IONIZATION APPARENT

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The question of whether or not visible light is sufficient to ionize the presumed metallic particulate material recently evidenced by the photographs and video of Jan 03 2001 is now answerable. Primary candidates for the testing of the particulate matter has for some time now been those elements within Groups I and II of the periodic table, i.e., Li, Na, K, Rb, Cs, Be, Mg, Ca, Sr and Ba. Of this group, barium and magnesium are currently receiving the most attention within the research.

A physical quantity entitled the "work function" of a metal is crucial to the determination of the level of energy that is required for photo-ionization to take place. The work function is defined as follows:

"A quantity that determines the extent to which thermionic or photoelectric emission will occur according to the

Richardson equation or Einstein's photoelectric equation. It is sometimes expressed as a potential difference in volts and sometimes as the energy required to remove an electron in electronvolts or joules."

Oxford Dictionary of Science, 1999.

The work function is essentially the work that is required to separate an electron from the metal surface. The following table lists the magnitude of the work function for the elements above (as well as for aluminum):

Element	Work Function (eV)
Li	2.9
Na	2.8
K	2.3
Rb	2.2
Cs	2.1
Be	5.0
Mg	3.7
Ca	2.9
Sr	2.6
Ba	2.7
Al	4.28

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From Theoretical Physics by Joos 1958 :

"In order that there by ionization by light - photo-ionization- the incident light quantum hv must be at least equal to the work of ionization. Calling the latter eVi, we have

hv >= eVi

If we characterize the light by its frequency instead of by its wavelength, insertion of the numerical values yields the easily-remembered relationship between wave-length and equivalent electron energy

wavelength (in nanometers) x Vi (electron energy in volts) = 1238"

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or alternatively,

wavelength (nm) = 1238 / Vi (eV)

Using the values from the table above, for barium we find:

wavelength = 1238 / 2.7eV = 459nm, which is in the visible portion of the spectrum.

Similiarly for magnesium, we find:

wavelength = 1238 / 3.7eV = 335nm, which is in the midrange-ultraviolet portion of the spectrum.

Note that for aluminum,

wavelength - 1238 /4.28eV = 289nm, which is in the shortwave-ultraviolet portion of the spectrum.

The results of this study indicate that the energy available within visible light is sufficient to produce photo-ionization of barium particulate matter, and that midrange-ultraviolet light is sufficient to produce photo-ionization of particulates of magnesium if also considered. They also indicate that the majority of the elements that are candidates for consideration are subject to these same conclusions. These findings are significant in interpreting and explaining the apparent electrically charged behavior of the materials and the emission of photon energy as it has been recorded.

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ADDITIONAL RESEARCH:

Readers may also wish to research the following link:

THE ULTRAVIOLET SPECTRUM

From which it can be learned that

"Ultraviolet is closest to and just shorter than visible light in wavelength.
Ultraviolet can be subdivided according to wavelength into (from lowest to
highest): longwave ultraviolet (UVA or near ultraviolet), middlewave
ultraviolet (UVB), shortwave ultraviolet (UVC), and extreme ultraviolet.

Longwave ultraviolet is part of sunlight. It is the lowest-frequency
ultraviolet, and thus the nearest to visible light. Longwave ultraviolet passes
easily through most transparent types of glass and plastic. Longwave
ultraviolet lights are available,

and they are the cheapest and longest-lasting ultraviolet lights. They cause some fluorescent minerals (perhaps 15%) to exhibit fluorescence.

Midwave ultraviolet is also part of sunlight. Longer wavelengths of midwave ultraviolet cause suntans, while shorter wavelengths of midwave cause sunburn. Midwave, especially shorter wavelengths, is partially stopped by clear glass. Since midwave ultraviolet is passed by shortwave ultraviolet filters, and since midwave tubes have recently become widely available, some collectors are starting to use midwave to study mineral fluorescence.

Shortwave ultraviolet is emitted by the sun, but it is stopped in the upper atmosphere of the earth by the ozone layer. "

Also noting that the range is divided as follows:

Longwave UV : 350 - 380nm

Midrange UV : 300 - 350nm
Shortwave UV: 250 - 300nm
Extreme UV: < 250nm

Combined with the above information, we can conclude that barium is easily subject to photo-ionization, magnesium may be partially ionizable, and aluminum is not subject to photo-ionization due to the filtering at the necessary wavelength by the ozone layer.

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