

---

# Toxicity and carcinogenicity of potassium bromate – a new chitosan silver nanocomposite-carmoisine eliminating risk device in healthcare innovation

---

Moyofoluwa O. Ajayi, Caroline A. Akinremi, Temilade F. Akinhanmi and Sheriff Adewuyi\*

Department of Chemistry, College of Physical Sciences, Federal University of Agriculture,  
Abeokuta, Ogun State, Nigeria

\*Corresponding Author: kafcheff@yahoo.co.uk alt Email: adewuyis@funaab.edu.ng

The International Agency for Research on Cancer (IARC) labeled potassium bromate ( $\text{KBrO}_3$ ) used as chemical additive in flour to improve the action of the gluten, as a category 2B carcinogen. Also, due to its toxicity to the kidneys and oxidative damage to the mammalian DNA, it is banned worldwide except in U.S. and Japan. Unfortunately for consumers of bromated flour, the actual long term health impact cannot be specifically determined. However, it is easy to eliminate the risk following the paradigm “detect it yourself”. To achieve this goal, there is need for a fast, reliable and on-site device which does not require sophisticated and expensive equipment. Based on this, the existing analytical techniques for bromate analysis are limited in their applications, besides, they cannot be handled by non professional. In view of this, a new highly selective indicator, chitosan-silver carmoisine (CTS-AgCam) for detection of bromate in baked products was developed (Fig. 1). The detection is based on the oxidation of carmoisine by  $\text{KBrO}_3$  catalysed by silver nanoparticles (AgNPs). The CTS-AgNPs was prepared by the reaction of silver nitrate with sodium hydroxide stabilized in chitosan. Qualitative analysis were carried out on bread samples using the prepared indicator and quantitatively monitored by UV-vis spectrophotometer. Upon the addition of CTS-AgCam, persistence of the initial pink colour of this indicator revealed the absence of  $\text{KBrO}_3$  in the bread sample. However, the colour disappearance vividly indicated the presence of  $\text{KBrO}_3$  (Fig. 1). The detection limit of the indicator was  $1 \mu\text{g/g}$ . The result showed that this indicator device can be used as simple and efficient on-site detection of bromate thereby, affords elimination of health risk posed by consumption of baked products and therefore serve as a preventive healthcare innovation.

## Keywords

Carcinogen, Potassium bromate, chitosan, silver, nanocomposite, healthcare



Fig. 1: Chitosan-silver Nanocomposite carmoisine healthcare devise