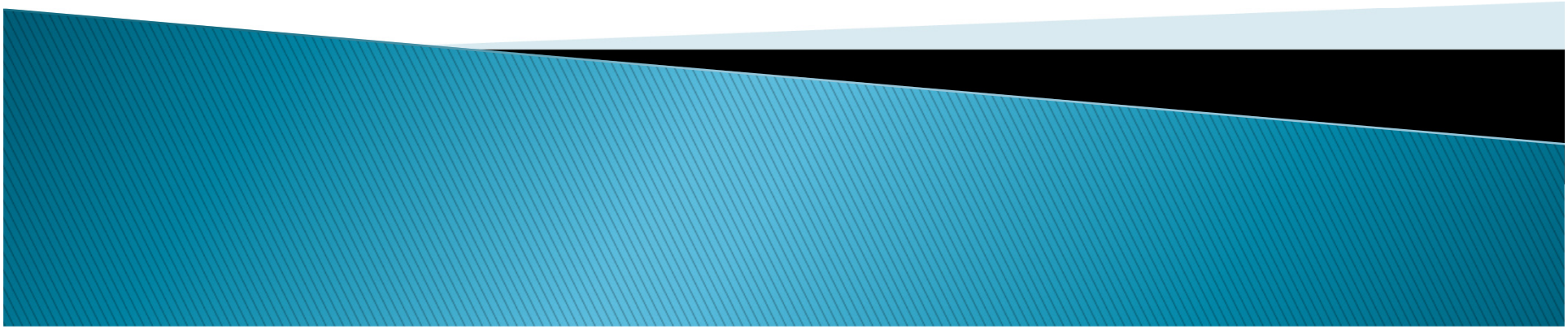
UV Disinfection Solutions for Drinking & Wastewater



Content

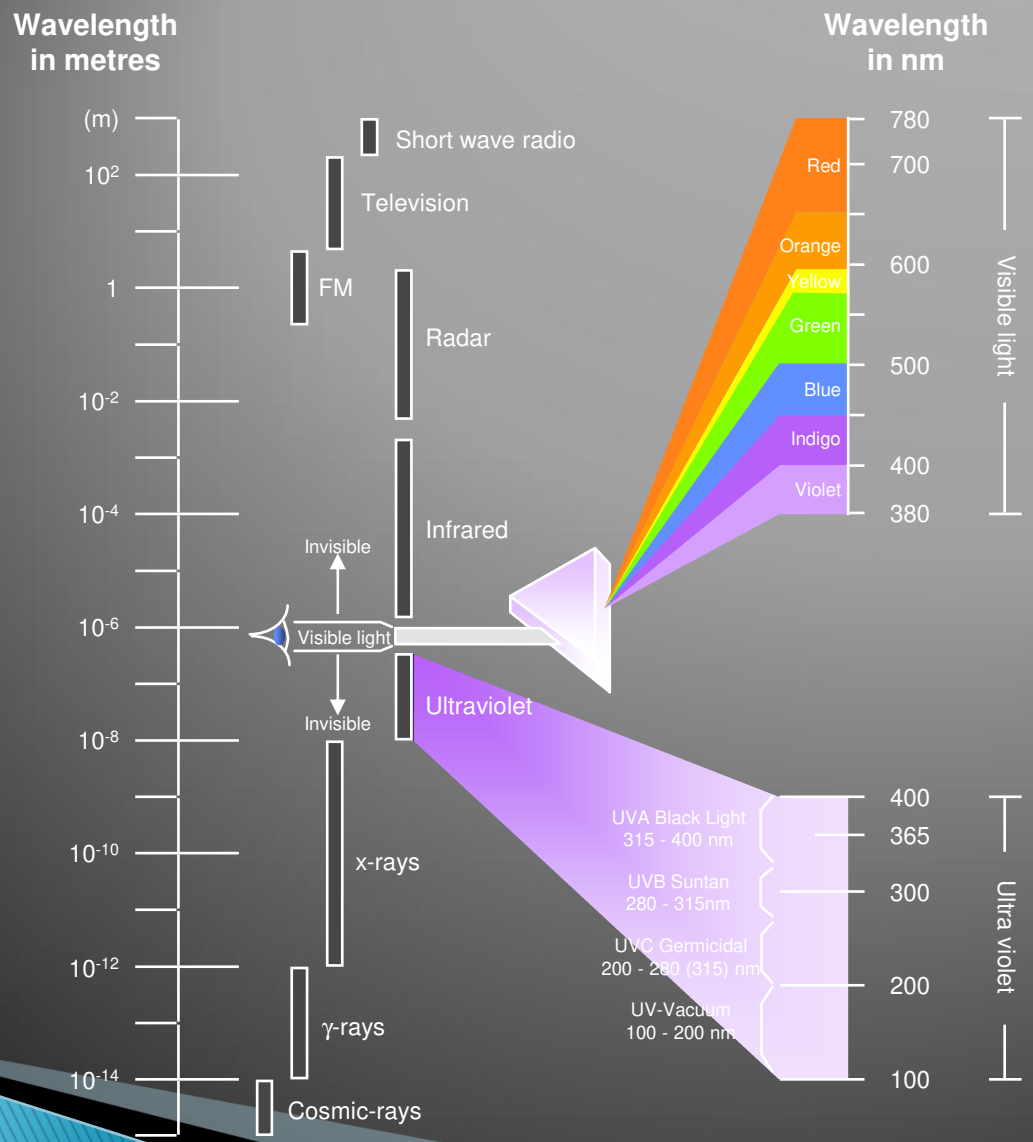
1. Disinfection techniques
2. What is UV?
3. UV reactor components
4. Design Considerations
5. Product Solutions
6. Case Studies

