

## CHITOSAN INTELLIGENT FILM: A FAST DETECTION OF H<sub>2</sub>S

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An intelligent sensor was developed combining chitosan as biopolymer and colorimetric indicator hydrogen sulfide gas, (H<sub>2</sub>S). Chitosan is very abundant natural biopolymer, which is discarded at tons by the fishing industry. Chitosan filmogenic solutions (3.0% w/w) were obtained and the H<sub>2</sub>S indicator was incorporated, at 2.0% (w/w).

Hydrogen sulfide (H<sub>2</sub>S) is a flammable, colorless gas with a sweetish taste and characteristic odor of rotten eggs that can be poisonous at high concentrations. People usually can smell H<sub>2</sub>S at low concentrations in air, ranging from 0.0005 to 0.3 parts per million (ppm) however, at high concentrations, a person might lose their ability to smell it. This can make H<sub>2</sub>S very dangerous [1].

This gas can be generated in petroleum refineries, natural gas plants, petrochemical plants, coke oven plants, kraft paper mills, viscose rayon manufacturing plants, sulfur production facilities, iron smelters, food processing plants, and tanneries [2]. In food industry products as canned vegetables (palm hearts, mushrooms), foods minimally processed, foods consumed *in natura* as honey and vacuum packaged meat are exposed to the possibility of contamination before, during or after processing, (in anaerobic ambient microorganisms, i.e., *Clostridium sp.* produces as one of its metabolites the H<sub>2</sub>S).

The aim of this study was to develop biodegradable and intelligent sensor system based on chitosan film containing H<sub>2</sub>S colorimetric indicator.

Parameters of colour were measured using a colorimeter (Konica Minolta Chroma Meter CR-400), the results were analyzed with STATISTICA 5.0. The distribution of the indicator in chitosan matrix was evaluated with a Scanning Electron Microscopy Energy Dispersive X-ray Spectroscopy (SEM/EDS).

Colour variation in intelligent sensor system was observed submitting the chitosan sensor at under

different exposition time to H<sub>2</sub>S gas. The incorporation of indicators produced a colorimetric signal as a rapid response to the presence of H<sub>2</sub>S. Figure 1 illustrated the colour variation under different H<sub>2</sub>S exposition time.

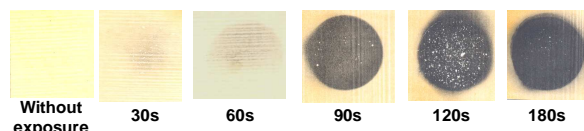


Figure 1 – Card paper sensor under different times of H<sub>2</sub>S exposure.

Figure 2 illustrated the L\* parameter value in function of H<sub>2</sub>S exposition time.

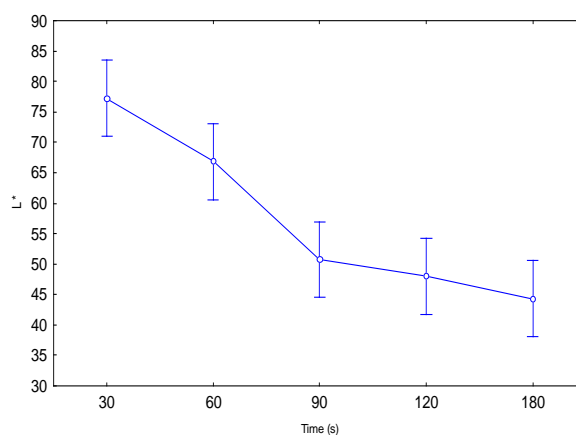


Figure 2 – L\* parameter value vs exposure time.

The indicator was uniformly distributed through chitosan matrix as showed by SEM – EDS micro images.

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### References

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