3.3 Analysis of Organotin in Fish (1) - GCMS

•Explanation

Organotins such as tributyltin (TBT) and triphenyltin (TPT) are widely used as antifouling paints for ships and fishing nets, which has led to seawater and marine life pollution problems.

Conventionally, such compounds are analyzed using GC-FPD, but here an analysis example for GCMS with superb qualitative accuracy will be introduced.

Though tripentyltin (TPeT) is often used as the internal standard substance, this is not the best selection because TBT, TPT and TPeT have different recovery rates. In this example, a deuterium label compound that makes full use of GCMS features was used as the internal standard substance.

The advantage of the deuterium label compound as standard substance is that it is materially identical to the target compound but does not exist in the sample.

•Pretreatment

Fig. 3.3.1 shows the methods of extraction from fish and seawater.

•Analytical Conditions

Instrument : GCMS-QP5000
Column : DB-1 0.32mm × 30m df = 0.25μm
Column temperature : 50˚C(2min)-140˚C(20˚C/min) -220˚C(7˚C/min)-310˚C (15˚C/min)(6/min)
Injection inlet temperature : 280˚C
Interface temperature : 300˚C
Carrier gas : He(40kPa)
Injection method : Spitless(2min)

Component	Selected ions (m/z)
d27-TBT	295, 293, 316
TBT	277, 275, 291
Tetra-BT	291, 289
TPeT	303. 305
d15-TPT	366, 364
TPT	351, 349

