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Is Sterad^{R} from J&J is Truly Plasma Gas Sterilizer?

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Sterad^{R} from Johnson & Johnson (J&J) is provided as a hydrogen peroxide (H_2O_2) gas plasma sterilizer in the market. Several papers published as Sterad^{R} is not H_2O_2 gas plasma sterilizer, but H_2O_2 gas sterilizer because Sterad^{R} can skip plasma exposure procedure to attain sterilization and the sterilization result is identical between with skipping and without skipping from the result of SAL (sterility assurance level) (Figure 1). In addition, from Sterad^{R} it produces OH radical for sterilization and OH radical has a greater oxidation-reduction potential among active oxygen species (Table 1), but the life period of OH radical is too short (10^{-6} to 10^{-9} second), indicating it is hard to sterilize too large capacity like Sterad^{R} 100.

Most of the gas plasma sterilizer has much smaller capacity to sterilize the items. These gases are nitrogen, oxygen, argon or xenon which are inert gases. On the contrary H_2O_2 gas itself has a sterilization capacity and lifer time is so and so. It means H_2O_2 gas plasma has no or little contribution to sterilization in Sterad^{R}. The main contribution of gas plasma is radical. Radical is too short life time and flight distance is also too short, therefore sterilizer capacity cannot large. Most of the gas plasma sterilizer capacity is around 10 cm distance between electrodes and the gases used are inert, so gas itself has no capability to sterilize bioburden (viable microorganisms on/in the products). Sterad^{R} can sterilize buiburden without any help of gas plasma, therefore the sterilizer capacity can be large, too large as a gas plasma sterilizer, therefore the serious gas plasma sterilizer researcher has a curiosity that Sterad^{R} is truly H_2O_2 gas plasma sterilizer.

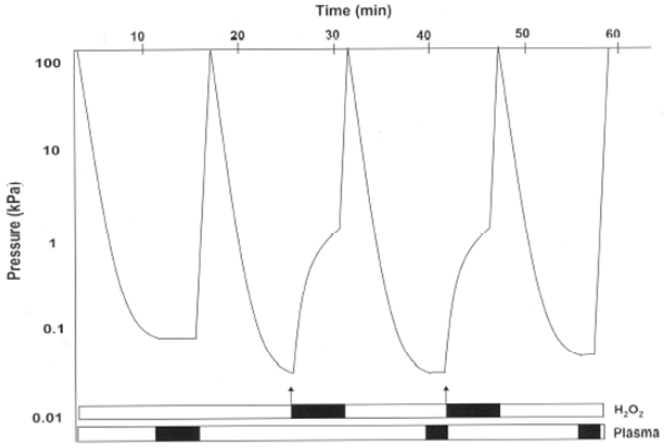

Figure 1: The Sterad 100S sterilization cycles. The exposure time, for this particular cycle is about 55 min. Pressure changes during the cycle are shown in a $\log_{10}$ scale. During the cycle, exposures to hydrogen peroxide gas (injection of gas indicated by arrows) and times of plasma generation are shown (black bars). Note that atmospheric pressure is 760 mmHg.

Name	chemical sytructure	Eh (V)
Hydroxy radical	OH	2.05
Atomic Oxygen	O_1	1.78
Ozone	O_3	1.52
Hydrogen Peroxide	H_2O_2	1.30
Hypochlorous Acid	KOCl	1.10
Oxygen	O_2	0.94

Table 1: Oxidation reduction potential (Eh) of active oxygen.

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