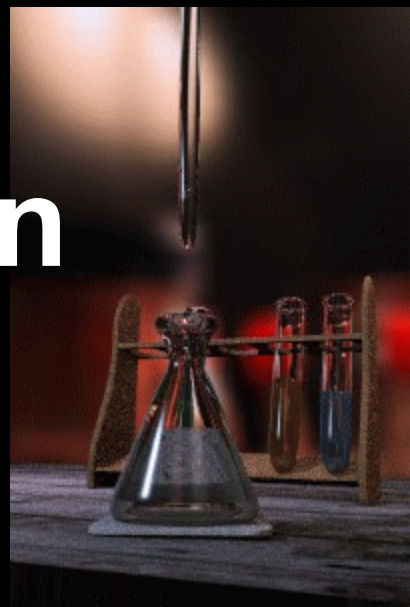
ACIDS AND BASES

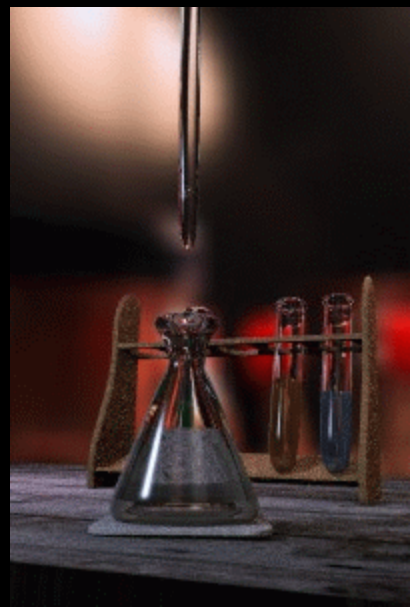
Determining the Acidity of a Solution



Measuring pH

- The traditional way of determining the pH of a solution is by using **indicators** → substances that exhibit different colors in acidic and basic solutions.
- We can represent a generic indicator as a weak acid HIn.
- Let's assume that for a particular indicator HIn is red and the anion In^- is blue.

$$HIn \rightleftharpoons In^- + H^+$$



Measuring pH

$$HIn \rightleftharpoons In^- + H^+$$

- Thus, in a solution containing lots of H^+, the indicator will be red (the HIn form).

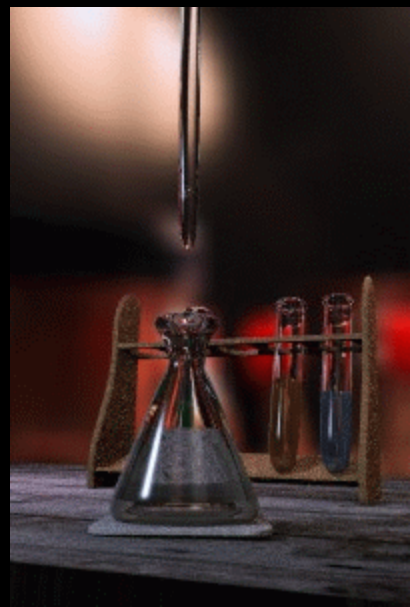
$$HIn \rightleftharpoons In^- + H^+$$

acidic solution

- In a basic solution, the H^+ will be removed from HIn to form the blue In^- ion and the solution will be blue.

