

CHROMOGENIC INDICATORS FOR TEMPERATURE CONTROL IN THE FOOD COLD CHAIN

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Abstract

Temperature has critical impact on food quality and safety within food supply chain, therefore, food should be kept at the defined storage temperature range. Final consumer should be assured when buying food about actual temperature and thermal history of the selected food product and this is why it should be indicated on the packed or prepacked item.

The chromogenic temperature indicator for cold food chain was prepared from suitable active material packed in the properly structured holder. When temperature rises above the defined storage temperature, the active material changes colour and physical state (solid/liquid). Simultaneously, special packaging structure enables irreversible recording of the time exposed to the elevated temperature. The active material was made of thermochromic composite, consisting of dye, developer and solvent. It changes colour at its melting point, being coloured below and discoloured above it. The temperature is called activation temperature of the composite. Its value was adjusted by appropriate solvent and additives used for preparation of the composite, to reach the desired value. The temperature dependent colour change of the composite was determined by colorimetric measurements. The conditions for best observation of the change by naked eye were also examined. The structure of the active material's holder was analyzed for best displaying of the time spend at high temperature (above the activation temperature).

Functioning of the indicator was examined with growth of pathogens as a function of migration of the active material at temperature above the required storage temperature of the food. It was found out that the described chromogenic temperature indicator for cold food chain shows the thermal history of food storage by colour-, phase- and migration changes of the active composite material and consequently would be reliable as indicator in cold food chain to indicate temperature abuse and would disclose potential growth of psychrophilic microorganisms.

Key words: *Chromogenic temperature indicator, Food cold chain, Food quality and safety, Temperature control, Thermal history.*