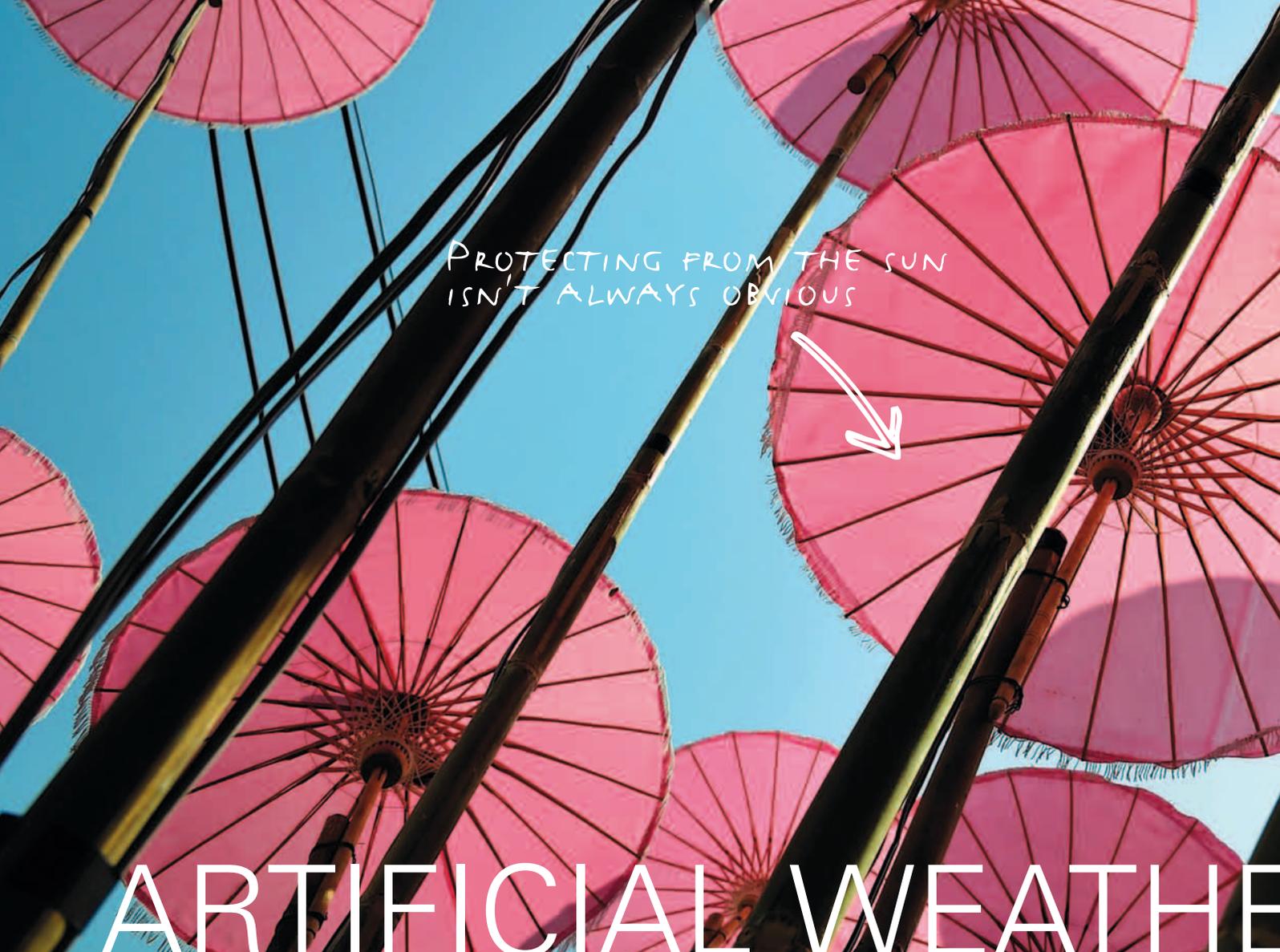


BRINGING LIFE  TO PLASTICS

# ARTiFiCiAL- weathering





PROTECTING FROM THE SUN  
ISN'T ALWAYS OBVIOUS

# ARTIFICIAL WEATHER

## THE RADIATION SPECTRA

RANGE	WAVELENGTH	% OF LIGHT
UV-C	> 280 nm	0
UV-B	280-320 nm	0,5
UVA-A	320-400 nm	5,6
VIS - visible	400-800 nm	
IR-A	800-1400 nm	29,4
IR-B	1400-3000 nm	12,7
IR-C	> 3000 nm	"Neglectable for testing"



# WEATHERING

## THEORY OF WEATHERING

Each material has its own spectral sensitivities. For organic materials these sensitivities are mostly indicated to be situated within the "UV range".

