ATLAS
MATERIAL TESTING SOLUTIONS

Consumer Goods Testing

LEADERS IN PHOTOSTABILITY TESTING FOR THE CONSUMER GOODS INDUSTRY

Packaged Consumer Goods

Challenges of Product Photostability

The success of today's consumer goods like drinks, foodstuffs, personal care or household products is highly dependant on its packaging. Transparent packaging is the preferred choice to attract the buyer by the color of the product. An attractive color is often the key criterion which influences spontaneous purchasing decisions for a certain product or brand.

Wherever there is light however, there is a risk for photo-induced reactions that can impact colorants, vitamins, flavors, scents or product homogeneity.

Consumer goods are typically exposed to either of the following light conditions: Outdoor Sunlight (Transportation/Storage), Indoor Sunlight (Display/End-use), or artificial light (Display/Production).

Light Sensitive Ingredients of Consumer Goods

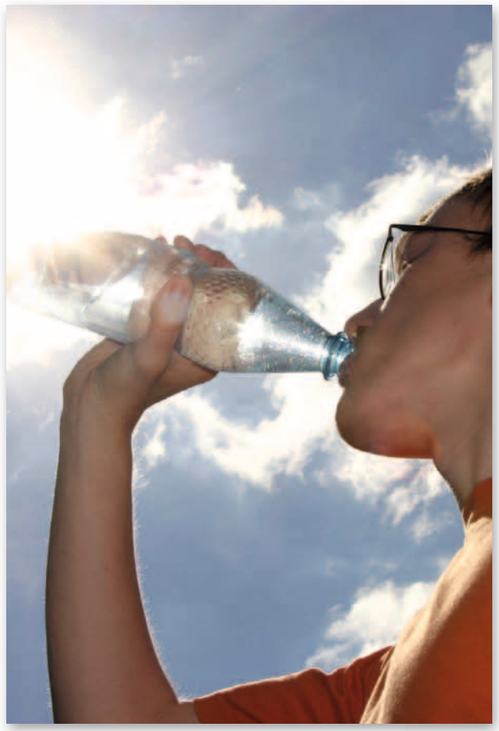
Ingredient	Degradation	Risk	Examples
Natural / Synthetic Colors	Photooxidation, destruction of π-electron systems; potential interaction with Vitamin C	Fading Loss of saturation Color change (Hue shift)	FD&C blue #1, FD&C red #40, D&C violet #2, D&C red #33, Azo-Colors
Vitamins	Photooxidation	Decreased vitamin content Decreased efficacy	Vitamin A, B2 (riboflavin), B6, B12, C, folic acid
Flavors / Fragrances	Photooxidation, reactions via free radicals	"Off" flavors / odors even at very low concentrations Production of sulfuric-smelling compounds	Citral, limonene, aspartame, hops, hops extractions, unsaturated fatty acids
Emulsions	Thermal cycling, photooxidation	Loss of structure Separation of emulsion Loss of colloidal stability	Proteins, colloids, fatty acids, oils

