

Jablonski Energy Diagram

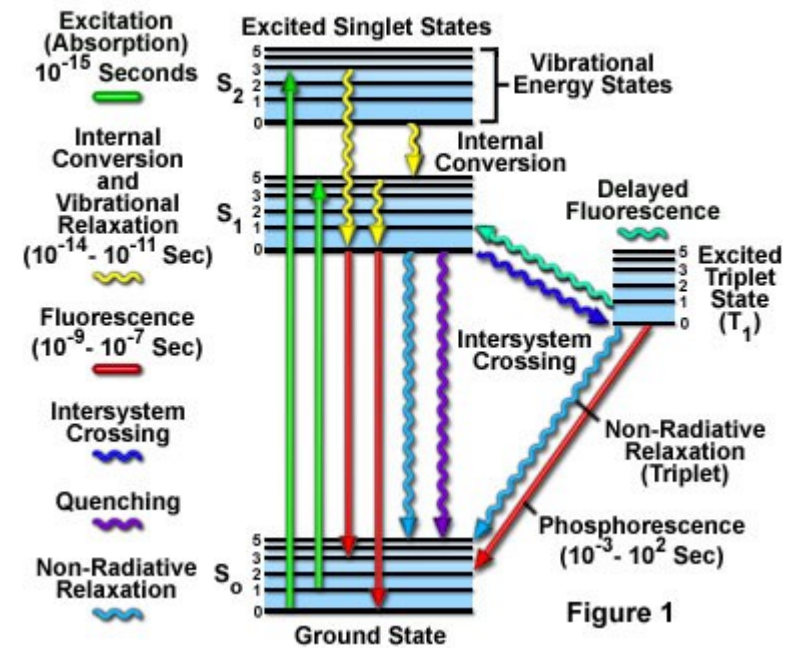
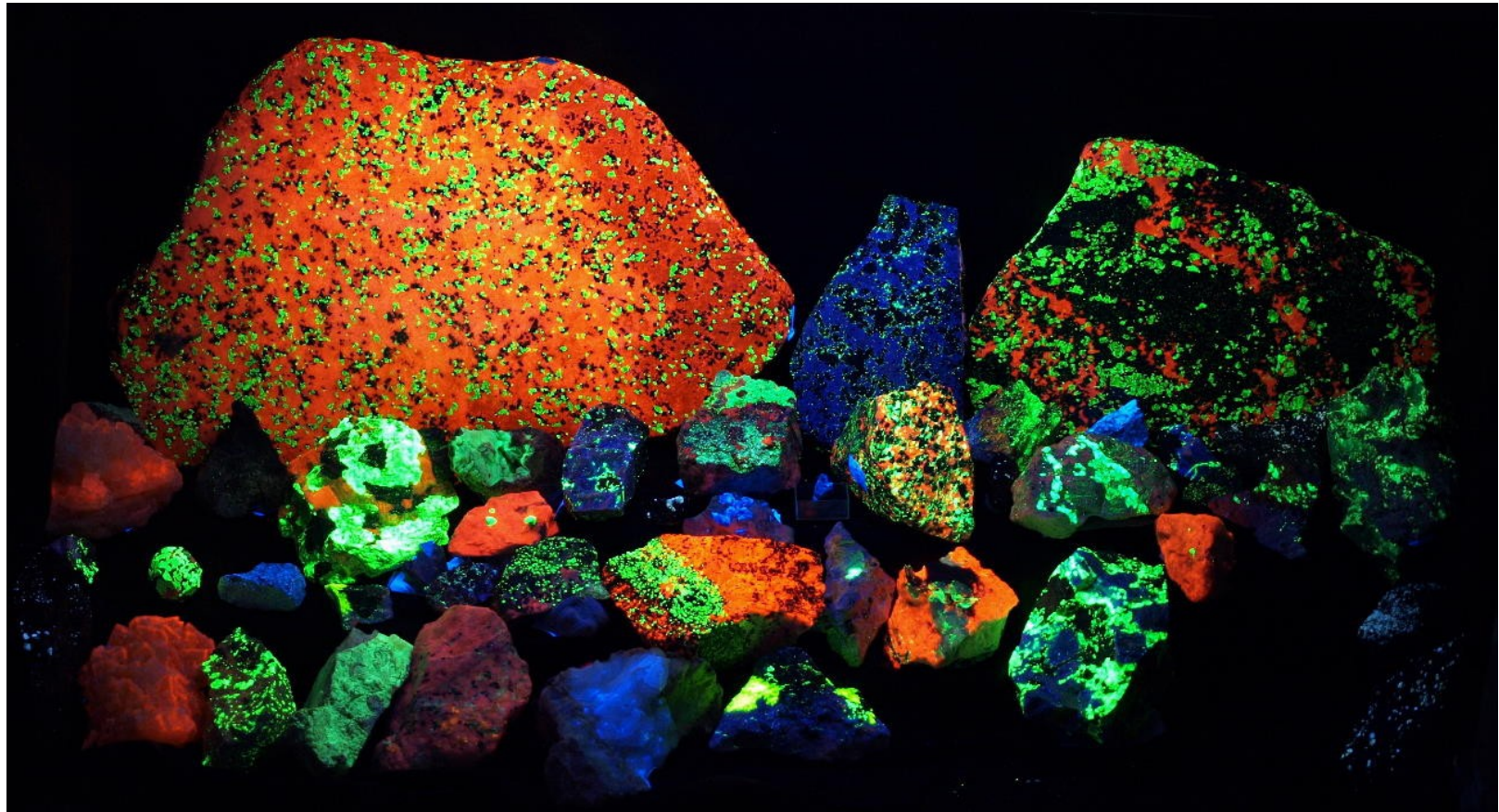


