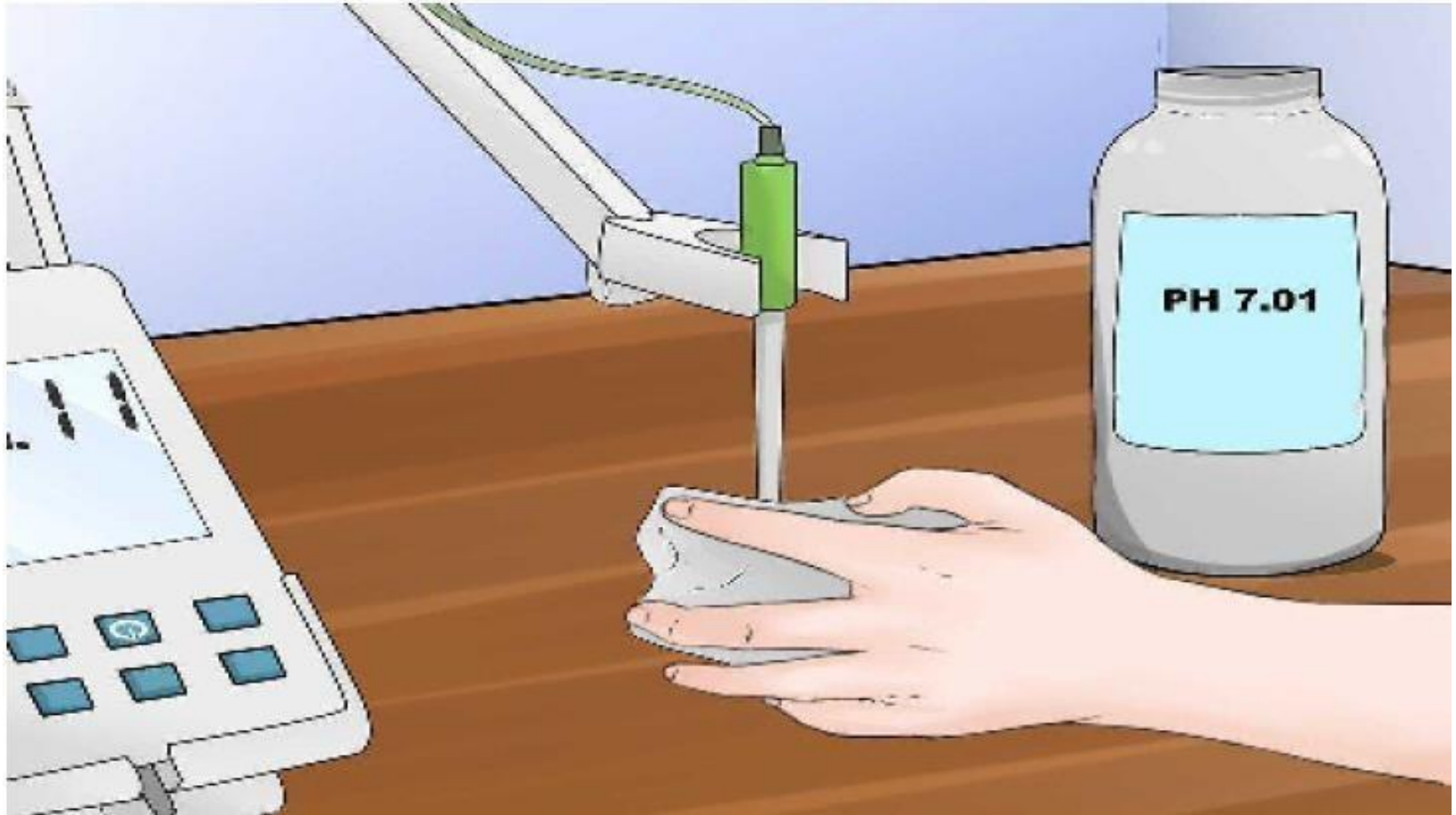
Your first buffer should be neutral, meaning it has a pH of 7.

Your second buffer will either have a pH of 4 (for an acidic sample) or 9.21 (for a basic sample).