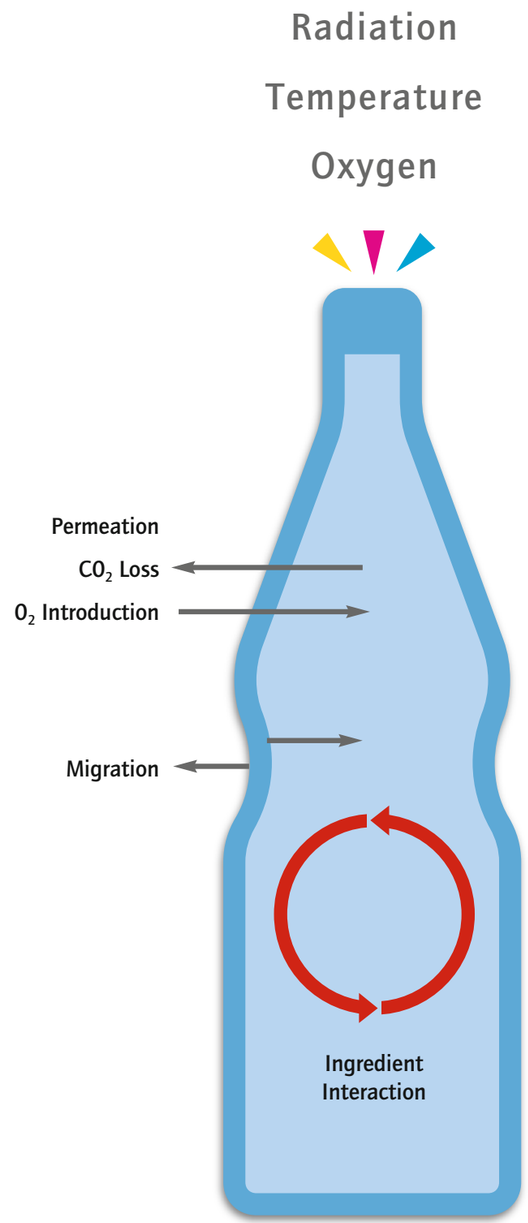
Environmental Stress

Three Important Factors

Important Stress Factors:

- Radiation, temperature and oxygen
- Photostability of independent vs. combined ingredients under UV or VIS light
- Potential permeation of oxygen into the packaging, or loss of product ingredients; e.g. CO_2, flavors, or scents
- Migration of chemical compounds from packaging





Realistic Testing

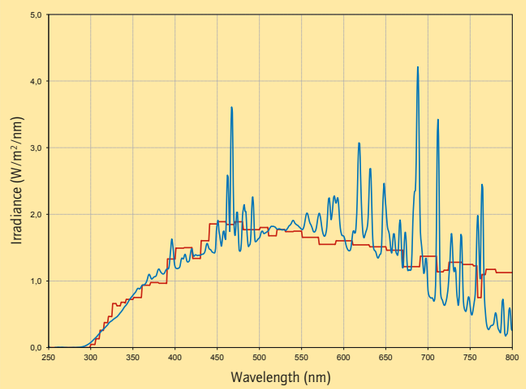
Reliable Product Development And Support of Shelf-Life Claims

Three Relevant Light Conditions in Photostability Testing

Covering the full spectrum UV-VIS-IR is critical. Some ingredients may be sensitive to the UVB range, while others react to longer wavelength UVA or VIS radiation, such as colors, flavors or fragrances. Providing the infrared part of the spectrum is needed to achieve realistic specimen heating.

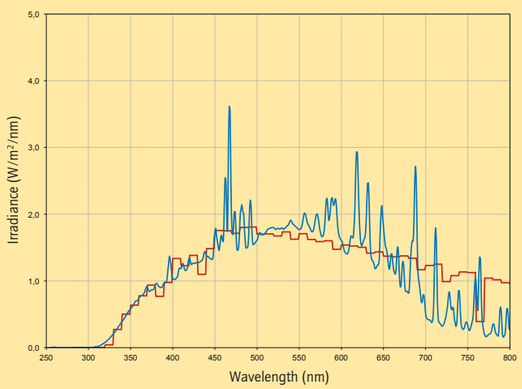
Filtered Xenon light: realistic simulation of outdoor sunlight

XENOCHROME 300 vs CIE85 Daylight



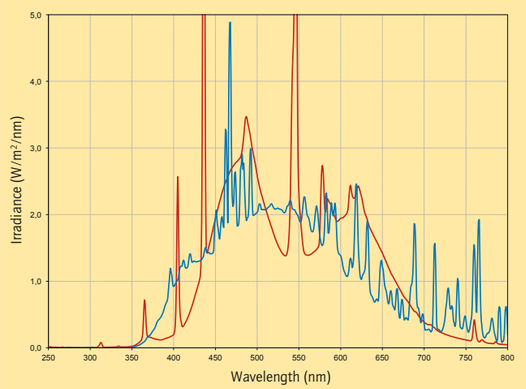
Filtered Xenon light: realistic simulation of indoor sunlight

XENOCHROME 320 vs CIE85 Daylight behind Window Glass



Filtered Xenon light: realistic simulation of artificial supermarket light

Store Light vs Supermarket Flourescent Light



Product Exposure

Conditions Inside the Product Chain

Typical Environmental Conditions During The Consumer Product Life Cycle

	Storage / Transportation	Display / End use	Display / Production
Spectra	Outdoor Sunlight	Indoor Sunlight	Fluorescent / Halogen lamps
UV Cut-on	~ 295 nm	~ 320 nm	~ 360 nm
E (300-400 nm) [W/m²]	45–60	15–40	–
E (300-800 nm) [W/m²]	400–550	100–350	20–100
Product Temperatures [°C]	20–45	20–35	20–25
Relative Humidity [%]	20–70	30–50	30–50

Air Temperature Range

SunCool Beta+ FD	15–70° C
SunCool XXL+ FD	15–70° C
SunCool XLS+	10–30° C
Ci-Series	15–80° C

Adapted chillers maintain realistic product temperatures even at high irradiance levels.

