



EXPERTISE



QUALITY

**ETHYLENE OXIDE & 2-CHLOROETHANOL
RESIDUE TESTING**

MAKING THE DIFFERENCE

**ENSURING QUALITY BY SAFEGUARDING FOOD PRODUCTS
FROM ETHYLENE OXIDE CONTAMINATION**

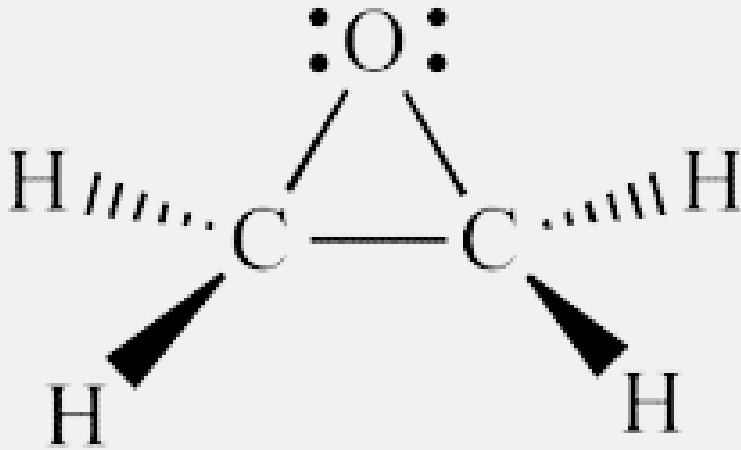


CONTROL



WHAT IS ETHYLENE OXIDE?

Ethylene oxide (EO) is a colorless, flammable, highly reactive, toxic gaseous organic compound with a characteristic ethereal odor. It is also known as Oxirane, Epoxyethane, Oxacyclopropane, Diethylene oxide, EO, ETO and EtO with the formula C₂H₄O. It is a man-made chemical that is primarily used to make ethylene glycol (i.e., chemical used to make antifreeze and polyester). Ethylene oxide is produced from a few natural sources like water-logged soil, manure, and sewage sludge, but emissions are expected to be negligible.



Ethylene oxide can destroy most viruses, bacteria and fungus including bacterial spores. Due to this property, it is used to sterilize food items, spices, medical and pharmaceutical products.

Ethylene oxide sterilization is the best way to sterilize food items when compared with the steam sterilization, as steam sterilization can cause the natural color pigment to fade, reduction of nutrients and increase in the moisture content, which creates favorable conditions for growth of bacteria and fungus and produce toxic substances like mycotoxins.

In 2017, due to microbial contamination with *Salmonella* Spp., European Union (EU) has amended the regulation (EC) No 669/2009, which led to the increase in number of rejections. To avoid this, food and agricultural commodities exported from India were sterilized with ethylene oxide to inhibit the growth of *Salmonella* during storage and transportation. After ethylene oxide sterilization, the samples should be aerated for 24 hours to remove the residue which is left during the process. If the aeration is not validated properly there is a chance of presence of ethylene oxide residue in samples which can lead to the formation of another toxic non-volatile compound, 2-Chloroethanol (Other names: 2-Chloroethan-1-ol; Ethylene chlorohydrin; Glycol chlorohydrin; Abbreviations: 2-CE, 2CE, CE, ECH) by the reaction of ethylene oxide and the chlorine from the natural inorganic chloride content present in the food content.

IMPORTANCE OF ETHYLENE OXIDE RESIDUAL TESTING

Exposure to ethylene oxide causes major irritation to eyes, skin, and the respiratory tract. It induces nausea, vomiting and central nerve system depression.

Ethylene oxide is mutagenic to humans and chronic exposure is associated with an increased risk of cancer.

2-Chloroethanol is more toxic to kidneys, causing damage to heart, liver and kidneys and respiratory failure. It could be fatal in some cases.

Due to the carcinogenic and mutagenic concerns, EU has proposed separate Maximum residual limits (MRLs) for ethylene oxide and its primary metabolite 2-chloroethanol in different food and agriculture commodity ranging from 0.02 to 0.1 mg/kg (Commission Regulation (EU) 2015/868).

In recent times, USA and Canada have introduced common MRLs for ethylene oxide and 2-Chloroethanol in spices, dried herbs, dried vegetables and oily seeds (including sesame seeds) at 7 and 940 mg/kg, respectively.

From September 2020 till February 2021, there have been more than 500 recalls of food products, due to the contamination by ethylene oxide found to be above the EU MRLs.



The SGS method involves, the determination of 2-CE as a marker of ethylene oxide by using gas chromatograph tandem mass spectrometer (GC-MS/MS). This method has been validated according to the SANTE/12682/2019 guidelines. The result of ethylene oxide will be reported as the sum of ethylene oxide and 2-chloroethanol at or above the limit of quantification (LOQ) of 0.01 mg/kg. The accuracy of the method has been demonstrated in the proficiency testing for sesame seeds, conducted by the EU Referral lab (EURL).

BENEFITS

We provide precise and extensive testing services so that you can ensure the safety of your products and retain consumer trust in your brand. Using our global presence and expertise in worldwide markets, we can ensure your products are safe to market, reducing risk to all stakeholders involved in your global food chain.

ABOUT SGS

SGS is the world's leading testing, inspection and certification company. We are recognized as the global benchmark for quality and integrity. Our 89,000 employees operate a network of more than 2,600 offices and laboratories, working together to enable a better, safer and more interconnected world.

SGS provides a comprehensive suite of solutions to the food industry combining audits and certification, testing and analysis, inspection, training and technical services.

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WHEN YOU NEED TO BE SURE