Figure 1



FLUORESCENCE

What is it?

FLUORESCENCE IS:

the emission of visible light
(radiation),
by a substance during exposure
to external light (or other
radiation)

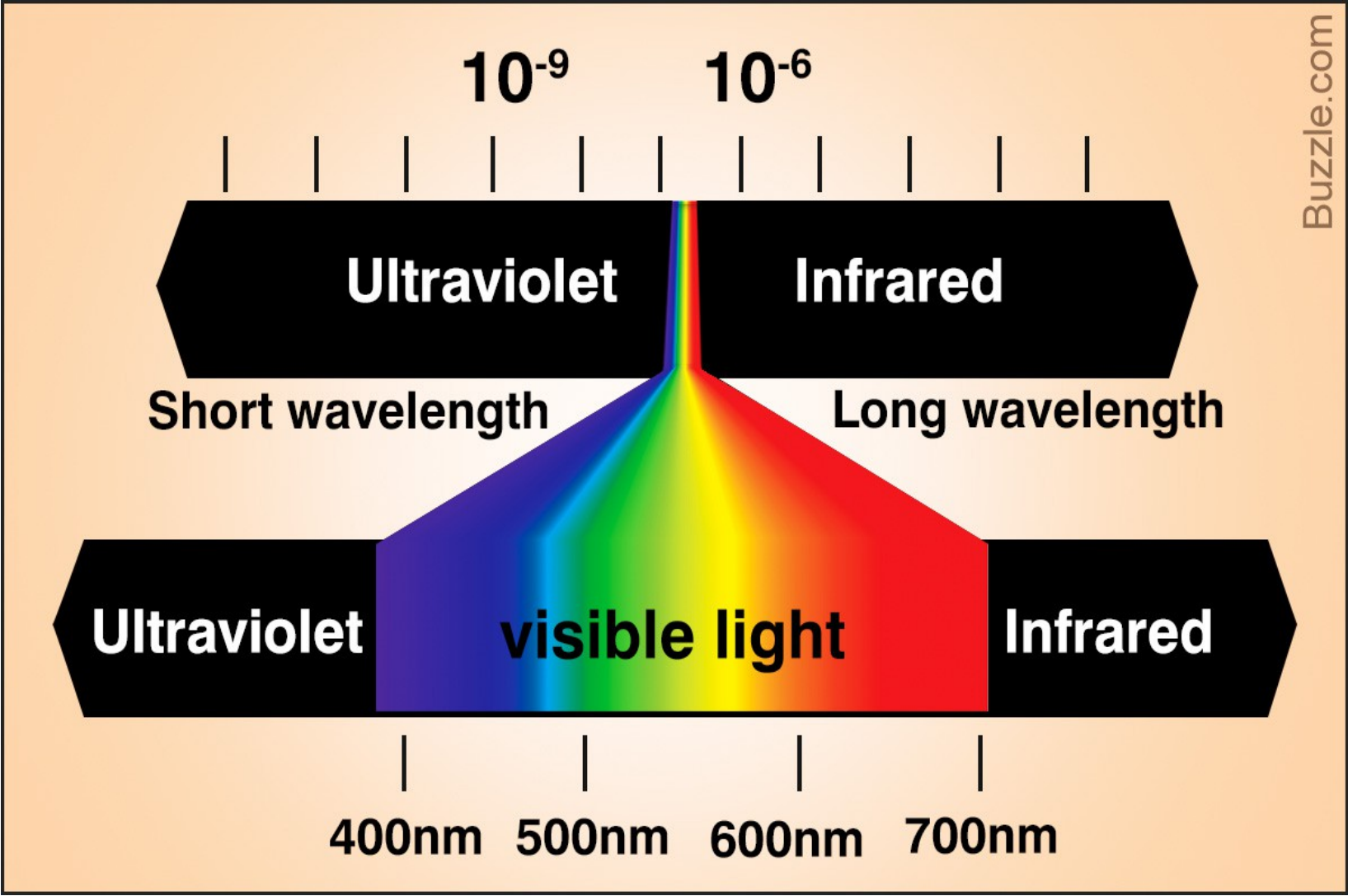
LIGHT

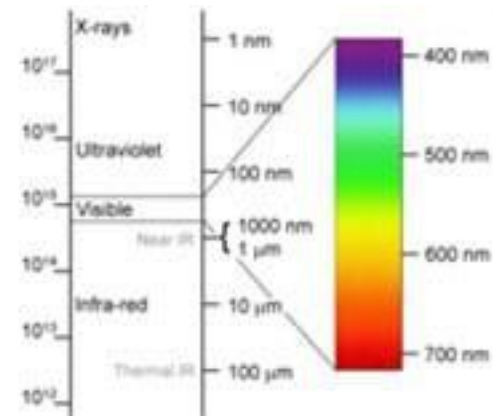
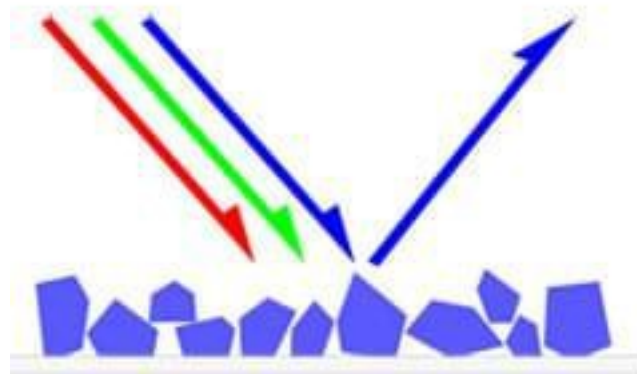
energy in the form of waves

Visible light – 400 - 600 nm

Long wave Ultraviolet – 320-400 nm

Short wave Ultraviolet – 254 nm





WHO CARES?

Fluorescence has many practical applications:

biological detection – bodily secretions

tagged postage stamps

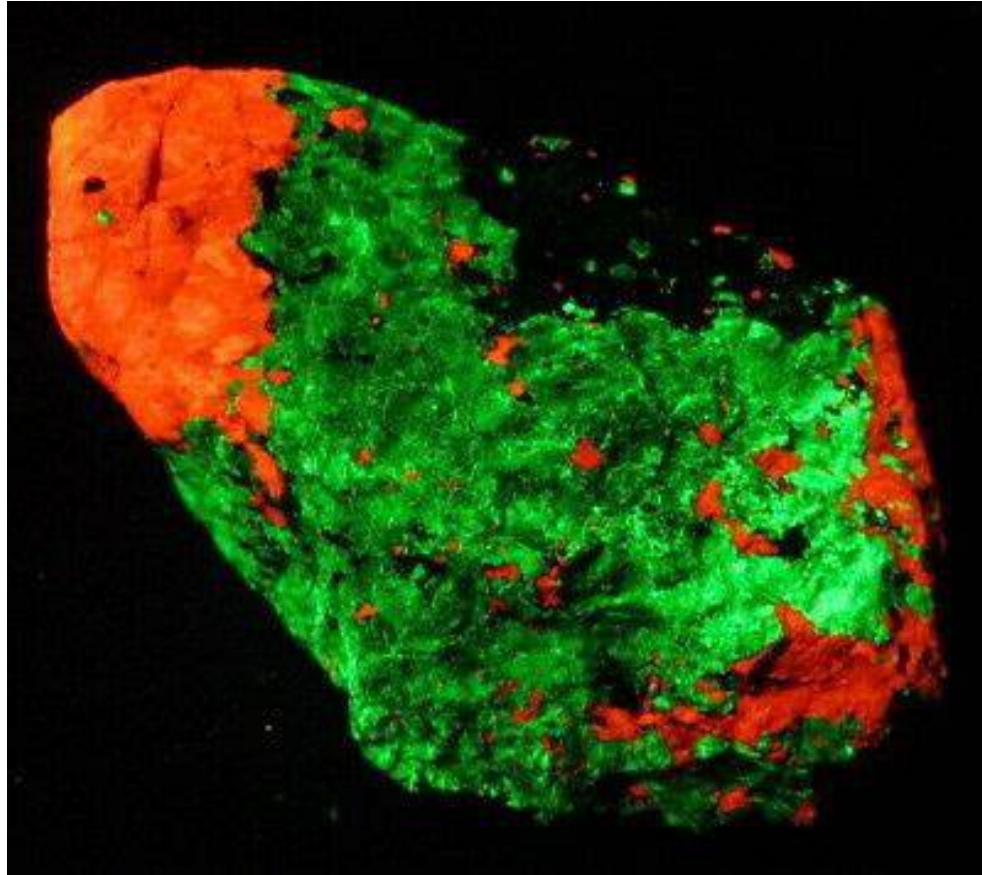
performance theatre

medicine – stains in microscopy

gemmology – rubies (red in long wave)

mineralogy – zinc ore (green) in willimite
(calcite is red)

Willimite



UV Equipment



What causes fluorescence?

- Most minerals do NOT fluoresce naturally. (Exception is scheelite $[\text{CaWO}_4]$ (SW)).
- Impurities in the mineral called “activators”
- Different activators produce different colours