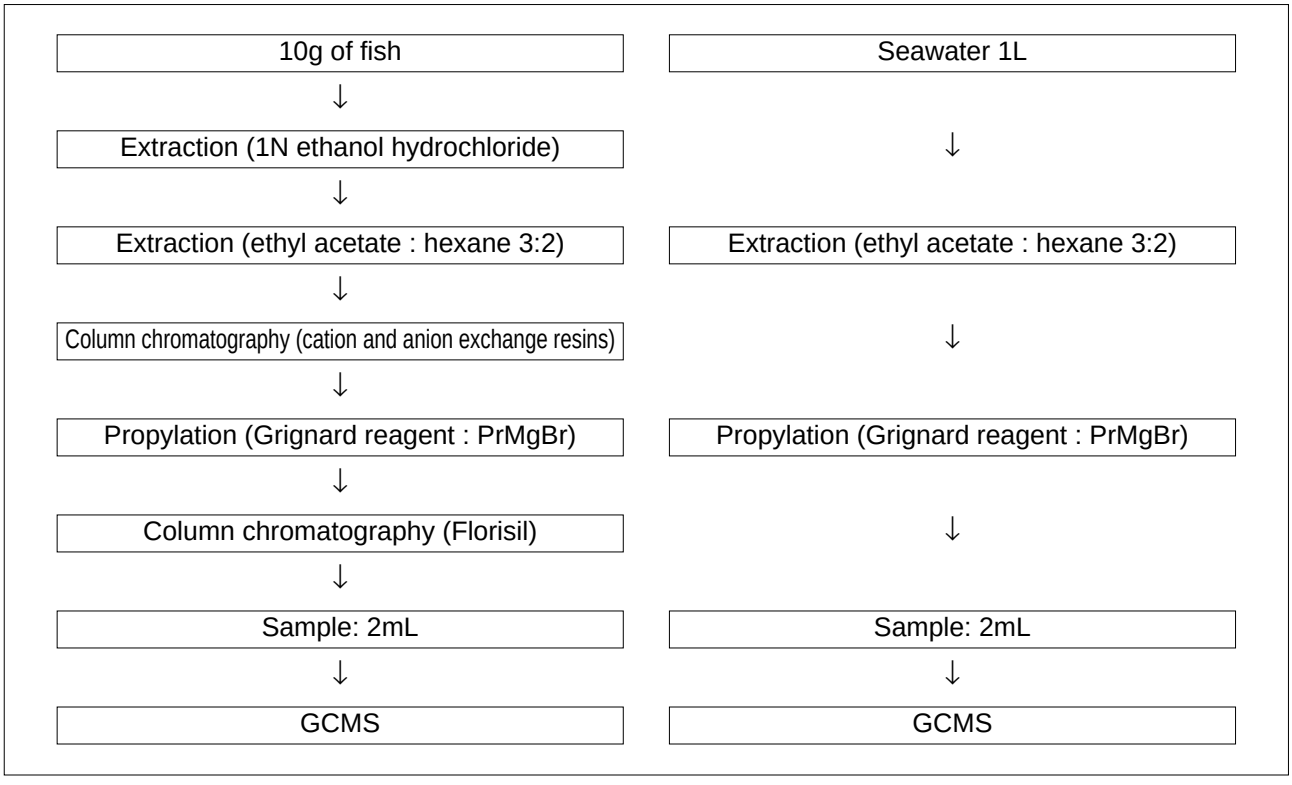

Fig. 3.3.1 Extraction methods for organotin in fish and seawater

3.3 Analysis of Organotin in Fish (2) - GCMS

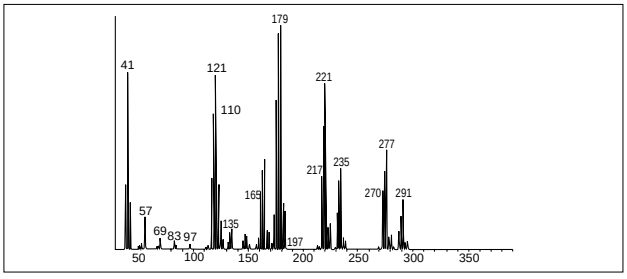

Fig. 3.3.2 TBT mass spectrum

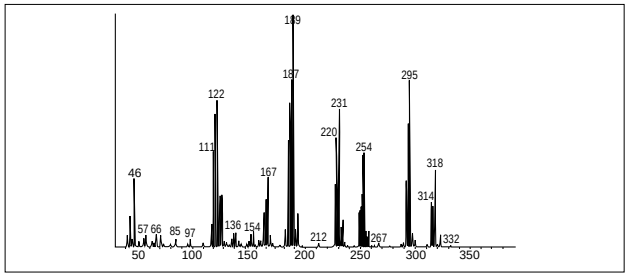

Fig. 3.3.3 d27-TBT mass spectrum

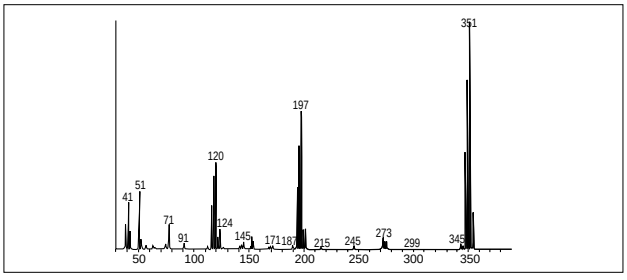

Fig. 3.3.4 TPT mass spectrum

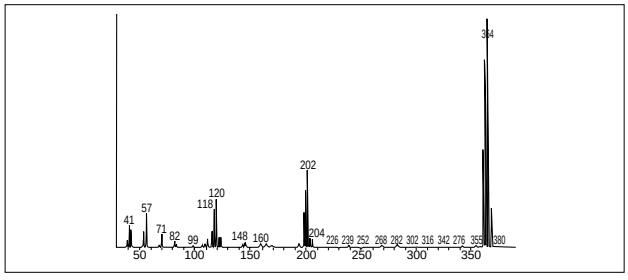

Fig. 3.3.5 d15-TPT mass spectrum

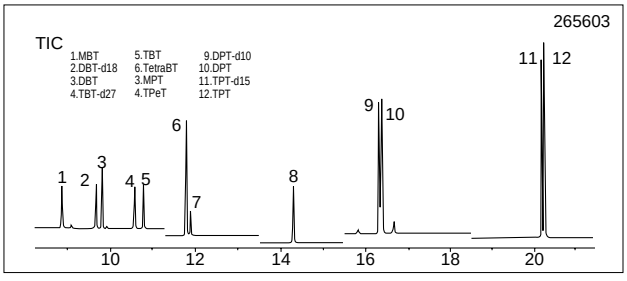

Fig. 3.3.6 SIM chromatogram of standard sample

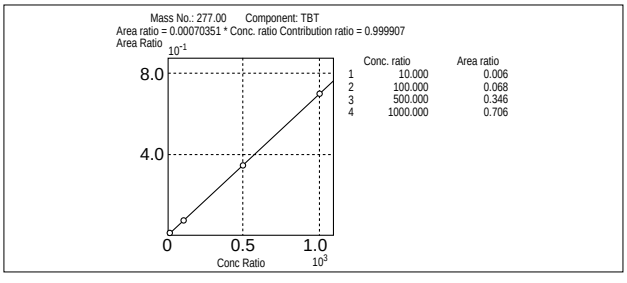

Fig. 3.3.7 TBT calibration curve (10 to 1000ppb)

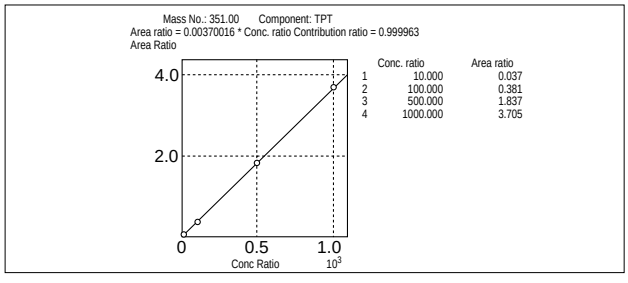

Fig. 3.3.8 TPT calibration curve (10 to 1000ppb)

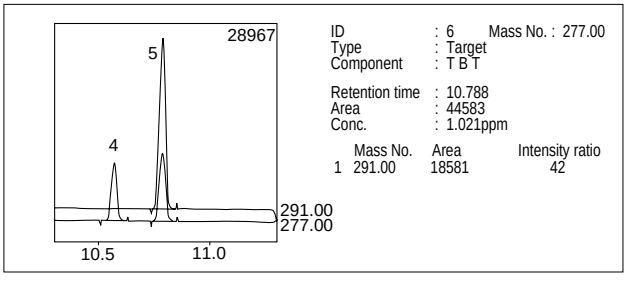

Fig. 3.3.9 SIM chromatogram of TBT in fish (sea bass)

Component	Sea bream (μg/g)	Sea bass (μg/g)	K port (μg/L)	W port (μg/L)
TBT	0.436	0.782	0.173	0.068
TPT	0.014	0.010	0.019	0.078

Chart 3.3.10 Quantitative results for tin in fish and seawater