### EXAMPLE HUMAN SKIN

RANGE	WAVELENGTH	EFFECT
UV-C Light	170-280 nm	skin cancer
UV-B Light	280-315 nm	skin irritation
UV-A Light	315-380 nm	suntan

## SPECTRAL SENSITIVITIES OF POLYMERS

PE	300-310, 340
PP	290-300, 330, 370
PS	320-325
PA	290-315
PC	280-310
SAN	310-330, 290
ABS	300-310, 370-385
PMMA	290-315

*All indications in nanometer wavelength  
Literature: ATLAS MTS*

# SEVEN WORLD CLIMATES

2\_POLAR



6\_HUMID MICRO THERMAL



1\_DRY DESERT



3\_TROPICAL RAINY



NATURAL  
CLIMATE HAS  
LARGE VARIETY

## 7\_ UNDIFFERENTIATED HIGHLANDS

### 5\_ HUMID MESO THERMAL



### 4\_ SUBTROPICAL



## ENVIRONMENTAL INFLUENCES

<b>LIGHT</b>	spectral energy irradiation
<b>WATER</b>	quantity state of aggregation (humidity, dew) lens effects of droplets
<b>THERMAL</b>	(specimen-)temperature exposed variations duration
<b>CHEMICALS</b>	gases, polluting substances, dust,dirt, "biologicals", pesticides ...

Defined conditions are necessary.

