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Technical - Luminous Concepts.

Light, by definition, is an electromagnetic radiation of any wavelength. The definition may not mean much initially, but we all know what it is. We also know the properties of it. In the late 1600's two scientists hypothesized two different theories. Both of these are still used today to describe light. Sir Isaac Newton described light as a stream of small particles, while Christian Huygens described light behavior as waves. These two theories give us a foundation to study, understand, and control light.

Composition of a Light Wave.

The amplitude of a wave is measured from the midpoint of a wave to the peak or trough, each of which of equal distance. Wavelength is the distance between two crests or two troughs on a wave. Wave frequency is the number of wavelengths that pass a given point in a specified time frame. We are familiar with Hertz (Hz) from radios which refers to wavelengths per second.

Mechanism of Color.

The human eye can perceive "visible light" in the range of 450 nm to 800 nm. White light contains every wavelength of visible light and when refracted we can see the various colors of the spectrum. When an item is black, the object's pigment absorbs all the visible light. Hence, when an object looks blue we are seeing the reflected blue light while all the other colors of the spectrum are being absorbed.

Now with the light concepts understood let's get to the fun stuff. Glowing products can be categorized in various groups via how they were excited ('charged') and the timing of the emitted light. Understanding and applying the characteristics of each category allows you to know which glow product is right for your application. You would not want to mistake the need for a chemiluminescent product (glow stick) for a photoluminescent product when you are spelunking. Using the right technology or combination thereof can produce amazing results in your every day life.

Energy Basics.

Objects that glow need energy to do so. The energy can be obtained from light, chemical, biochemical, mechanical and electrical sources. The energy excites the electrons of the atoms which causes the electrons to move to a higher energy level. When the electrons move to a lower level, the energy released is in the form of light.

The type of energy that excites (or charges) the object will determine what category the object will fall into. For example, Shannon's Super Phosphorescent Pigment glows because of excitation due to light and is called Photoluminescence. The glow sticks on the other hand, emit light because of a chemical reaction.

Difference Between Fluorescent and Phosphorescent.

The difference between objects that fluoresce and phosphoresce is the time it takes for the objects to achieve ground state. When an object is in the ground state the electrons inhabit the lowest energy levels at normal temperatures. A fluorescent object will return to ground state almost immediately after the excitation energy has been extinguished. The phosphorescent object will take longer producing visible light in the process. Fluorescent objects 'glow' when ultraviolet radiation is used to excite the electrons but yet still return to ground state very rapidly. The phosphorescent pigments from Shannon Luminous Materials can emit light for hours after excitation, introducing a new era in "Glow In The Dark" technology.

Glow Processes.

There are "Hot" and "Cold" light emission process. The hot light, called incandescence, emits light because of its high temperature. Cold light, or luminescence, emits light without a rise in temperature. The following is a list of luminescent processes and a description of each.

Triboluminescence is when light is emitted after the energy being absorbed is mechanical. An example of triboluminescence is when you crush a wintergreen Lifesaver

Bioluminescence is when light is emitted after the energy being absorbed is from a chemical reaction in a living organism. Jellyfish, coral, insects, fungi, and plants can all emit light through bioluminescence. Fireflies are a perfect example.

Chemiluminescence is when the light emitted after the energy being absorbed is from a chemical reaction not in a living organism. We all love glow sticks, which illustrates this process perfectly. When a glow stick is bent, a glass vile inside releases the chemicals and produce light.

Photoluminescence is when the light emitted after the energy being absorbed is from light.

Thermoluminescence is when the light emitted after the energy being absorbed is from heat. Minerals such as Chlorophane exhibit thermoluminescence when heated.