Destruction of Viral Capsids by means of Specific Violet Radiation

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I show here that several types of Viral Capsids can be easily destructed by means of a specific *violet* radiation. This possibility is extremely advantageous from the technical viewpoint, because can be very efficient to destruct viral capsids for example, inside hospitals (hospital disinfection), at home, inside buildings, etc.
Key words: Virus, Viral Capsids, Viral Capsids Destruction.

INTRODUCTION

Viruses can be extremely simple in design, consisting of nucleic acid surrounded by a protein coat known as a **capsid**. The Viral Capsid is made of many smaller, identical protein molecules called capsomers [1].

Here, we show that, several types of Viral Capsid can be easily destructed by means of a specific violet radiation. This possibility is extremely advantageous because can be very efficient to destruct viral capsids at the air, mainly inside hospitals (hospital disinfection), at home, inside buildings, etc.

THEORY

When a photon incides on a Viral Capsids it incides on a protein molecule (capsomers), which is basically composed of atoms of Hydrogen, Carbon, Oxygen and Nitrogen.

The chance of the incident photon reach on atoms of Hydrogen, Carbon, Oxygen and Nitrogen is extremely high. The approximate sizes of these atoms are given, by the following values, $\phi_H = 50\,pm$, $\phi_C = 150\,pm$, $\phi_O = 120\,pm$ and $\phi_N = 130\,pm$, respectively.

The pressure, p, which a photon, with energy hf, produces when it incides on one of these atoms can be expressed

$$p = \frac{F}{S_{atom}} = \frac{hf/\lambda}{S_{atom}} = \frac{hc}{\lambda^2 S_{atom}} \qquad (1)$$

Thus, the *minimum* pressure, $p^{\min}$, is produced when the photon incides on the atom with *largest* area ($S_{atom}^{\max} = \pi\phi_{\max}^2/4$), i.e.,

$$p^{\min} = \frac{4hc}{\pi\phi_{\max}^2\lambda^2} \qquad (2)$$

The maximum diameter of the atoms of Hydrogen, Carbon, Oxygen or Nitrogen, is. $\phi_{\max} = \phi_C = 150\,pm$. Therefore, Eq. (2) can be rewritten in the following form:

$$p^{\min} = \frac{4hc}{\pi\phi_{\max}^2\lambda^2} = \frac{1.1\times10^{-5}}{\lambda^2} \qquad (2)$$

Studies indicate that certain viruses can withstand pressures exceeding $400MPa \cong 3900atm$ without suffering significant damage. However, it is also known that under pressure of $550atm \cong 5.6\times10^7\,N/m^2$, several types of Viral Capsids are destroyed [2]. Thus, we can conclude that, if

$$p^{\min} = \frac{1.1\times10^{-5}}{\lambda^2} > 5.6\times10^7\,N/m^2 \qquad (3)$$

then, photons with wavelength $\lambda < 4.4\times10^{-7}\,m = 440nm$ can destruct many types of Viral Capsids.

However, we cannot consider the spectrum radiation with $\lambda < 380nm$, because are very dangerous radiation. (380nm is the inferior limit of the violet spectrum. Below this value is the beginning of the UVA spectrum). Then, only remains the following spectrum

$$380nm - 440nm.$$

This is also the spectrum of *violet* light ($380nm - 440nm$).

Violet light (380 – 440nm) – works on cell regeneration and increases local metabolism; Improves viscoelasticity; Accelerates skin renewal; Reduces expression lines and wrinkles; Increases cellular and tissue hydration levels; Controls cellulite – gynoid hydrolipodystrophy; Stimulates lipolysis. [3]

CONCLUSION

The radiation with 380*nm* wavelength appears to be the most efficient in destroying Viral Capsids. An important characteristic of this radiation is that *it is not visible* to most people; in addition, it can penetrate in the human skin, 0.1mm – 0.2mm, only and is not dangerous for the peoples.

The idea here is to use this radiation in order to eliminate many types of viruses, mainly inside hospitals (hospital disinfection), at home, inside buildings, for example.

It is known that, in the high-atmosphere, the molecular oxygen (O_2) can emit violet radiation with a wavelength of 380 nm (Herzberg bands). Then, imagine a planet with a *non-polluted* atmosphere where this *strongly* occurs, in such way that its atmosphere is continuously bathed with this type of *invisible* radiation. Under these conditions, viruses can not exist in that planetary atmosphere; consequently, if exist a human population on that planet, it would be practically *free from viral diseases*.

As we know, viral diseases occur far more frequently than other types of illnesses; thus, we can conclude, for instance, that the aforementioned planet would have a much healthier population than *actual* population of Earth.

REFERENSES

[1] Collier *L, Balows A, Sussman M, eds. (1998). Topley & Wilson's Microbiology and Microbial Infections. Vol. 1, Virology (9th ed.). pp.33-55.*

[2] Purohit, P.K, Kondev J., and Phillips, R., (2003) *Mechanics of DNA packaging in viruses*, *Proc. Natl. Acad. Sci. U.S.A.* 100 (6) 3173-3178, https://doi.org/10.1073/pnas.0737893100

[3] Meta AI and Chat GPT