Notes For Use

UNILAB®

R07212 UVC Lamp NFU607

Purpose

The UVC lamp is primarily intended to demonstrate the photoelectric effect using a zinc plate and gold leaf electroscope. The lamp emits UVC light with a peak wavelength of 253.7nm and **must not** be used as a general purpose UV light source. This lamp is an excellent replacement for the now obsolete Philips TUV6 lamp.

Specification

Lamp

Wattage	3W
Spectral peak	253.7nm
UV output	0.16W
UV micro watts	1.7 µW/cm^2 at 1m
Average Life	3000 hours

Power supply

Use only the power supply that came with the product. If a spare supply is required, contact Unilab Technical Support.

Input	230V a.c. 50/60 Hz
Output	24V d.c. 0.75A (centre +ve)

Safety

Warning! This Lamp emits UVC light with a wavelength of 253.7nm

CAUTION
ULTRAVIOLET RADIATION

Wear eye protection

- **This lamp emits high intensity ultraviolet (UVC) light, which is harmful to skin and eyes.**
- **UVC light is hazardous to skin and may cause cancer. Avoid exposure to UVC light when the lamp is operational.**
- **Keep the use of the lamp to as short a period as possible.**
- **Point the aperture away from the user and avoid unwanted reflections from glossy surfaces.**
- **This lamp must only be used under supervision.**

Using the UVC Lamp

This UVC lamp is only intended for use in demonstrating the photoelectric effect and it **must not** be used as a general purpose UV light source.

Mount the UVC lamp in a suitable retort stand with the aperture facing away from the user.

Switch the lamp on by connecting the 24V d.c. power supply to the socket provided. After a few seconds the lamp will light and begin to emit UVC light.

As soon as the experiment is completed, unplug the power supply to extinguish the lamp.

Replacing the UV bulb

Replacement UVC bulbs are available from Unilab and Philip Harris. To access the lamp holder, simply remove the two screws securing the end cap, the one with the d.c. jack socket, and gently removing the end cap from the extrusion.

Demonstrating the Photoelectric Effect

Equipment required:

- Gold leaf electroscope (H26679)
- Zinc sheet (H26965)
- Sand paper
- Electrostatic materials (H26631)

Introduction - The Triboelectric Effect

Electrostatic charges build up when one surface is in contact with another, and electron exchange occurs. The triboelectric effect occurs when certain materials are brought into contact with one another and then separated, causing one material to become positively charged and the other negatively charged.

The materials that gain positive charge do so because they lose electrons to the other material, which in turn become negatively charged due to the electrons gained. We can list materials in order based on their ability to gain or lose electrons, known as the triboelectric series (see an example in Figure 1). The first triboelectric series was described by Johan Carl Wilcke in 1757, many years before electrostatic fields were understood.

The materials at the top (+) of the series are most likely to lose electrons and become positively charged, and those at the bottom (–) are likely to gain electrons and become negatively charged. The farther away two materials are from one another on the series, the greater the charge exchanged. If two materials are very close to each other on the series, they may not exchange any charge.

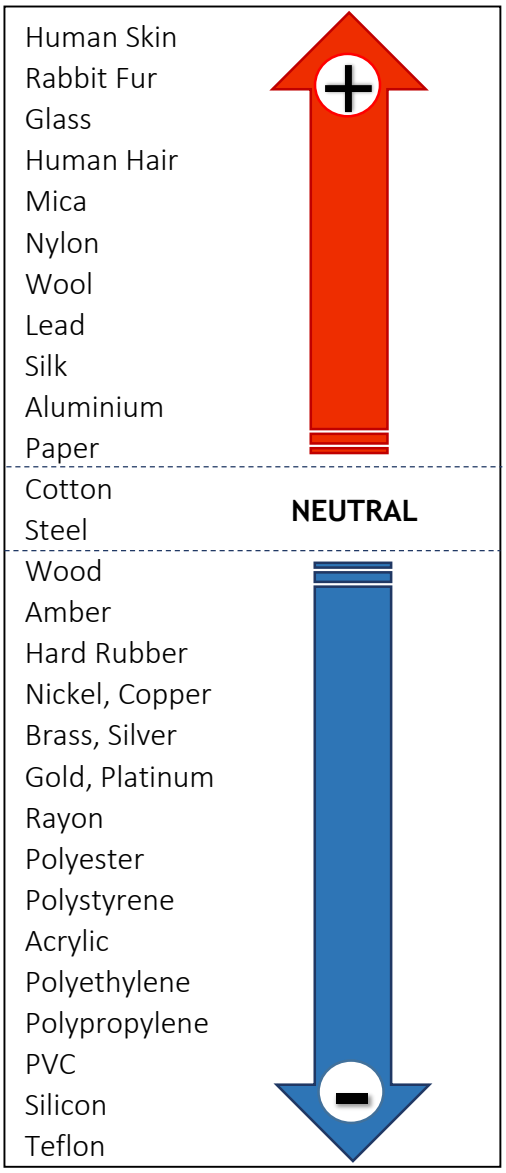

Figure 1. The triboelectric series

Method

To demonstrate the photoelectric effect it is necessary to generate a negative charge. This is achieved by rubbing two dissimilar materials together, so picking two materials that are furthest apart in the triboelectric series will generate the biggest charge (see Figure 1). A polythene rod and a wool rich fabric, for example.

Using the sand paper, clean the surface of the zinc plate and place the zinc plate on the gold leaf electroscope. Charge up the polythene rod by rubbing with a woolen fabric and touch it to the zinc plate. Repeat the charging process until the desired deflection is achieved.

Does light have any effect on the charge? Try shining a very bright torch onto the zinc plate, does this have any effect? Or a traditional UV black light? Finally try the same process with the UVC lamp (**please refer to the safety section before using the UVC lamp**). As soon as the UVC light falls on the zinc plate, the leaf falls, showing that the zinc plate has been discharged. Only UV light of very short wavelength can overcome the work function of zinc and cause the electrons to be released from the zinc plate's surface. It is not the brightness of light (number of photons) that matters, it is the energy of the photon.

Try the experiment again. This time select materials to give a positive charge to the zinc plate. Now shining the UVC light on the zinc plate has no effect. This serves to demonstrate that it must be electrons that are being released by the UVC light.

Periodic testing

Check the power supply lead and plugs at both ends for any damage.

Disposal of Waste Electrical and Electronic Equipment (WEEE)

Do not dispose of this product with household waste

- For the proper treatment, recovery and recycling please take this product to an appropriate collection point.
- If you are unsure where this is, contact your Local Authority
- By disposing of this product correctly you will be providing positive help to the environment.

Warranty, repairs and spare parts

The UVC Lamp is guaranteed for a period of one year from the date of delivery to the customer. This warranty does not apply to defects resulting from the action of a user such as misuse, improper wiring, any operations outside of its specification, improper maintenance or repair, or unauthorized modification.
Our liability is limited to repair or replacement of the product. Any failure during the warranty period should be referred to Customer Services or techsupport@philipharris.co.uk

Instructions for authorized service technicians

Please refer to the detailed service procedures, safe servicing and continued safety – contact techsupport@philipharris.co.uk for advice.
Please refer to product specific risks that may affect service personnel, the protective measures and verification of the safe state after repair.

Supplier details

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