Literature: WMO

## TIME-LAPSE FACTORS

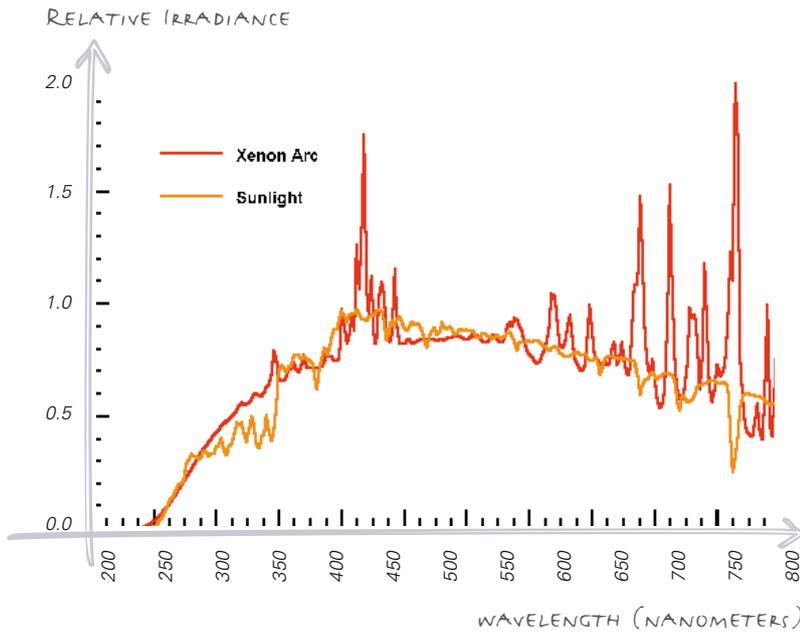
### **NATURAL WEATHERING ON DEFINED LOCATIONS**

Florida, Arizona, ...  
time-lapse to middle Europe 1,5:1

### **ARTIFICIAL WEATHERING AS ALTERNATIVE**

time-lapse to middle Europe 4-6:1

# SUNLIGHT VS. XENON ARC LAMP

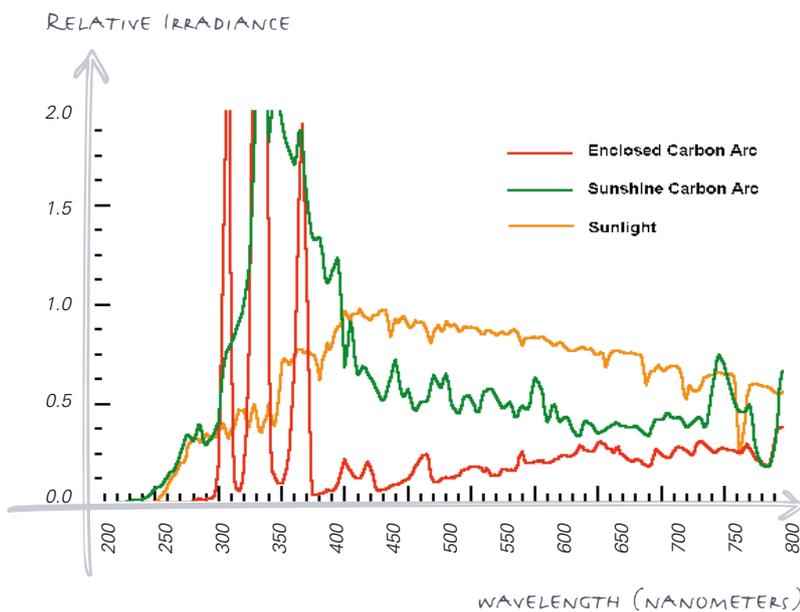


## XENON ARC LAMP

The xenon arc lamp, when properly filtered, simulates UV and visible solar radiation more closely than any other artificial light source. The spectral power distribution is altered through filtering to simulate solar radiation. It is widely preferred as a light source when the material to be tested will be exposed to natural sunlight.

Literature: ATLAS MTS

# SUNLIGHT VS. CARBON ARC LAMP

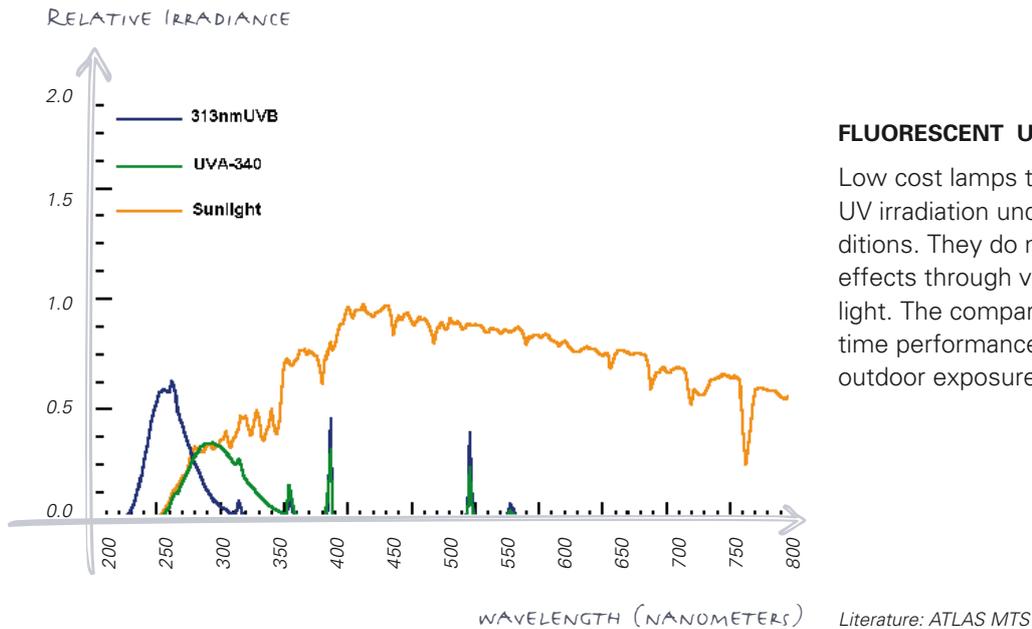


## CARBON ARC LAMP

Carbon Arc lamps deliver high amounts of UV Radiation. They were the very first device for artificial weather testing. However, they were replaced in most cases by Xenon Arc lamps.

