

Infrared treatment light

- principles of operation
 - function
 - use
 - scientific principles
- construction
 - components
 - system diagram
 - inputs/outputs
- troubleshooting
 - identifying common faults
 - replacing components
 - rectifying faults



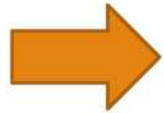
18.4.2 Maintain an infrared treatment light

Unit C18.4 Maintaining Physiotherapy Equipment

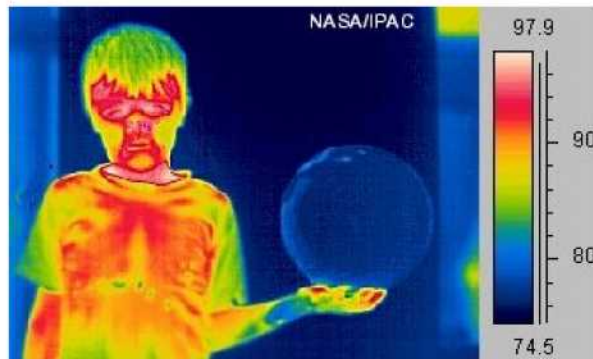
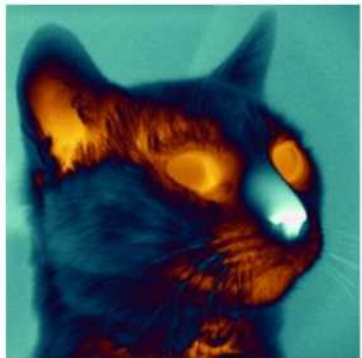
Module 279 19 C Medical Instrumentation II

Infrared radiation

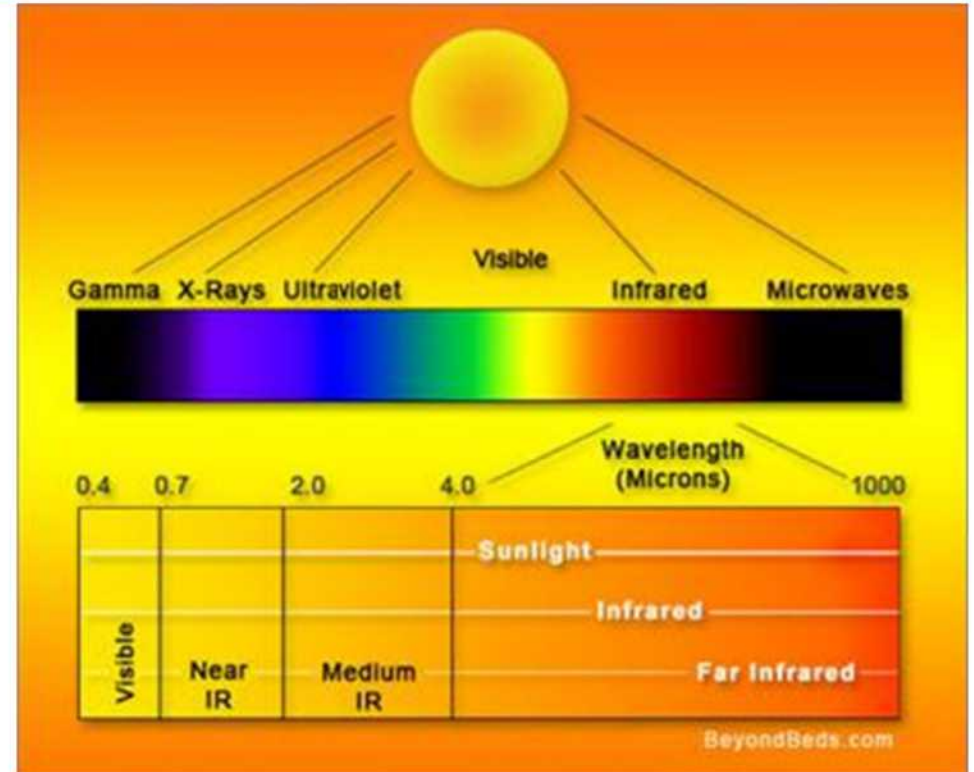
Infrared 'light' immediately follows red light on the electromagnetic spectrum. Infrared (IR) light energy is broken down into three groups:



- **Near Infrared (IR-A)** is used by most home therapy devices (700 - 1400nm wave length).
- **Medium Infrared (IR-B)** is used in household electronic devices such as remote controls.
- **Far Infrared (IR-C)** or thermal infrared is the largest part of the IR spectrum, used for heating of buildings, etc.



infrared pictures



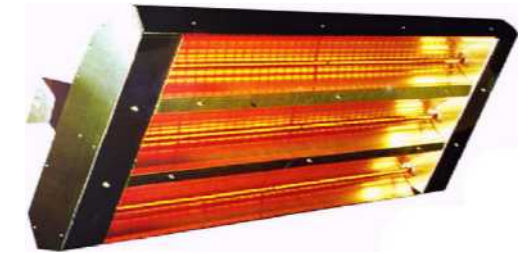
SPEED
LIMIT
299,792,458
meters per second

$$\text{Wavelength} = (\text{Speed-of-light}) / \text{Frequency}$$

Use of Infrared light

Infrared lamps are electrical devices which emit infrared radiation.

Infrared lamps are commonly used in **radiant heating** for industrial processes and building heating.



Infrared lamps are also used for some **night vision devices** (example: military).

Infrared lamps are used in certain scientific and industrial instrument for **chemical analysis** of liquids and gases.

Infrared LEDs are used for **communication** over optical fibres and in remote control devices. Infrared is the most common way for remote controls to command appliances.



How Does it Work?

In infrared light therapy, (red light energy and) invisible **near-infrared energy** is absorbed in the cells. The body experiences this energy as a gentle radiant heat.

The **longer the wavelength** of the light, the **deeper it penetrates** into the body. IR radiation is more useful than the visible radiation for heating our body, because we absorb most of it, compared to a strong reflection of visible light.

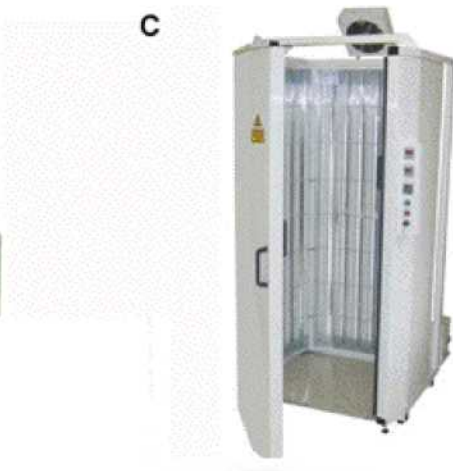
For skin applications, short wavelengths (620nm-700nm) are used. For deeper laying organs, bones, joints, etc. longer wavelengths are used (800-1000nm), which penetrate up to 4 cm beneath the skin.

Once absorbed, the light energy (heat) kicks off a series of metabolic events, stimulating the body's natural processes on a cellular level. A main effect is the increase in local blood flow through **widening of the capillary blood vessels**.

Therapeutic effects of heat include reducing pain, decreasing joint stiffness, reducing inflammation, etc.



A wide variety of infrared lamps



Tungsten-Halogen (TH)



Halogen lamps have a high power density up to 200 watts/inch of lamp, useful for industrial heating, drying and processing applications.

Infrared LEDs

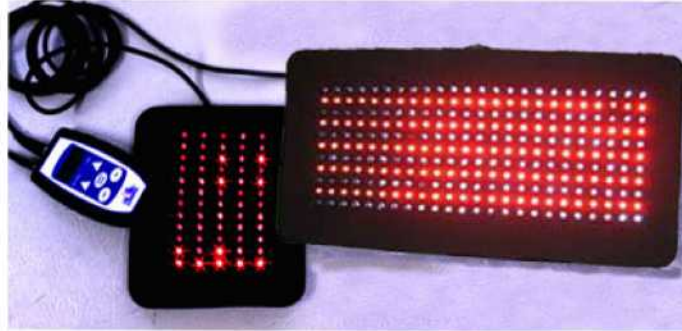


Xenon (Xe)

Incandescent light bulbs use a tungsten filament heated to high temperature to produce visible light and infrared radiation.



Use



System Diagram



a timer is often included

Trouble shooting

find the correct replacement bulb(s)

broken wires

change batteries

....

Safety Considerations

too much heat (too long treatment)

acute joint injuries

potential damage of the radiation to the eyes

not to continue after prolonged pain sensation

END

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