

# EnVision

P.O. Box 131 • Camden • ME 04843

## Spectroscope Light Source Adaptor #10120

### Description:

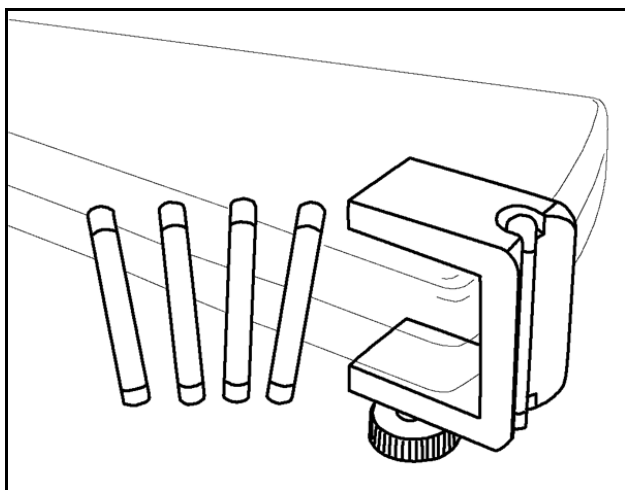


Figure 1  
Light source adaptor and Light Sticks (spectroscope not included).

### *This kit includes:*

1 Light Source Adaptor for Quantitative Spectroscopes  
4 Chemiluminescent light sources

### *You will need:*

A Quantitative Optical Spectroscope (such as EnVision's Spectroscope #10100) with a thickness of 1 inch or less.

A plastic test tube or vial with a liquid tight cap if you want to work with liquid samples

Various liquid samples (such as chlorophyll in solution, tincture of iodine, or food coloring).

Rubber bands.

### Precautions:

- Only use light sources that remain cool to the touch. Do

not use any light source that generates heat or becomes too warm to touch while in operation. Contact your educational materials distributor or visit the website [envisionlabs.com](http://envisionlabs.com) for more information about compatible light sources.

- Always wear full eye protection when using the light source adaptor or spectroscope.
- **Do not** use any solvents with the materials in this kit. Use only water.
- Always place the cap on the test tube before attaching it to the light source adaptor.
- To avoid possible spills, keep the spectroscope and light source adaptor horizontal at all times when viewing spectra. **DO NOT** point it upward when a sample is in the adaptor.
- Chemiluminescent light sticks are small and present a choking hazard. **Do Not** eat the light sticks or break them open for any reason. The chemicals contained in them may stain skin and clothing. **Be sure to read and understand all precautions printed on the light stick packaging.**
- **Always use safe laboratory practices when using these materials!**

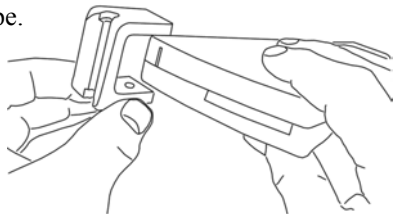
### Maintenance:

- The light source adaptor and test tube can be cleaned periodically with soap and water. **Do not use solvents of any kind.**
- The chemiluminescent light sources have an expected life time of approximately 4 to 6 hours after they have been activated. Replacement packs of 9 assorted colors can be ordered from your educational materials supplier. Be sure to properly dispose of all expended light sticks.

**Assembly:**

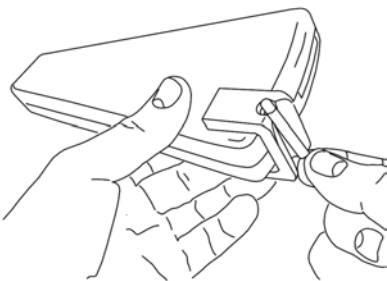
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Loosen the thumb screw on the light source adaptor (the 'C' shaped plastic clamp) so it can be slipped over the slit end of your spectroscope. Align the slot in the light source adaptor with the entrance slit in the spectroscope then gently tighten the thumb screw to hold the adaptor in place.

