

Colorimeter



HOW
It
WORKS

By Ken Johnson 2013

Colorimeters have long been used in chemical analysis.

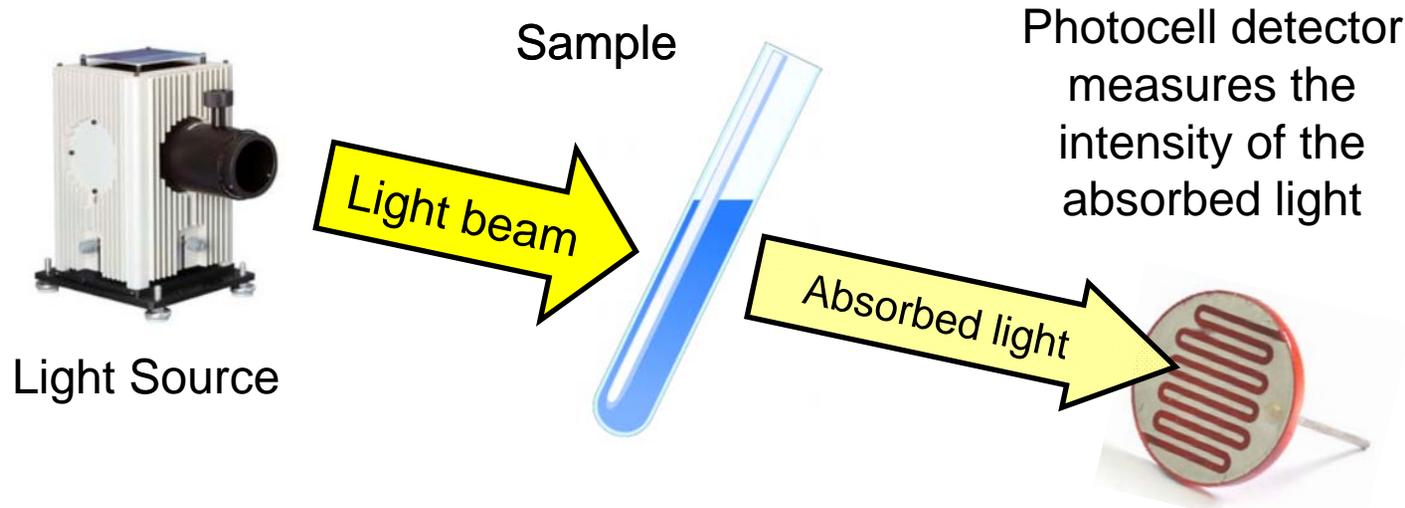
The HACH DR 890 colorimeter performs a similar function as the color wheel in the older HACH field kits.

It is capable of performing more than 50 different kinds of tests by determining how much light is absorbed in a solution.

- It functions by comparing the amount light that is absorbed as it passes through a “blank” sample of stream water to one prepared with a specific reagent.
- The reagent and the sort-for compound, Phosphate for example, react to tint the sample.
- **CAUTION!** The reagents are different from the ones we use for the older HACH field kits.



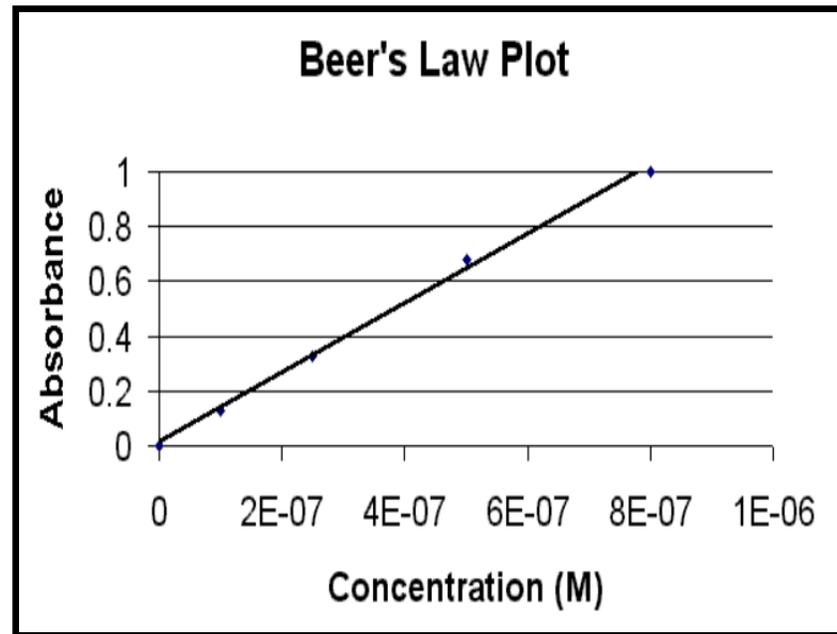
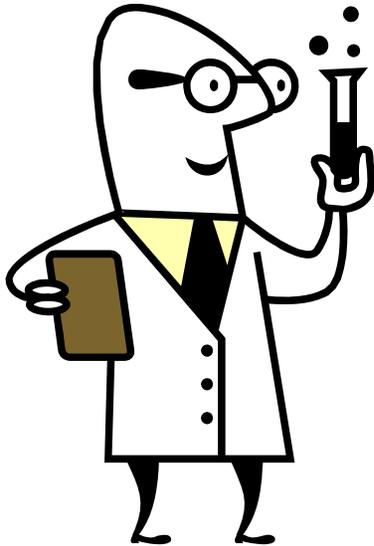
Principle of Colorimeter Operation



