



## Centre of Forensic Sciences Investigators & Submitters Technical Information Sheets

### Lachrymator Analysis Information

#### Introduction

Lachrymators such as pepper spray, tear gas and mace are chemical substances that induce watering and involuntary closure of the eyes and may also cause coughing, and burning of the skin. In an aerosol dispenser, a lachrymator is usually dissolved in a solvent and compressed in a canister with a propellant (pressurized gas). When a lachrymator dispenser is activated, a stream of liquid containing the lachrymator is ejected.

#### Examination and Interpretation

Lachrymator examination involves chemical analysis of the contents from an aerosol dispenser or the identification of lachrymator(s) from a stain on clothing or any other item.

The dispenser is evaluated by depressing the trigger to determine if it is operational. The aerosol dispenser may be inoperable if any part of it is damaged, or if the solvent or propellant used in the dispenser is spent. The contents of an aerosol dispenser are analysed using Gas Chromatography/Mass Spectrometry (GC/MS). The concentration of the lachrymator in an aerosol dispenser is not determined during analysis.

Items such as clothing or swabs that may contain a lachrymator are examined for staining. Most commercially available pepper sprays leave orange-brown stains however, some lachrymators are colourless and leave no visible spray pattern. The stains are cut out and extracted using a solvent and identified using GC/MS.

#### Glossary

##### *Operational Lachrymator Dispenser*

Any device capable of forcibly dispensing a lachrymator. Common lachrymators include pepper spray, tear gas (CS) and mace (CN). The solvent in the dispenser may be identified during analysis.

##### *Capsaicin (CAP) and Dihydrocapsaicin (DHC)*

Are lachrymator compounds found in pepper spray dispensers. The CAP and DHC in pepper spray typically come from oleoresin capsicum (OC). OC is an extract of hot peppers. Condiment hot-sauces such as "Tabasco" may also contain CAP and DHC.

##### *Chloroacetophenone (CN)*

The lachrymator commonly referred to as mace.

*Ortho-chlorobenzalmalononitrile (CS)*

The lachrymator commonly referred to as tear gas. CS may also be referred to as *ortho*-chlorobenzylidenemalononitrile.

*Gas Chromatography/Mass Spectrometry (GC/MS)*

A standard analytical technique that separates the components of a sample and allows for their identification.