FREQUENTLY ASKED QUESTIONS: PHOTOSTABILITY

What are the FDA's requirements for photostability testing of new drugs?

The FDA requires that stress testing must be conducted on all new drugs, which may include (if appropriate) photostability testing. The FDA refers to ICH quality guideline Q1B as the source for relevant photostability test standard conditions.

What does ICH mean?

The International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) is an ongoing project that brings together the regulatory authorities of Europe, Japan and the United States and experts from the pharmaceutical industry in the three regions to discuss scientific and technical aspects of product registration. Its purpose is to make recommendations on ways to standardize the interpretation and application of technical guidelines and requirements for product registration in order to reduce or obviate the need to duplicate the testing carried out during the research and development of new medicines. The objective of such harmonization is a more economical use of human, animal and material resources, and the elimination of unnecessary delay in the global development and availability of new medicines whilst maintaining safeguards on quality, safety and efficacy, and regulatory obligations to protect public health. This Mission is embodied in the Terms of Reference of ICH.

For more information on ICH, go to their website: http://www.ich.org/about/mission.html.

What conditions does ICH Q1B specify?

Q1B simulates product shelf life, by exposing drugs in base substance and packaged formats to a light source that simulates a mix of sunlight through a window and retail fluorescent lighting. Drugs must be exposed to at least 1.2 million lux-hours of visible light and 200 W-Hr/m^2 of UVA (near UV) light. Q1B does not specify either temperature or humidity parameters during testing, other than to require "appropriate" control of temperature to "minimize…localized temperature changes". This is typically interpreted to mean that temperature should be controlled at the applicable Long-Term Q1A level, to reduce the potential impact of uncontrolled thermal effects on test substances.

I noticed that Q1B has an Option I and an Option II. What is the difference between these two options?

Option I testing is performed with a wide-range light source, encompassing both near UV (UVA) and visible light spectra. The light source is typically either fluorescent D65, xenon or metal halide (HID).

Option II uses two different lamp types, fluorescent cool white lamps for VIS exposure and near UV fluorescent lamps (320nm to 400 nm) for UVA exposure. Option II VIS and UVA testing can be performed simultaneously or sequentially.

Why would I select one Option over the other?

The unitary wide-spectrum light systems required by Option I typically produce dramatic UVA overexposure, skewing the specified ratio of UVA to visible light. Option II, by comparison, can produce a perfect match to the specified UVA to visible light ratio. Option I produces high exposure levels, and correspondingly low cycle times, but with high heat levels. High heat generated by Option I systems introduce thermal variables into a photo test, creating misleading results. Finally, unless usable shelf area is limited, Option I chambers can be very difficult to validate, due to poor light uniformity from their single-point-source bulb. Option II chambers have lower exposure levels, making them slower to target exposure, but run much cooler, and can be designed with far tighter light uniformity. As a result of all of these factors, most photostability chambers used for the ICH Q1B application are designed to Option II.

Which ICH Q1B Option does Caron offer on its photostability chambers?

All Caron 7500 series photostability chambers are Option II.

Is it better to mix Option II UV & VIS lights, or separate them out in their own shelves?

Mixing Option II light sources creates uniformity issues within a chamber that are very difficult to anticipate and address. Sample exposure levels are highest when directly under a bulb. If bulbs are installed alternating between UVA and VIS, the effect is to vary product exposure levels by spectra based on their specific shelf position. The simplest and most repeatable way, therefore, to avoid varying UV/VIS exposure ratios within a test batch is to divide UV and VIS exposure into separate physical areas. Caron's chambers offer separate UV and VIS shelves, each separately measured and controlled.

How is light intensity and exposure measured? Is this important?

Visible light intensity is measured in terms of Lux and exposure level in Lux-hr. UVA light intensity is measured in W/m^2 and exposure level in $W\text{-}hr/m^2$. Q1B chamber testing should be controlled based on actual exposures, and not on a calculated time to exposure. Bulb outputs diminish over time, creating under-exposure risk in simpler time-based control systems. Caron measures light intensity using calibrated radiometers, one each for visible and UVA illuminance, and tracks exposure by irradiance type on the units' control system.

Does Caron offer any type of validation support for its photostability chambers?

Caron offers an Installation and Operation Qualification (IQ/OQ) protocol for 7500 series chambers (VALD003). This information outlines the procedure for chamber validation, but does not include the actual on-site validation.

Caron also can provide a full on-site IQ/OQ/PQ validation (VALD102), executing the Protocol (as listed above) using specialized light monitoring and recording equipment.

How can I record and track cycle light intensity?

Caron offers several cycle recording options, including a 12" circular paper chart recorder, multi-channel analog outputs, and USB-based digital data download. All of these options are designed to continuously record UVA and visible light intensity, along with temperature and humidity (if appropriate) throughout the duration of the cycle.

Can Caron's photostability chambers control humidity?

7545 photostability chambers provide humidity with a range from 40 to 70% RH. 7540 chambers do not offer controlled humidity.

What is the difference between the "-1", "-2" and "-3" 7540 & 7545 models?

"-1" models are 115V, 60Hz, and use non-dimming ballasts. They use the least power, of any units in the range, but light intensity can't be adjusted, and maximum light output is restricted, resulting in longer exposure times. The "-2" models are 208/230V, 60Hz. They use more power, but allow adjustment of light levels and provide both maximum light output, and minimum time to exposure. "-3" models are similar to "-2"s, but require a 50Hz power source, typically found outside of the US.

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