$$HIn \rightleftharpoons In^- + H^+$$

basic solution

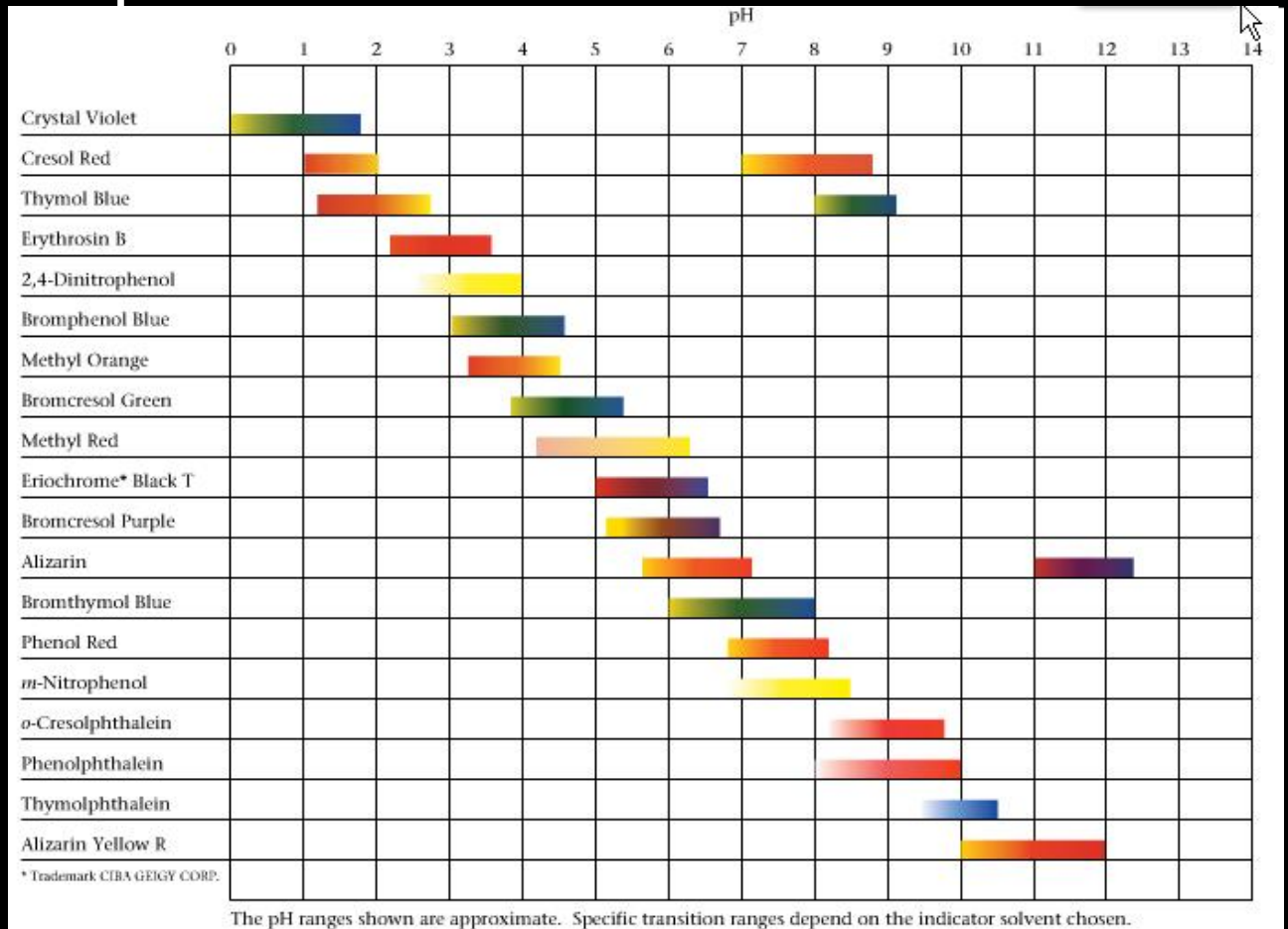


Measuring pH

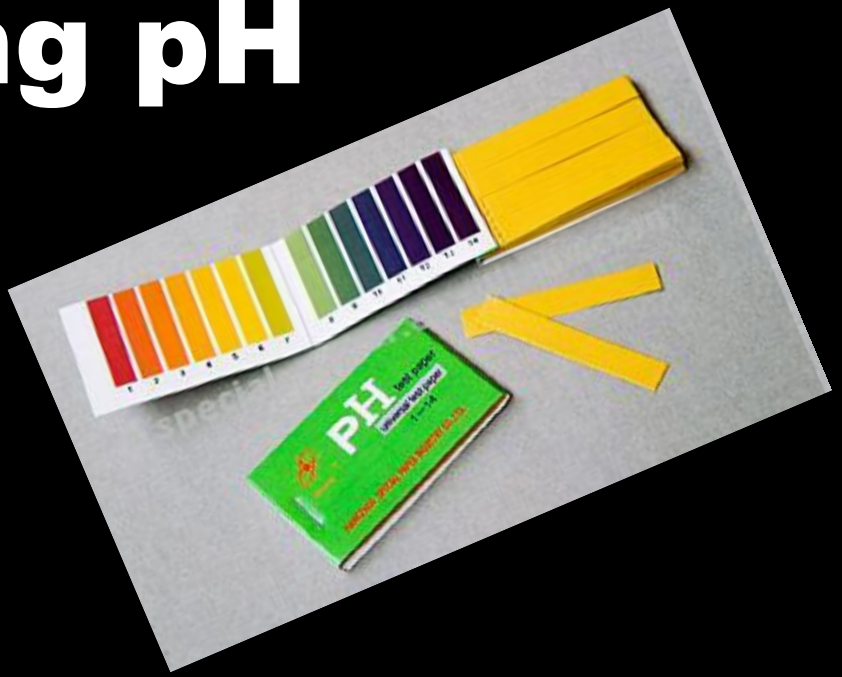
- In intermediate pH regions, significant amounts of both HIn and In^- will be present and the solution will be some shade of purple (red plus blue).
- Many substances exist that turn different color when H^+ is present (HIn) than when H^+ is absent (In^-).
  - Some of these indicators are shown in the picture, along with the colors of their HIn and In^- forms.

Measuring pH

– Different indicators change at different pH values depending on the acid strength of HIn for a particular indicator.



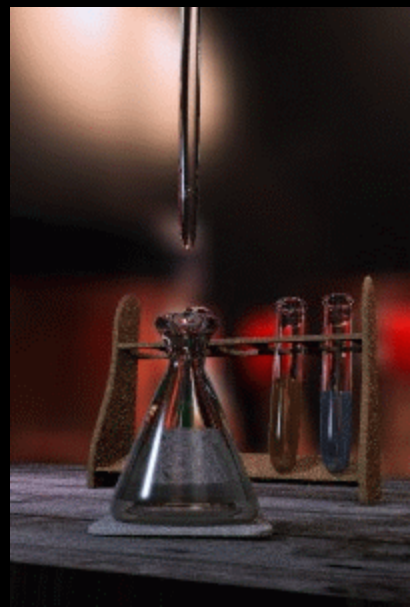
Measuring pH



- A convenient way to measure the approximate pH of a solution is by using indicator paper.
- Indicator paper is a strip of paper coated with a combination of indicators.
- Indicator paper turns a specific color for each pH value.

Measuring pH

- The pH value of a solution can be measured electronically using a pH meter.
- A pH meter contains a probe that is very sensitive to the $[H^+]$ in a solution.
  - When the probe is inserted into a solution, the $[H^+]$ in the solution produces a voltage that appears as a pH reading on the meter.
  - A pH meter can determine the pH value of a solution quickly and accurately.



- The End