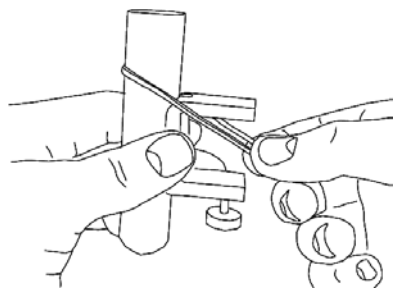


Before choosing a light stick to place in the adaptor, be sure to fully read and understand the instructions and precautions printed on its packaging. Remove the light stick from its storage envelope and bend it enough to break the glass capsule contained within the stick. Do not break the light stick open or release the chemicals contained inside, **the chemicals in the light stick can stain skin and clothing.** Once the glass capsule breaks, the chemicals within the stick begin to mix and glow. Shake the stick vigorously for several seconds to completely mix the chemicals within the stick. Once activated, the light stick has a useful life of approximately 4 to 6 hours.

Press the light stick into the bottom of the 'V' shaped groove on the front of the adaptor and you are ready to go. Simply look into the eyepiece of your spectroscope to view the spectrum of the light stick. If a spectrum is not clearly visible, you may need to adjust the position of the light source adaptor so that the light stick is directly in front of the entrance slit of the spectroscope. It may also be helpful to dim the room lights while viewing spectra.



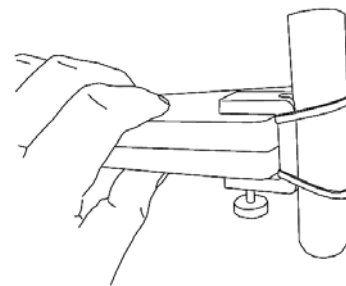
To remove the light stick from the adaptor, simply pry one end of the light stick out of the groove in the adaptor with a fingernail.



Larger light sources, test tubes or other samples can also be mounted on the adaptor. Place the 'V' groove of the adaptor against the empty test tube and hold them together with one hand. With the other hand, wrap a rubber band around the test tube and adaptor as shown. Once the test tube is securely fastened to the adaptor, fill the tube

with your sample solution then **cap the test tube.**

Mount the light source adaptor on your spectroscope as described above. **When using liquid samples, always hold the spectroscope horizontally, never raise the spectroscope above eye level or hold it vertically. This can be a potential spill hazard. Use appropriate eye protection and observe standard lab safety practices.**

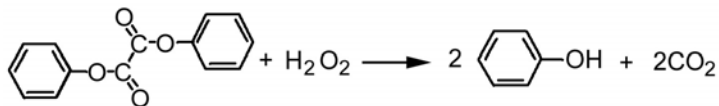


## Spectra:

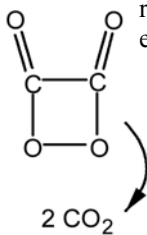
Energy can be transferred into and out of matter in many different ways. Energy can be transferred as heat, light, or by chemical reactions. When light is emitted from matter, it is referred to as **luminescence** (with one exception: when matter is simply heated to a high enough temperature, it begins to glow. This is called **incandescence** and this is where the incandescent lamp gets its name). When energy is released from matter in the form of light as a direct result of a chemical reaction, it is called **chemiluminescence**.

Chemiluminescent light is usually emission from energized molecules. Unlike the emission from atoms that produce spectra with a series of well defined narrow lines, emission from molecules produce spectra in the form of broad bands that are significantly more complex than the bright lines of atomic emissions.

The energy for the chemiluminescent reaction in the light stick comes from the oxidation of oxalic phthalate ester with hydrogen peroxide. The phthalate ester is the solution in the



main part of the light stick and the hydrogen peroxide is in the glass ampule that breaks. An intermediate is formed during the oxidation that has a high energy four membered ring. The breakdown of this intermediate passes energy to a dye molecule. This places the dye molecule in an excited state, and when it returns to its lower energy ground state, it fluoresces. This is the light you see from the light stick.



For more information about spectroscopy, and suggestions for experiments, visit our web site at [envisionlabs.com](http://envisionlabs.com).