Scheelite on muscovite - visible



Scheelite on muscovite - SW





Calcite – blue SW



Calcite – red SW

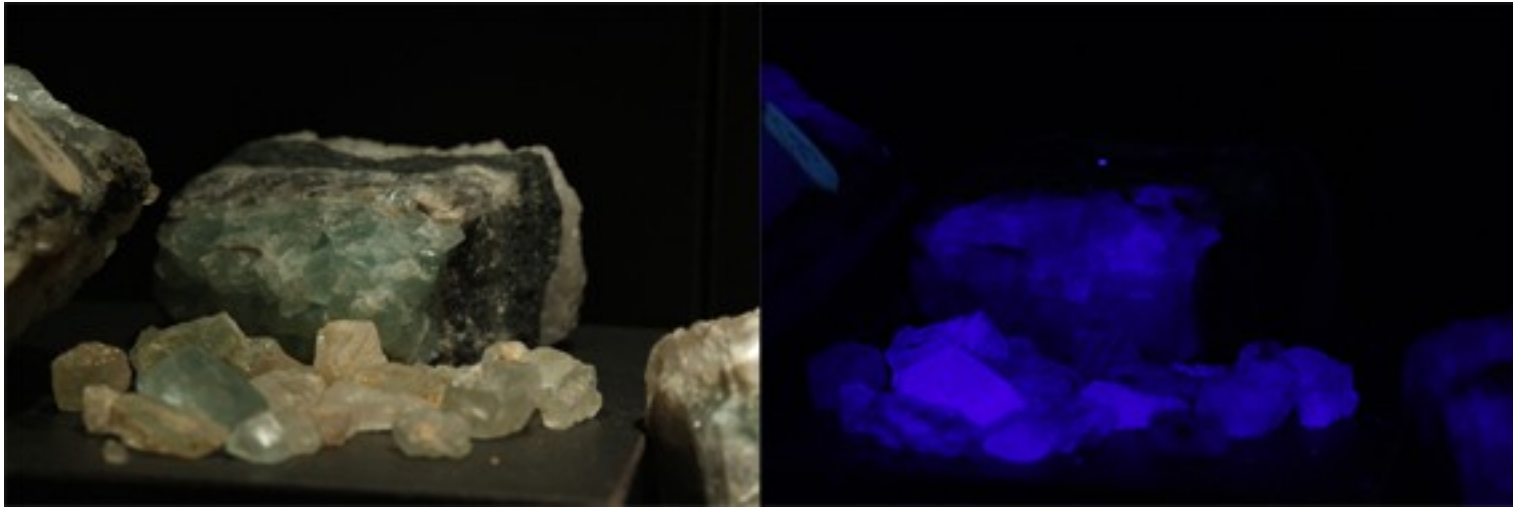


Fluorite

The common blue fluorescence seen in fluorite has been attributed to the presence of europium.

George Gabriel Stokes named the phenomenon in 1852.