Air-cooled rotating rack test chamber including xenon lamp, optical filter lantern, and light monitor

Sample rack with packaging (optional)

Atlas Full-Spectrum Xenon Equipment

Rotating Rack Technology

Atlas full-spectrum xenon instruments enable you to test your products realistically under accelerated conditions. Typically with time-saving factors >10 vs real time. They can save you money by helping you choose the right ingredients and packaging materials, as well as backing up shelf-life claims.

Xenotest® Beta+ FD

The latest air-cooled xenon technology for photostability testing of packaged consumer goods.

Features & Benefits

- Large 4000 cm² rotating rack for premium performance
- Economical non-aging filters Outdoor / Indoor / Store Light
- Irradiance range 25–200 W/m² (300–400 nm) for high acceleration
- Chamber Air Temperature range 15–70° C
- Easy to use with online programming & monitoring Add-ons
- Bottle Rack / Packaging Rack
- Maximum Load 20 kg

Ci Weather-Ometer® Racks

Features & Benefits

- Largest capacity instrument in the market
- Custom-engineered racks for special applications
- Rotating rack and specimens provides unmatched uniformity
- Irradiance range 30–135 W/m² (300–400 nm)
- Temperature range 15–80° C
- Several filter options for multiple light environments

Atlas Full-Spectrum Xenon Equipment

Flatbed Technology

SUNTEST® XXL+ FD

Features & Benefits

- Extra large flatbed technology with 3000 cm² specimen table
- Economical non-aging filters Outdoor / Indoor
- Irradiance range 25–65 W/m² (300–400 nm)
- Chamber Air Temperature range 10–40° C
- Easy-to-use with online programming and monitoring Add-ons
- Maximum Load approximately 6 kg

SUNTEST XLS+

Features & Benefits

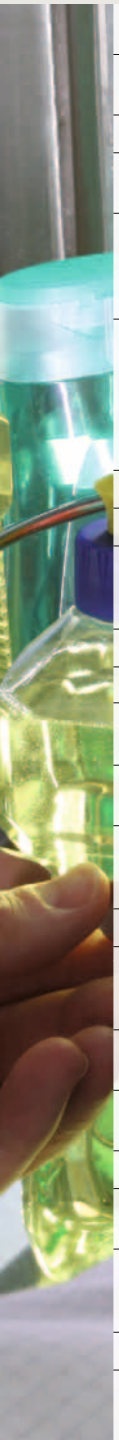
- Compact benchtop model with 1100 cm² specimen table
- Economical non-aging filters Outdoor / Indoor / Store Light
- Irradiance range 25–65 W/m² (300–400 nm)
- Chamber Air Temperature Range 10–70° C
- Easy-to-use with online programming and monitoring Add-ons
- Maximum Load approximately 4 kg

ATLAS
MATERIAL TESTING SOLUTIONS

Atlas offers more than testing instruments. From technical advice to final test method implementation, Atlas provides the support you need when determining the right weathering testing solution for your products. For more information, please contact your local Atlas sales office or visit us at **www.atlas-mts.com**