Disinfection Methods Comparison

	Ultraviolet	Biocides*	Ozone
Destruction	Physical	Chemical	Chemical
Total carbon footprint	Low	Low	High
Capital Cost	Medium	Low	High
Operation Cost	Low	Low	High
Maintenance Cost	Low	Medium	Medium
Maintenance Frequency	Low	Medium	Medium
Disinfection Performance	Excellent	Good	Good
Contact Time	1-5 seconds	15-45 min.	5-10 min
Crypto effectiveness	Yes	No	No
Transport, Storage risk	None	Medium	High
Toxic Chemicals	No	Yes	Yes
Water Chemistry Changes	No	Yes	Yes
Residual Effect	No	Yes	Yes

*Biocides considered are gaseous chlorine, sodium hypochlorite, calcium hypochlorite, chlorine dioxide

WHAT IS ULTRA VIOLET LIGHT



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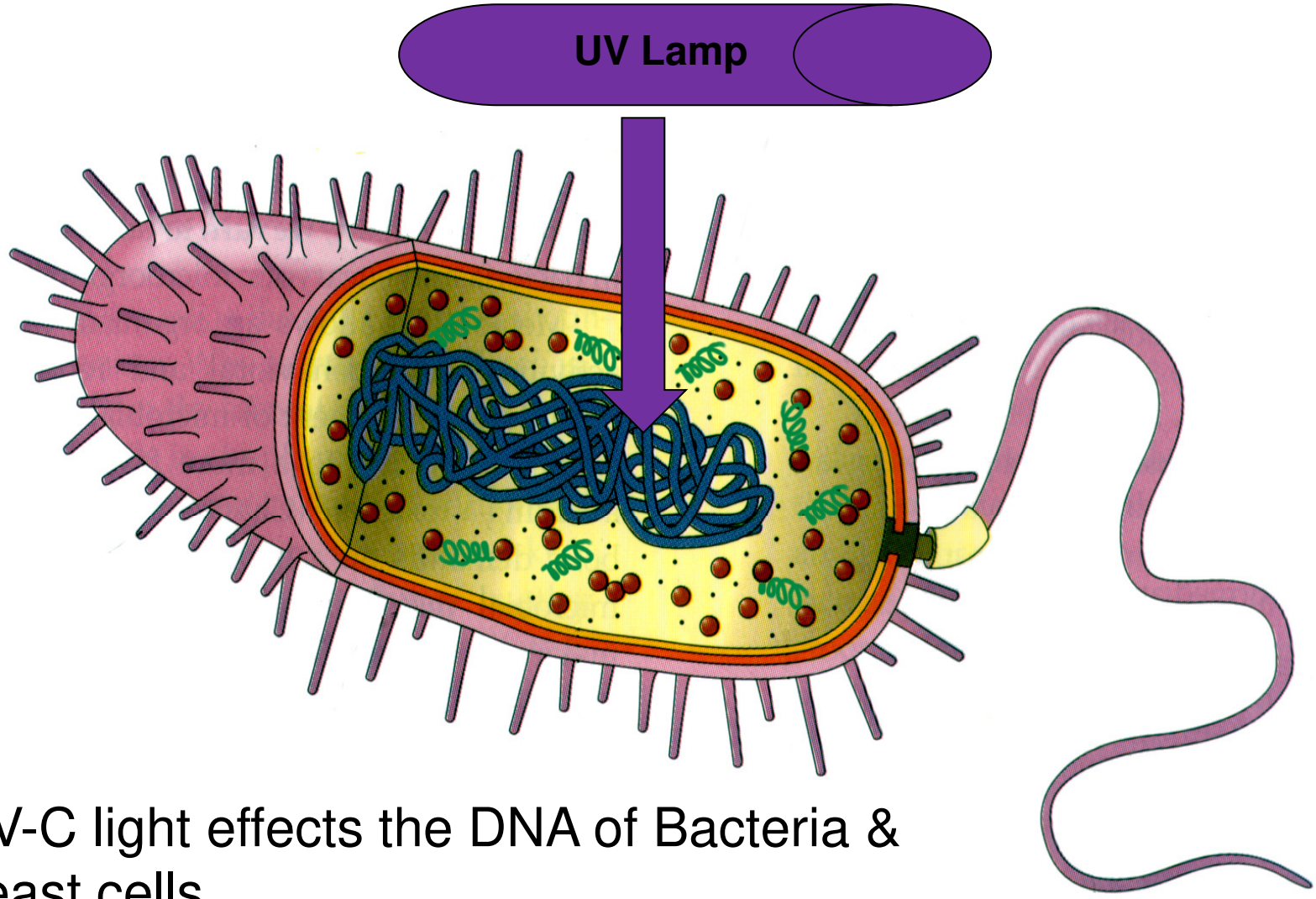
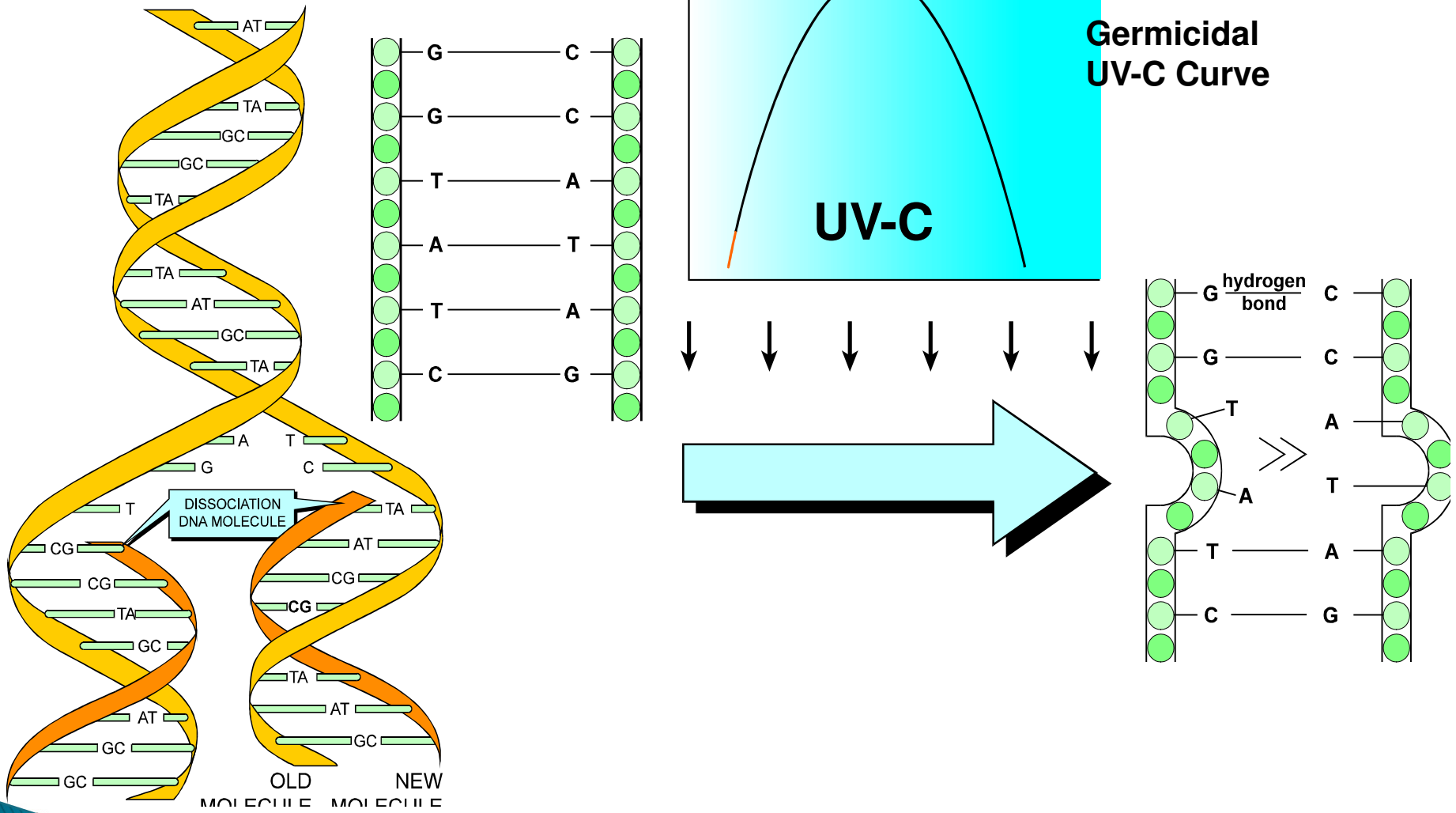
UV light