Fluorite - SW





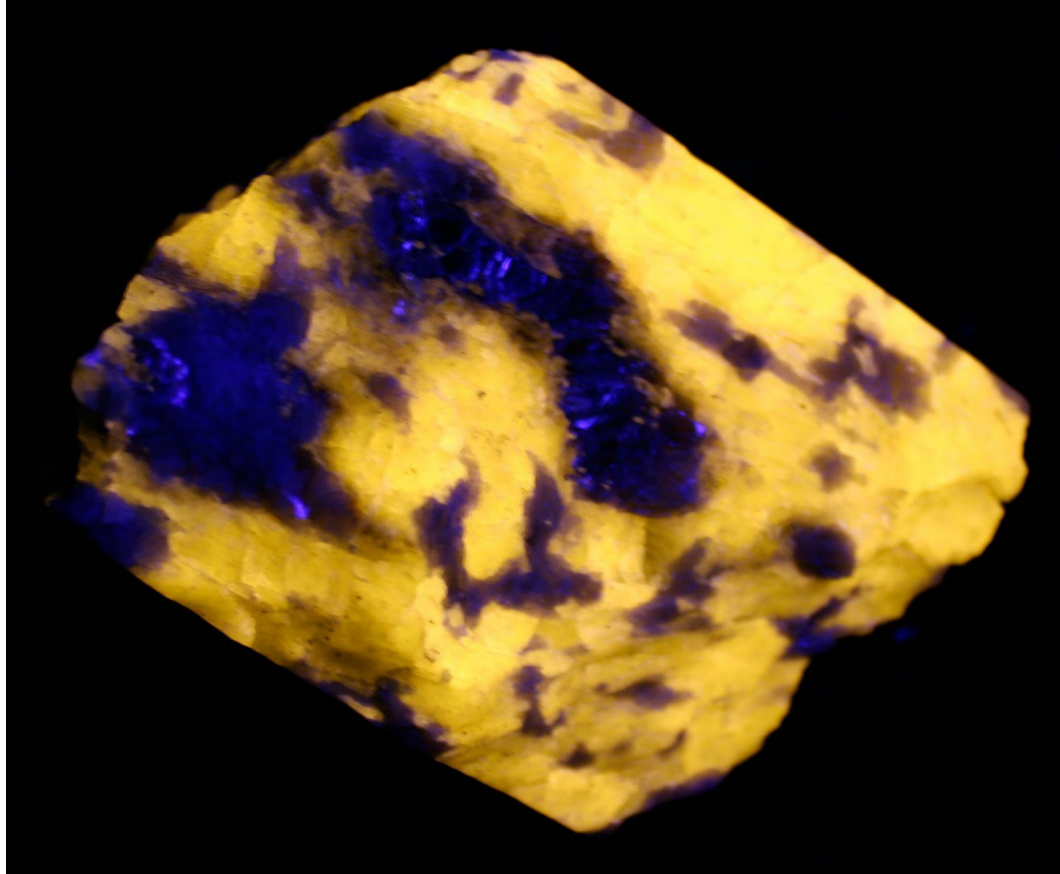
FLUORITE
WEARDALE, DURHAM, ENGLAND

#F196. Corundum (Ruby) in marble - Vietnam
Long-wave UV

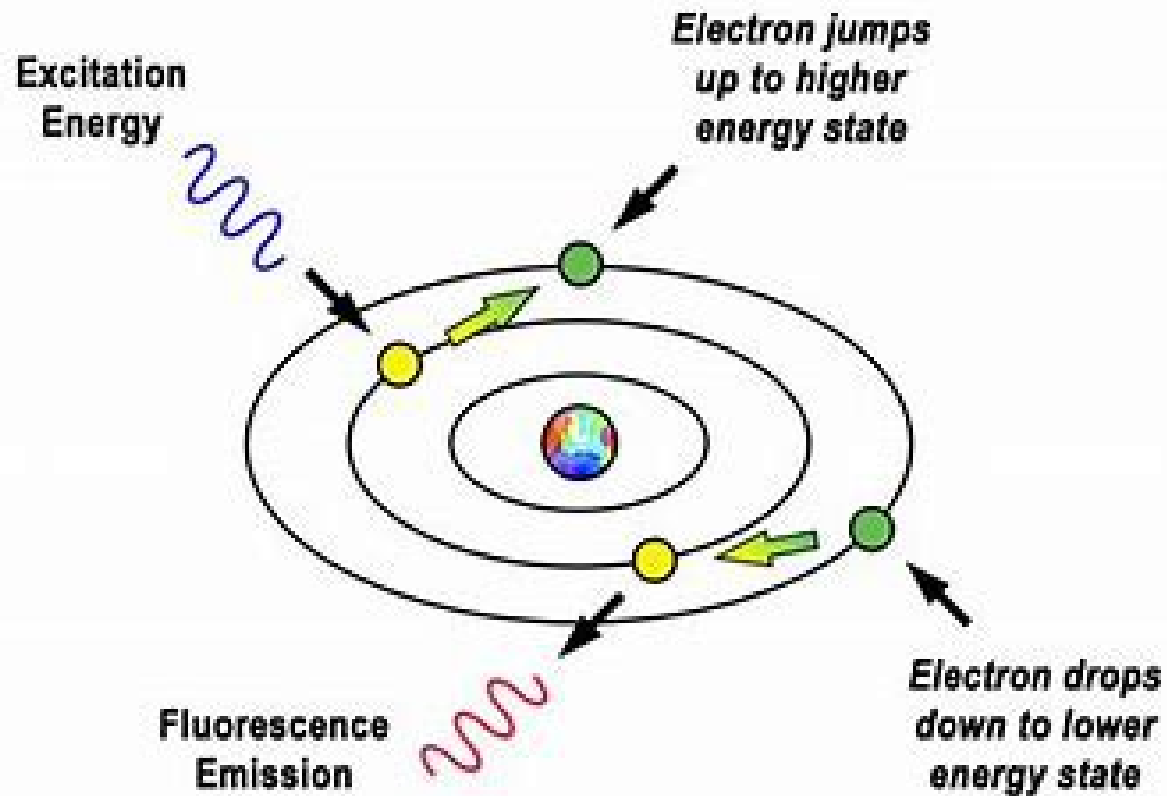


www.crscientific.com

Scapolite/Wernerite gem



Physics of excitation



Disclaimer

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- Some have attribution attached

Additional References

- *The Story of Fluorescence* by Henry Wain, www.raytech-ind.com
- *Ultraviolet Guide to Minerals* by S. Gleason, 1960, D.Van Nostrand Co.
- *Collecting Fluorescent Minerals* by S. Schneider, 2004, Schiffer Pub. Ltd., Pa
- Fluorescent Minerals at Geology.com