***Place your electrode in the buffer with a pH value of 7 and begin reading**



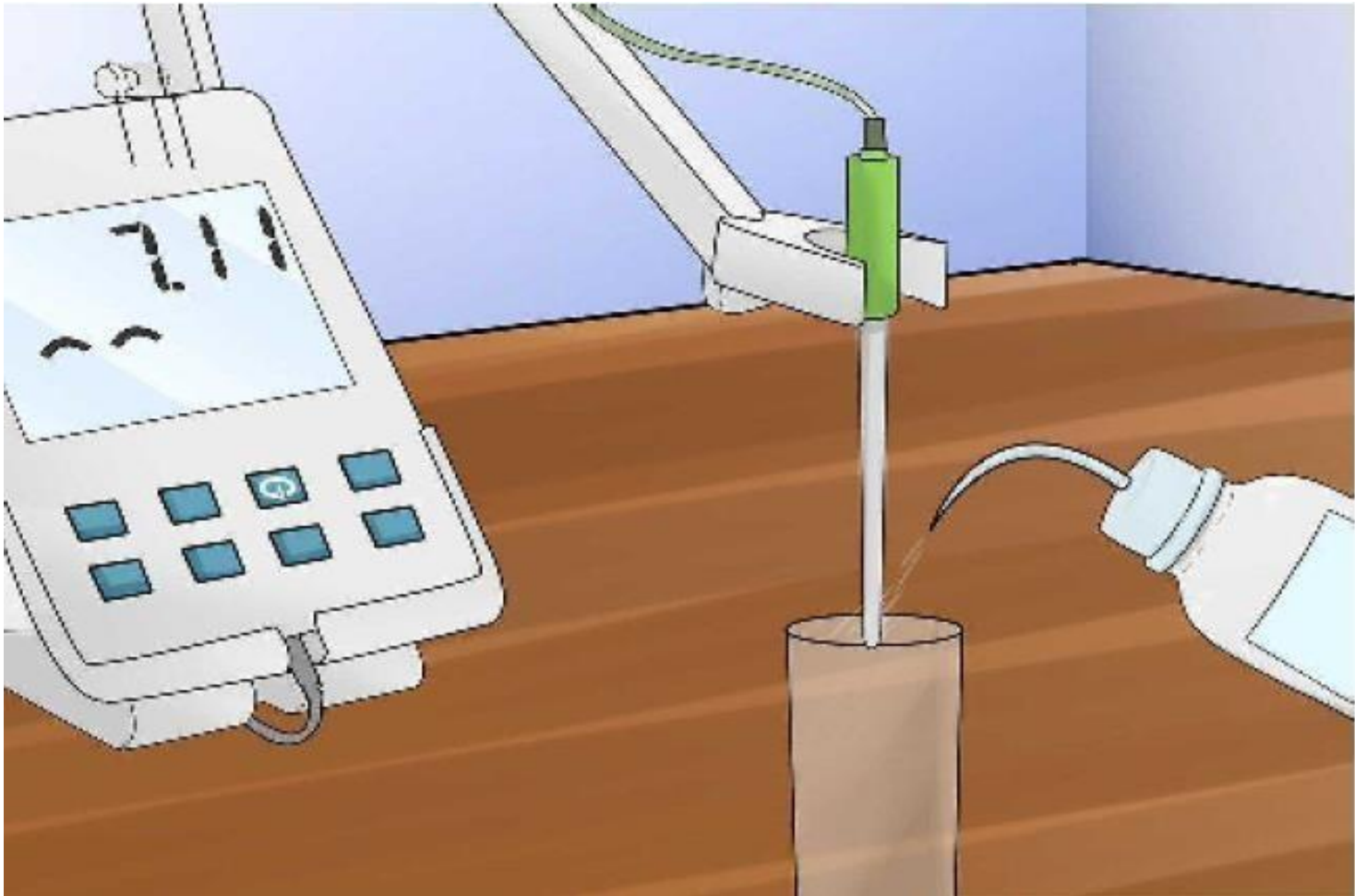
*Rinse your electrode with distilled water