- UV-A: 315 – 400 nm; Tanning of skin
- UV-B: 280 – 315 nm; Cancer
- UV-C: 200 – 280 nm; Germicidal
- UV-Vacuum: 100 – 200 nm

UV- Vacuum = easily adsorbed and only transmitted in a vacuum environment.



UV-C light effects the DNA of Bacteria & Yeast cells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UV Lamps / Output

Low Pressure Bulbs

6 – 115 Watt Bulbs

Effectiveness: 7-15%

Output is unstable, effectiveness is compromised when the lamp is cooled down.

Amalgam lamps

80 – 800 Watt Bulbs

Effectiveness: 32%

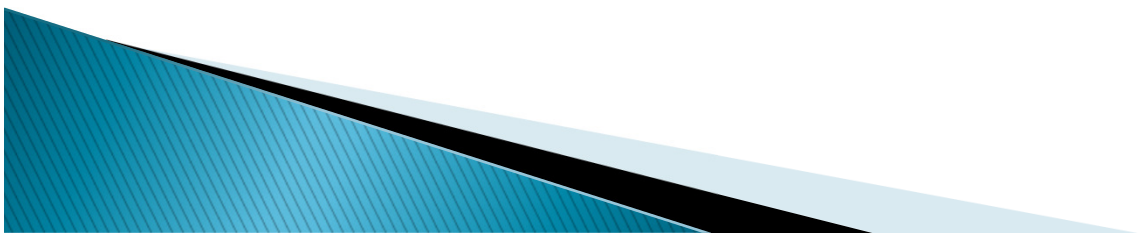
Output is stable over a wide temperature range