The colorimeter determines the amount the light was absorbed by the sample and calculates the concentration of the solute based on the ***Beer-Lambert*** Law

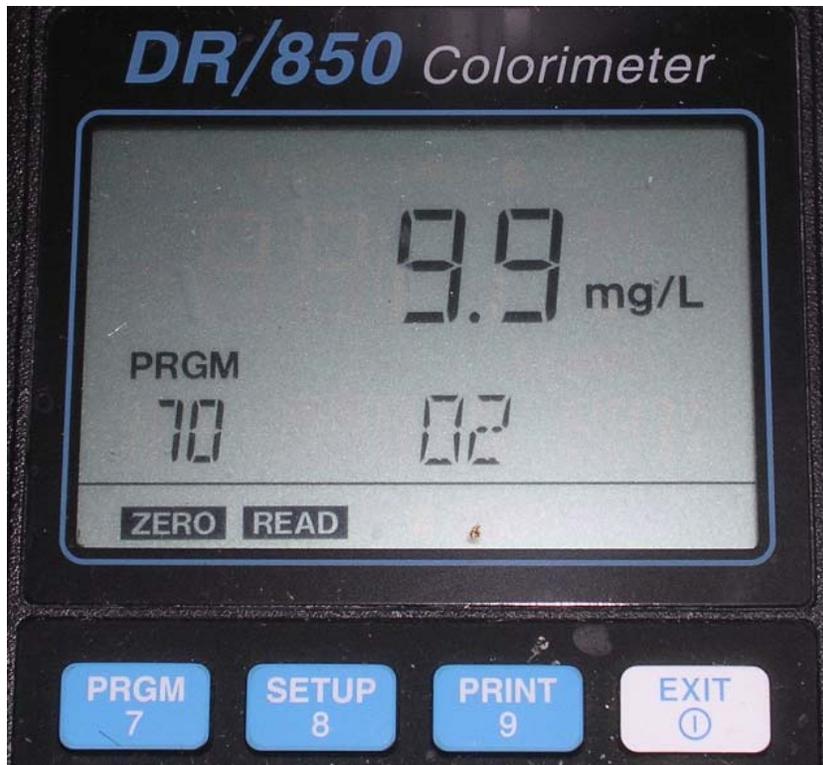
Beer-Lambert Law

“The concentration of a solute is proportional to the absorbance.”



The greater the absorption of light the higher the concentration as shown in the graph.

The colorimeter performs the conversion and displays the result as a numeric value and units of measurement.



Dissolved
Oxygen

The instrument has an inherent advantage over the color wheel in that it reduces inaccuracies that result from the difficulty we users encounter when making visual comparisons.



Key to Successful Results

The colorimeter light source near the base of the cavity and a photocell that measures the light coming through the sample cell must be kept clean.

