

UV & IR PHOTOGRAPHY IN FORENSIC SCIENCE

INTRODUCTION

- Ultraviolet and infrared have valuable application in law enforcement photography.
- Photography utilizing these radiations may provide information about an object or material which cannot be obtained by other photographic methods. Either or both could be considered as part of a physical examination in cases where visual examination or photography by normal processes fail.

- The visible spectrum ranges from blue at 400nm to red at 700nm. Ultraviolet wavelengths are shorter than 400nm and infrared wavelengths are longer than 700nm.
- They provide us with no visual response and therefore are not considered to be light. Certain narrow bands of this invisible radiation, however, have practical photographic applications.

- All standard photographic papers and photographic films are sensitive to UV. They are not, however, sensitive to infrared. Special film, sensitized to infrared radiations, is required for infrared photography. This infrared film is also sensitive to blue-violet and to ultraviolet.
- Developing and printing techniques are similar to the normal processes for both ultraviolet and infrared photography.

- The good thing is that both processes are non-destructive to inanimate objects. For life forms, the usual precautions regarding exposure to the eyes should be heeded. In cases of uncertainty as to which technique might produce the best results, you may have to try all.

ULTRAVIOLET PHOTOGRAPHY

- **Ultraviolet Radiation**
- For practical photographic purposes we use only the long wave ultraviolet band.
- ***Long wave ultraviolet*** :- 320 to 400 nanometres.
- This band is transmitted by regular optical glass, of which most photographic lenses are made and, therefore, is of most practical value in ultraviolet photography.

- ***Middle Ultraviolet*** :- 280 to 320 nanometres.
- *Middle ultraviolet radiations are not transmitted by regular photographic lenses. A lens made of quartz, however, will transmit middle and long wave ultraviolet and could therefore produce an image using them.*
- ***Short wave ultraviolet***:- 200 to 280 nanometres.
- It is notable for its germicidal effects but will also cause "sunburn" of unprotected eyes or skin.

Common Sources Of Ultraviolet Radiations

- Long wave ultraviolet (320nm to 400nm), is emitted by the following common sources:
 - electronic flash units
 - fluorescent tubes (F15/T8 BLB)
 - sunlight
 - mercury vapour lamps

- Whereas conventional photography may be thought of as recording what is visible in light, ultraviolet photography is based upon the premise that two or more elements of an object will reflect or absorb ultraviolet to different degrees thereby making detail visible in the photograph that was not visible to the eye previously.
- For example, writings made by two similar looking inks may show distinct differences in their brightness in an ultraviolet photograph.

Uses Of UV Photography

- Blood situations where its colour blends with surroundings, documents erasures, inks and typewriter ribbons.
- pigments vary in the absorption and reflection of ultraviolet invisible Stains of various body secretions, such as: urine, semen, pus, perspiration, etc., as they often emit a particular fluorescence.

- Fingerprints on multicoloured backgrounds; shiny or concave object; organic matter (all using fluorescent fingerprint powders).
- In secret marking of objects - powders, pastes, inks, pencils.

INFRARED PHOTOGRAPHY

- *An actinic infrared* can be used for photography with ordinary camera lenses.
- The actinic infrared ranges from 700nm to 900nm.
- Actinic infrared photography can be defined as the technique of using a camera lens to focus and expose an infrared image on an emulsion sensitized to infrared radiation.

- For a subject to be photographed in this manner it must:
 - reflect or transmit infrared radiation or
 - the subject must luminance in the infrared region
 - Luminescence of a suitable subject occurs when it is illuminated with the shorter wavelengths of visible light or ultraviolet radiation.

Common Sources of Infrared Radiations :

- electronic flash units
- tungsten lamps
- white fluorescent tubes
- sunlight

Uses Of IR Photography

- gun shot wounds to illustrate powder burns.
- cloth, hair and fibre examinations may show differences among like subjects by differences in reflection or luminescence capabilities.
- In secret writings will sometimes reveal contents sealed envelopes.
- In charred document, we can decipher writings with the help of IR photography.

- Documents alterations (where original script has been tampered with) inks visualizing differences seemingly identical to the naked eye.
- Dyes and other pigments luminescence when exposed to infrared stimulation (sometimes they may be identified by their degree of luminescence).
- We can reveal the writing in case of chemical erasures.

THANK YOU