German Pub. No. 56352581 · US Pub. No. 2101

AMETEK®
MEASUREMENT & CALIBRATION TECHNOLOGIES



	Xenotest Beta+ FD	SUNTEST XXL+ FD	SUNTEST XLS+	Ci4000	Ci5000
Light Source	3 × 2200 W Air-Cooled Xenon Arc Lamp	3 × 1700 W Air-Cooled Xenon Arc Lamp	1700 W Air-Cooled Xenon Arc Lamp	6500 W Water-Cooled Xenon Arc Lamp	12000 W Water-Cooled Xenon Arc Lamp
Guaranteed Lamp Life	1500 Hours	1500 Hours	1500 Hours	2000 Hours	2000 Hours
Filters	Non-aging XENOCHROME (300/320), and Store Light	Non-aging Daylight or Window Glass	Non-aging Daylight or Window Glass and Store Light	Interchangeable Inner and Outer	Interchangeable Inner and Outer
Irradiance Control	Automatic control at 300–400 nm or at 300–800 nm	Automatic single point control at 340 nm or 420 nm or 300–400 nm	Automatic control at 300–400 nm/340 nm or 300–800 nm/Lux	Automatic single point control at 340 nm, 420 nm, 300–400 nm or LUX; optional monitoring at 2nd point	Automatic single point control at 340 nm, 420 nm, 300–400 nm or LUX; optional monitoring at 2nd point
Irradiance Range	Bottle Rack 25–200 W/m² (300–400 nm) 200–950 W/m² (300–800 nm) Packaging Rack 15–120 W/m² (300–400 nm) 200–950 W/m² (300–800 nm)	25–65 W/m² (300–400 nm) 0.26–0.60 W/m² (340 nm) 0.65–1.44 W/m² (420 nm)	25–65 W/m² (300–400 nm) 250–600 W/m² (300–800 nm)	30–140 W/m² (300–400 nm) 0.25–1.20 W/m² (340 nm) 0.70–2.80 W/m² (420 nm)	30–135 W/m² (300–400 nm) 0.25–1.20 W/m² (340 nm) 0.70–2.80 W/m² (420 nm)
Light Monitor	On-rack XENOSENSIV®	SUNSENSIV®	SUNSENSIV®	Smart Light™ Monitor	Smart Light™ Monitor
Humidity Control (RH)	N/A	Automatic	N/A	Automatic	Automatic
Humidity Range with chiller OFF	N/A	Light Cycle: 10–70% (Dependent on Temp) Dark Cycle: Up to 100%	N/A	Light Cycle: 10–75% (Dependent on Temp) Dark Cycle: Up to 100%	Light Cycle: 10–75% (Dependent on Temp) Dark Cycle: Up to 100%
Temperature Control (CHT)	Automatic	Automatic	Automatic	Automatic	Automatic
CHT Range	15°* to 70° C (*with chiller)	15°* to 70° C (*with chiller)	10°* to 40° C (*with chiller)	15°* to 70° C (*with chiller)	15°* to 70° C (*with chiller)
Black Panel or Black Standard Temperature Range	BST 25°* to 130° C (*with chiller) BPT 25°* to 95° C (*with chiller)	BST 25°*to 100° C BPT 25°* to 95° C (*with chiller)	BST 25°* to 100° C BPT 25°* to 95° C (*with chiller)	BST 25°* to 120° C BPT 25°* to 110° C (*with chiller)	BST 25°* to 120° C BPT 25°* to 110° C (*with chiller)
Simultaneous BST and CHT control	Standard	Standard	N/A	Standard	Standard
Specimen Rack Type	Bottle Rack (up to 15) or Packagings Rack (up to 22)	Flatbed	Flatbed	Rotating Rack (Custom applications available; Capacity depends on specimen size)	Rotating Rack (Custom applications available; Capacity depends on specimen size)
Total Exposure Area	4000 cm²	3000 cm² (79 cm × 39 cm)	1100 cm² (39 cm × 30 cm)	6500 cm²	11000 cm²
TFT full color touch screen control panel display of all test parameters	5.7"	5.7"	5.7"	12"	12"
Multiple languages (Asian and European)	Standard	Standard	Standard	Standard	Standard
Automatic test time countdown in kJ/m²	Standard	Standard	Standard	Standard	Standard
Data acquisition via interfaces	RS232 or Memory Card	RS232 or Memory Card	RS232 or Memory Card	RS232, USB, or Memory Card	RS232, USB, or Memory Card
Online programming and monitoring via Ethernet	optional Add-ons	optional Add-ons	optional Add-ons	optional Add-ons	optional Add-ons
Electric	400 V, 50/60 Hz (3, N, PE) AC CEE (32 A, 5 pole 6h) other configurations on request	400 V, 50/60 Hz (3P, N, PE) AC CEE (32 A, 3 pole 6h) other configurations on request	200–240 V, 50/60 Hz (1, N, PE) CEE (32 A, 3 pole 6h) other configurations on request	200–250 V, 3 Phase, 3 Wire, 50/60 Hz, 52 A; or 340–415 V, 3 Phase, 4 Wire, 50/60 Hz, 47 A	440–480 V, 3 Phase, 3 Wire, 50/60 Hz, 60 A; or 340–415 V, 3 Phase, 4 Wire, 50/60 Hz, 63 A
Physical Dimension (W × D × H)	90 cm × 200 cm × 228 cm	90 cm × 91 cm × 172 cm	90 cm × 54 cm × 62 cm	127 cm × 102 cm × 198 cm	160 cm × 127 cm × 198 cm
Floor Weight	390 kg	280 kg	90 kg	586 kg	807 kg