Literature: ATLAS MTS

# SUNLIGHT VS. FLUORESCENT UV LAMP



## FLUORESCENT UV LAMP

Low cost lamps to simulate narrow UV irradiation under specific conditions. They do not cause heating effects through visible or infrared light. The comparison to service life-time performance or correlation to outdoor exposures is not possible.

## NORMATIVE STANDARDS

Selected out of many normative standards for artificial weathering

### NATURAL WEATHERING STANDARDS

International standard	ISO 2810
Automotive standards	SAE J576
Product specification	CSTB

### ARTIFICIAL WEATHERING STANDARDS

Xenon arc sources	ISO 4892
QUV Accelerated Weathering Test	ASTM G 154

YOU WILL LEARN MORE ABOUT OUR TESTING METHODS FROM THE PAGES THAT FOLLOW – FOR A LONGER LIFE EXPECTANCY OF YOUR PLASTIC PRODUCTS →

# THE GABRIEL-CHEMIE TEST METHOD

REFERING TO ISO 4892 – 2 XENON ARC SOURCES

Method A: "Outdoor" Simulation  
Method B: "behind glass panel"

control: 340 nm  
control: 420 nm

## GC METHOD

x

Black Panel Temperature:  
Rel. Humidity:  
Chamber Temperature:  
Cycles: 102 Minutes dry,  
18 Minutes water spray

65°C or 100°C  
50% or 65%  
not defined

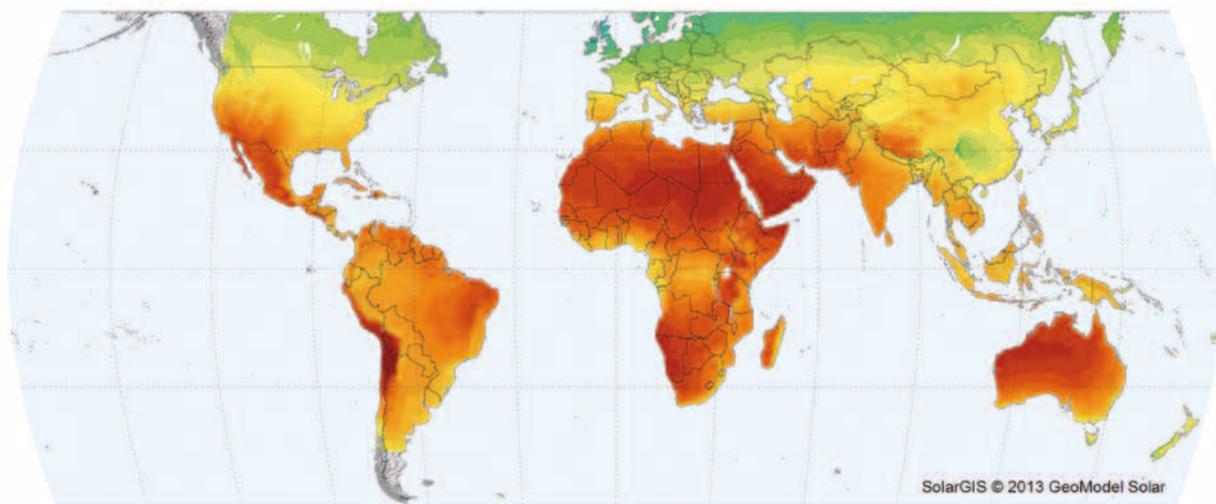
65°C  
50 %  
40°C

X

light/dark cycles possible

light only





Long-term average of: Annual sum 60 75-80 95 110-115 130 145 160-165 180 200 215 230 kLy/m<sup>2</sup>

# WORLD MAP OF GLOBAL IRRADIATION

**BUSINESS UNITS OF GABRIEL-CHEMIE GROUP:**



Building & Agriculture



Home & Lifestyle



Packaging for Industrial & Consumer Goods



Cosmetics Packaging



Food & Beverage Packaging



Medical



**GABRIEL-CHEMIE**  
GROUP

GABRIEL-CHEMIE Gesellschaft m. b. H.

Industriestraße 1

2352 Gumpoldskirchen

Austria

Tel. +43 2252 636 30 0

Fax +43 2252 627 25 0

info@gabriel-chemie.com

**WWW.GABRIEL-CHEMIE.COM**