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STUDY OF THE PASSAGE OF HYDROGEN PEROXYDE THROUGH EYE-DROPS BOTTLES INTENDED FOR STERILITY TESTS DURING THEIR DECONTAMINATION IN AN ISOLATOR

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CONTEXT

Sterility test of eye-drops produced in our unit is performed in an isolator. Hydrogen peroxide (H_2O_2) is the oxidizing agent used for decontamination process. The eye-drops are packaged in bottles made of low-density polyethylene (LDPE), with different type of cap, depending on the preparation. As the possible passage of the H_2O_2 through LDPE has not been studied. So, the bottles are protected by overwrapping bags during decontamination.

OBJECTIVE

To study the passage and release of H_2O_2 in eye-drops vials intended for sterility testing without overwrapping

METHODS

Validation of the assay method according to ICH criteria

3 batches of 7 non-overwrapped vials filled with 8 mL of water were decontaminated :

- Conventional bottles with simple tip (A)
- Novelia® Soft PF1500 bottles (B)
- Novelia® PF200 bottles (B)

Decontamination cycle parameters :

- 8 min – H_2O_2 injection (2g/min)
- 4 min – Contact time
- 13 min – Aeration

H_2O_2 measurement by spectrophotometry at 560 nm (EvolutionOne®, Thermofischer) at **T0** and **T24H**

Sample pretreatment using the Thermo Scientific Pierce quantitative peroxide assay kit[1] :

$$\mathbf{H_2O_2} + Fe^{2+} \rightarrow Fe^{3+} + HO^{\bullet} + HO^{-}$$

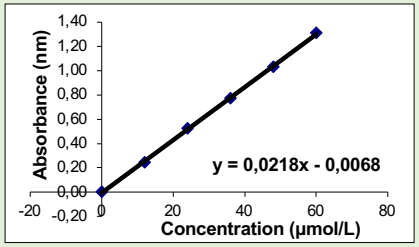
$$Fe^{3+} + XO \rightarrow \mathbf{Fe^{3+}\text{-}XO\ (colored\ complex)}$$

RESULTS

1 Validation of the assay method according to ICH criteria

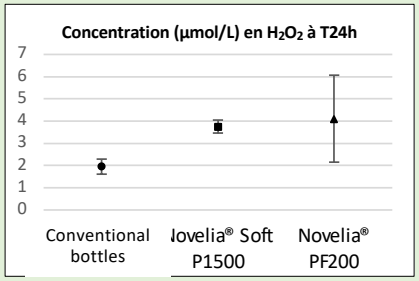
Linearity range	0 – 60 µmol/L
Correlation coefficient	0,9997
Repeatability	CV < 2%
Intermediate precision	CV < 5%
Accuracy	100,05 ± 1.96%

Limit of detection (LOD)	0,32 µmol/L
Limit of quantification (LOQ)	0,97 µmol/L



2 H_2O_2 measurement (µmol/L) at T0 and T24h

Batches	H_2O_2 concentration at T0	H_2O_2 concentration at T24h
Conventional vials	< LQ	1,95 ± 0,34
Novelia® Soft PF1500	< LQ	3,75 ± 0,29
Novelia® PF200	< LD	4,11 ± 1,96



DISCUSSION AND CONCLUSION

✓ **T0 :** H_2O_2 quantities are negligible → removal of overwrapping possible for sterility testing carried out **immediately** after decontamination.

× **T24h :** absorption and release of the decontaminant → without threshold value, impact of H_2O_2 passage on sterility control will have to be assessed in order to decide on the decontamination of vials without overwrapping.

1. Thermo Scientific Pierce quantitative peroxide assay kit . https://www.thermofisher.com/order/catalog/product/23280