The samples cells and colorimeter cavity must be clean – no chemical residue, no dirt, no condensation, no fingerprints – **CLEAN.**

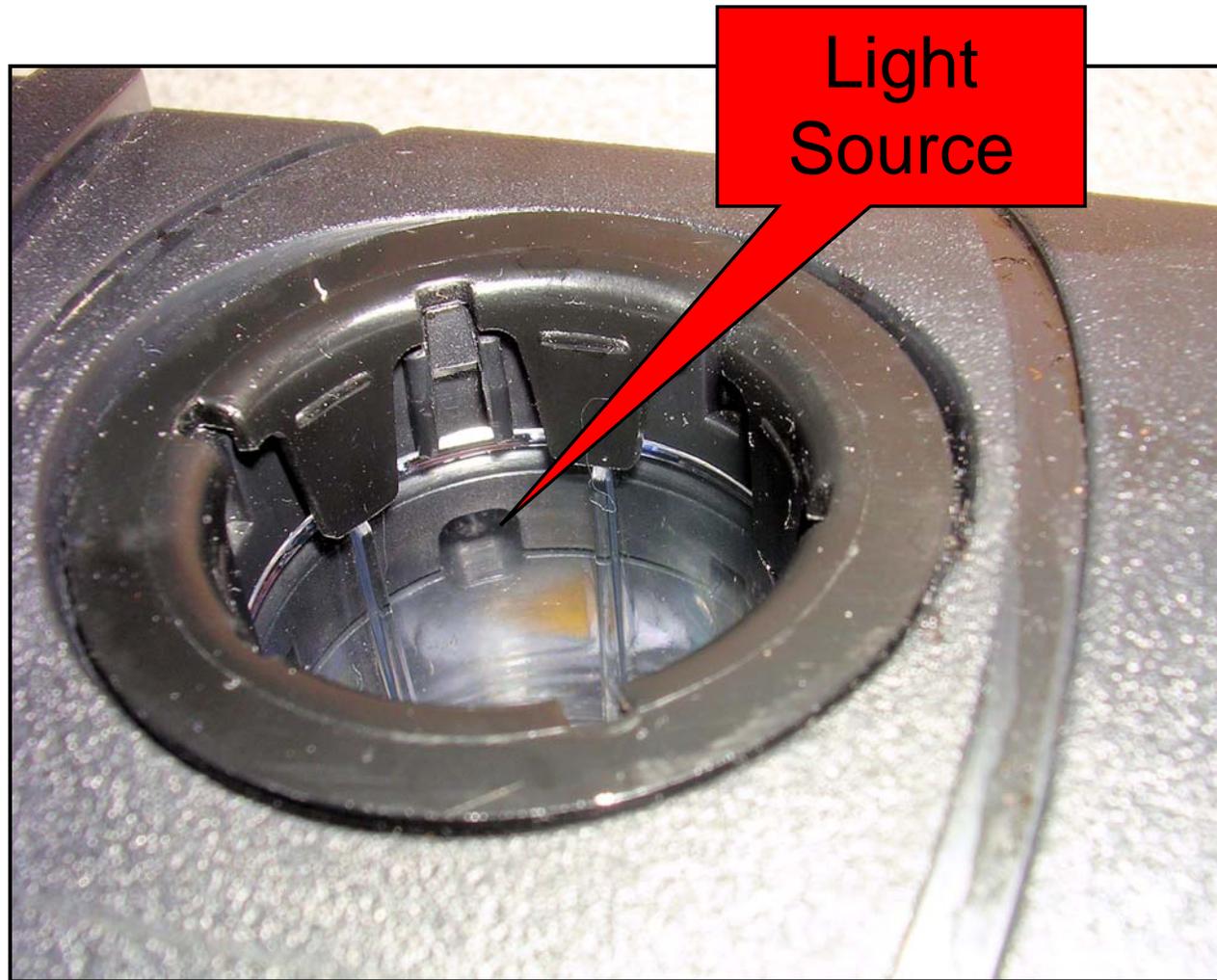
Use a clean cotton cloth

Always Clean (wipe) the glass sample cells before inserting them into the colorimeter. Watch for and remove condensation.