***Place your electrode in the appropriate buffer for your sample and begin reading.**

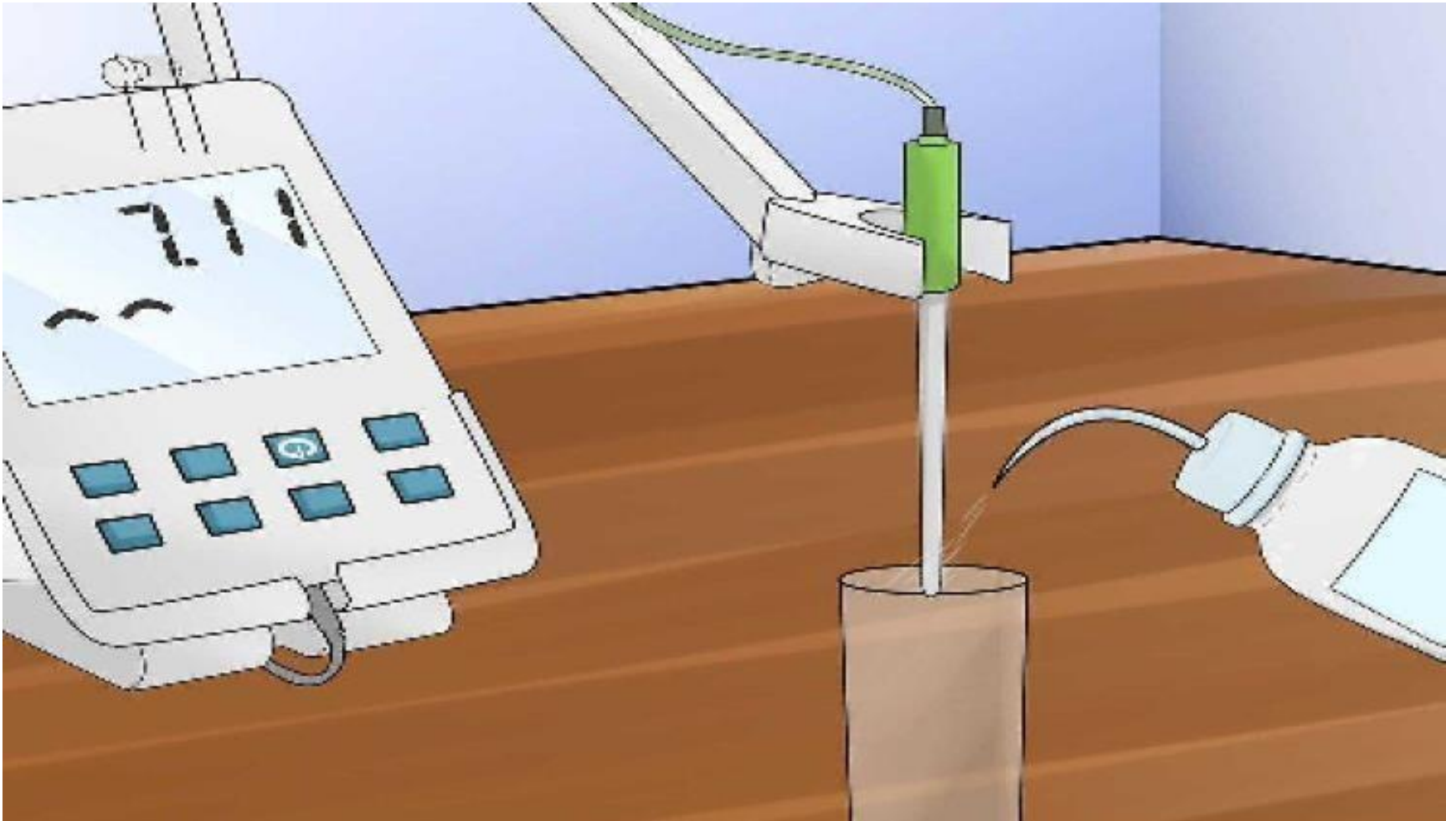


***Rinse your electrode.**



Once you've placed the electrode in the buffer, press the "measure" or "calibrate" button. It should take 1 to 2 minutes for the pH to stabilize. At this time, set the pH meter to the value of the buffer's pH by pressing the "measure" button again.

***Clean your electrode after use**



procedure :

1 Before the PH meter can be used to test the PH of unknown solution , it must be standardized .(As explain above).

2 The PH electrodes are fragile and should be treated accordingly .The manufacturer's directions about storage and activation should be followed carefully .In some cases the electrodes are stored in water , in other cases in saline or buffer .

3 The unknown solution is placed in a clean , dry glass beaker The electrodes are immersed in the solution , and reading is taken from the PH scale.

4 Before and after used the electrode should be clean with D.W and carefully dried -.

Discussion

1. Write and discuss the pH readings in your experiment.
2. Discuss the pH meter calibration.
3. Write pH meter testing steps.
4. What is pH meter work principal?
5. How you can use pH in your study as medical devices engineer?

Thank you ♥

BE SUCCESSFUL