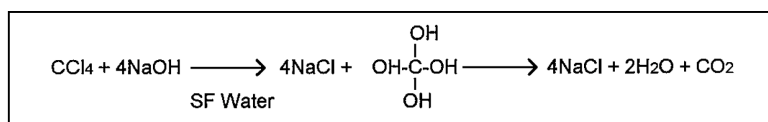


## Decomposition of Carbon Tetrachloride (CCl<sub>4</sub>) with Supercritical Water

Carbon tetrachloride can be decomposed to sodium chloride, water and carbon dioxide in supercritical water containing sodium hydroxide following the reaction path shown in Fig. 1. Fig. 2 shows the flow diagram of this reaction system. Carbon tetrachloride and sodium hydroxide aqueous solutions are pumped respectively into reaction coil for decomposition, and then the reaction product is collected in a glass tube placed downstream of the back-pressure regulator (5) as shown in Fig. 2. Decomposition efficiency at each reaction temperature was calculated by measuring the amount of sodium chloride (chloride ion) by ion-chromatography (see Fig. 3) and the amount of remaining carbon tetrachloride by gas chromatography (see Fig. 4), respectively.



*Keywords: Supercritical water;  
Carbon tetrachloride;  
Decomposition*

Fig. 1 Decomposition of CCl<sub>4</sub> with supercritical water

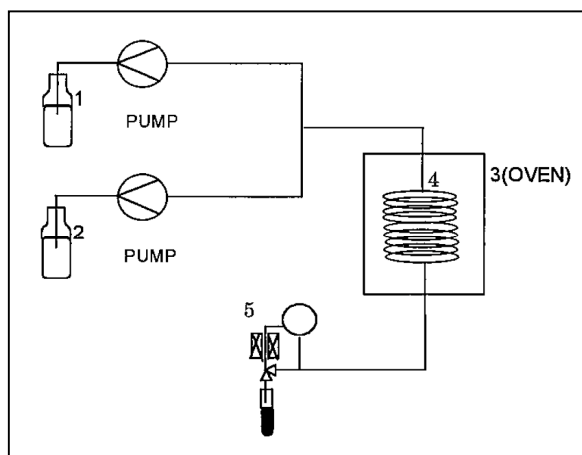


Fig. 2 Flow diagram

### Conditions

Reagent 1: 5 M NaOH 2.0 mL/min  
 Sample reagent 2: CCl<sub>4</sub> 0.1 mL/min  
 Reaction temperature: 380, 350, 300, 250, 200, 40°C  
 Reaction coil 4: Hastelloy-C276 tube  
 (0.5 mm I.D. x 5 m Length)  
 = 981  $\mu\text{L}$   
 Back pressure: 30 MPa

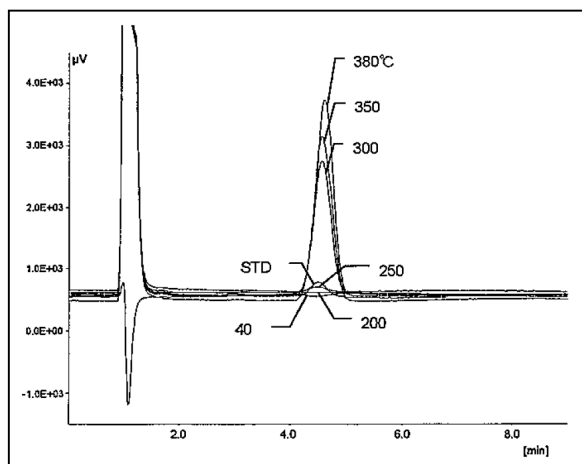
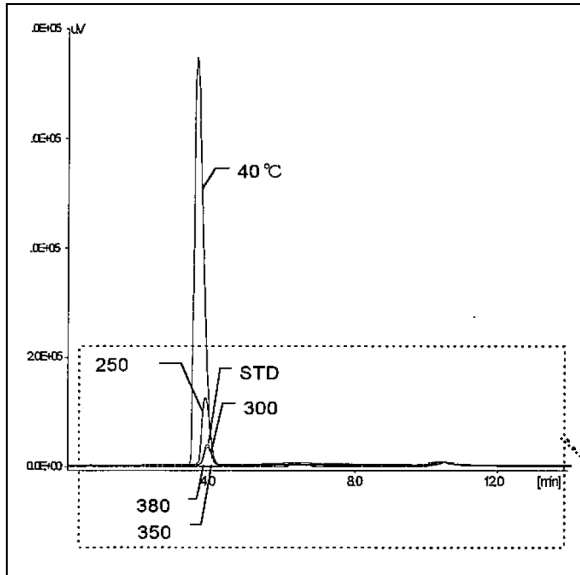


Fig. 3 Chromatogram of Cl<sup>-</sup> ion

### Conditions

Detector: Shodex CD-5  
 Column: Shodex IC I-524A  
 Shodex IC I-524AP  
 Eluent: 1.5 mM Phthalic acid adjusted  
 pH 3.0 with Tris.  
 Flow rate: 1.2 mL/min  
 Column temperature: 40°C  
 Injection volume: 5  $\mu\text{L}$   
 Sample: STD; NaCl 1.3 ppm  
 UNK; x 500



**Conditions**

GC: GC-5890 (HP)  
 Detector: FID 10<sup>3</sup>  
 Column: Cemipak NOT  
 Sus Col.6ft x 2 mm I.D.  
 Mobile phase: N2 at 3 kPa  
 Column temperature: 60°C  
 Injection volume: 5 μL  
 Sample: 5 mL/mL each of effluent at  
 380, 350, 300 and 40°C

Fig. 4 Chromatogram of CCl<sub>4</sub>