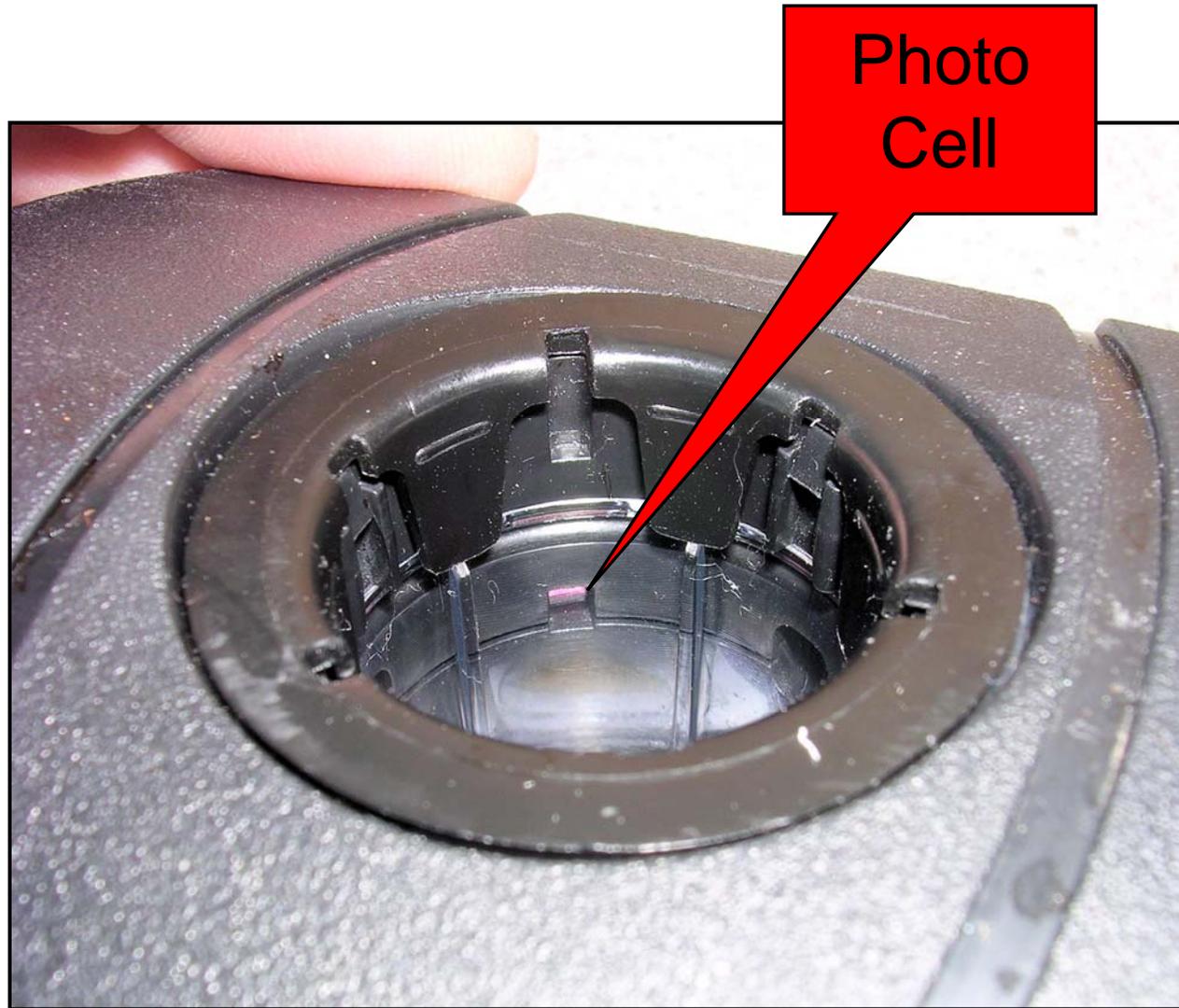
Always Clean (wipe) and inspect the Colorimeter cavity before **each test** – You can use a Q-tip.

Be careful - Do NOT use a paper towel **it may scratch the plastic cavity in the colorimeter.**

Location of the Light Source



Location of the Photo Cell



Dissolved Oxygen

After breaking the stem make sure Ampule is full – and **always look for discoloration** of the water in the beaker.

If discolored you will have to discard that Ampule and take another sample. Make sure the ampule has filled correctly.



Dissolved Oxygen

Remove the rubber cap before you wipe the Ampule for insertion into the colorimeter.

Note: the procedure tells you to wait 30 seconds or so with the cap off before taking the reading. This is to allow the air bubbles to escape.

By wiping the Ampule after removing the cap you will prevent the liquid in the cap from contaminating the colorimeter cavity.