

Detection and Quantitation of PBDEs by GC-EI-LRMS

Robby RENZ

November 13, 2018

1 Introduction

Gas chromatography (GC) is a separation technique that analyzes volatile compounds [1]. Consequently, this analysis can lead a lot of useful situations such as the determination of the purity of a compound or even detecting explosives [1]. In GC, the analyte is volatilized and carried through the column by the mobile phase, often called the carrier gas [2]. This carrier gas can either be He or H₂ [2]. These gases are often chosen as the carrier gas as they are chemically inert and would therefore not react with the analytes [1].

Polybrominated diphenyl ethers (PBDEs) are a class of halogenated compounds that are commonly used as flame retardants [3]. These compounds are an environmental health hazard as they have the potential to accumulate in the food chain [4]. In addition, BDE-47, a PBDE congener, has been found to cause neurotoxic effects in adults [4]. Commonly used detection techniques for PBDEs are high-resolution mass spectrometry and low-resolution mass spectrometry (LRMS) [3]. LRMS is commonly done with selected ion monitoring (SIM) [3]. SIM increases the selectivity of mass spectrometry for analytes and reduces its response to everything else [2].

The main objective of this experiment is to make a method that uses a SIM for quantitative analysis of PBDEs by GC-EI-LRMS.

2 Chemicals and their Hazards

BDE-47 full form: 2,2',4,4'-tetrabromodiphenyl ether; may be harmful if inhaled, swallowed, may cause skin and eye irritation.

PBB-77 full form: 3,3',4,4'-tetrabromobiphenyl; flammable, acute toxicity, hazardous to the aquatic environment, may cause skin irritation.

‘2-HCH also known as lindane; may cause acute toxicity, health hazard, hazardous to the aquatic environment.

References

- (1) Vitha, M. F., *Chromatography: Principles and Instrumentation*; Wiley: Hoboken, New Jersey, 2017.
- (2) Harris, D. C., *Quantitative chemical analysis*, 8th ed; W.H. Freeman and Co: New York, 2010.
- (3) Björklund, J.; Tollbäck, P.; Östman, C. *Journal of Mass Spectrometry* **2003**, *38*, 394–400.
- (4) Thomsen, C.; Småstuen Haug, L.; Leknes, H.; Lundanes, E.; Becher, G.; Lindström, G. *Chemosphere* **2002**, *46*, 641–648.