Medium pressure Bulbs

0.6 – 7 kW Bulbs

Effectiveness: 18% Multi wave output

Output is stable over a wide temperature range

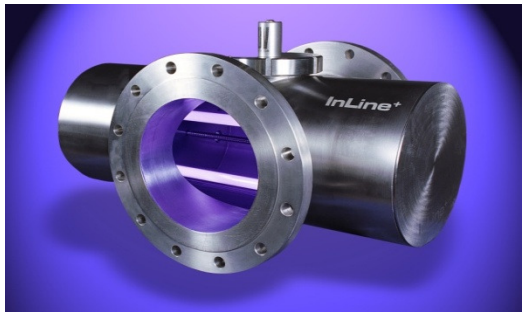


UV Dose calculation

UV Dose is a product of:

- UV Intensity (quantity of UV light)
- Contact Time (contact time in the reaction chamber)

UV DOSE



X Contact

UV Dose is expressed in: µWsec/cm^2 (Microwatt seconds/cm^2)

mWsec/cm^2 (Milliwatt seconds/cm^2)

mJ/cm^2 (Millijoules/cm^2)

10 J/m2 = 1 mJ/cm2 = 1 mWs/cm2 = 1000 µWsec/cm2

Application- waste water disinfection

City of O'fallon (USA)

2 streams of 4 UV-reactors

6 lamps @ 3-4 kW each

72-96 kW per stream

Flow :2000 m3/h

T_{10} :65%

Application- drink water disinfection

Configuration:
After nanofiltration
Riverwater
Capacity:7500 m^3/h
Location:Paris, France

Application- Swimming pool

University swimming pool 850 m^3/hr 14 kW

Application- Wine cellar water

Nederburg UV water treatment 40 m^3/hr

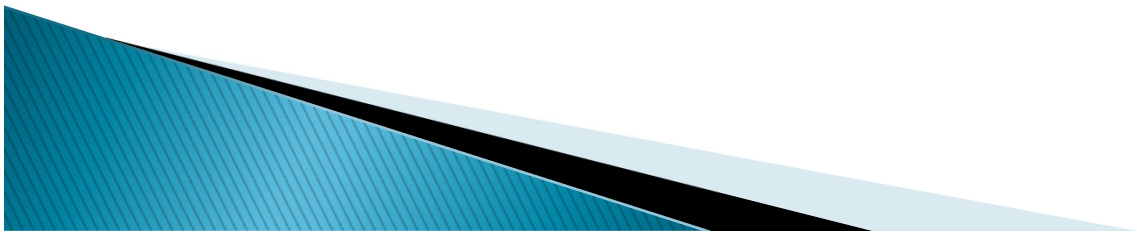
Home filtration

90 Lt/min

3-4 Bathrooms

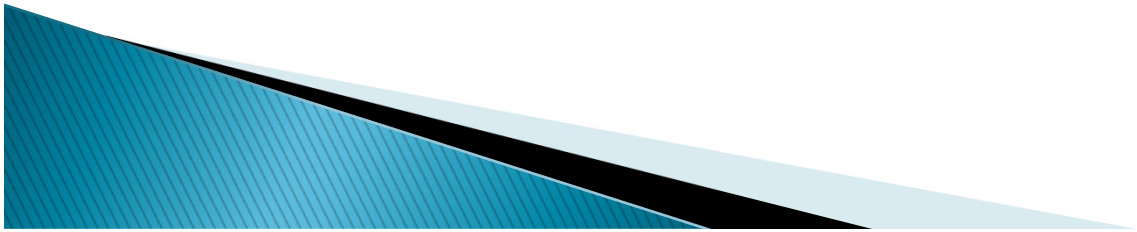
UV Design parameters

- *Flow rate.*
- *UV transmission.*
- *Liquid temperature.*
- *Log reduction*



Design Goals

- *No or less Chemicals*
- *Compact design*
- *Easy to operate*
- *Low power consumption*
- *Cost effective*
- *Africa proof*



TESTING

- – Flow
- – Product
- – Directly before and after treatment
- – Sampling
- – Dilution
- – Temperature

Parameters for correct sizing