

TRACE ANALYSIS OF INDOOR AIR USING GC/MS

Introduction

The health effects of long-term exposure to low concentrations of toxins has become a national issue. Since most of the general population spend long periods indoors, some with ill effects, requests for environmental

analysis of indoor air at the ppb level are on the rise. The Chromapack CP4010 column trap (Figure 1) is widely used to concentrate the trace components present in air for analysis.

Experiment

Introduced here is the Chromapack CP4010 injector method utilizing the QP-5000 GC/MS System, as applied to the analysis of trace levels of toxic substances in indoor air.

introduced to the GC/MS for analysis. At the same time, after injection by the CP4010, the flowline is back-flushed (standby back-flush stage), for cleaning of the system (Figure 2).

The CP4010 is a thermal desorption cold-trap injector (TCT). Its functions are described as follows.

Sampling and collecting of the gas occurs as a fixed volume of the indoor gas and is drawn in via the suction pump. The collection absorbent Tenax is widely used, however, to enable collection of large amounts of gas, three types of stationary phases of different absorption power are used in the three layers.

The trap is cooled prior to use to a low temperature (-100° to -170°C, pre-cool stage). After sample concentration, the collecting trap is heated to drive out the collected sample components. The injected gas components are

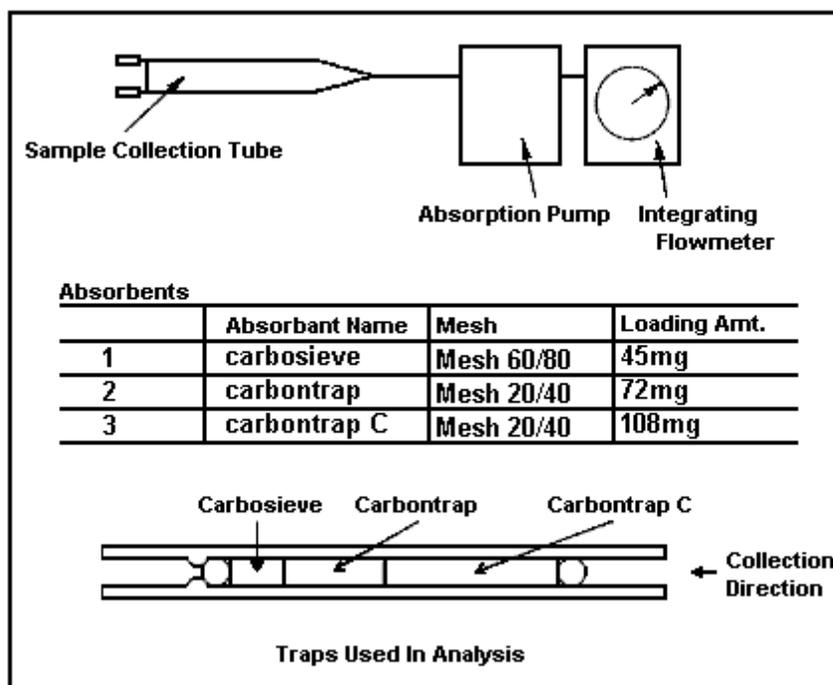


Figure 1 - Sampling

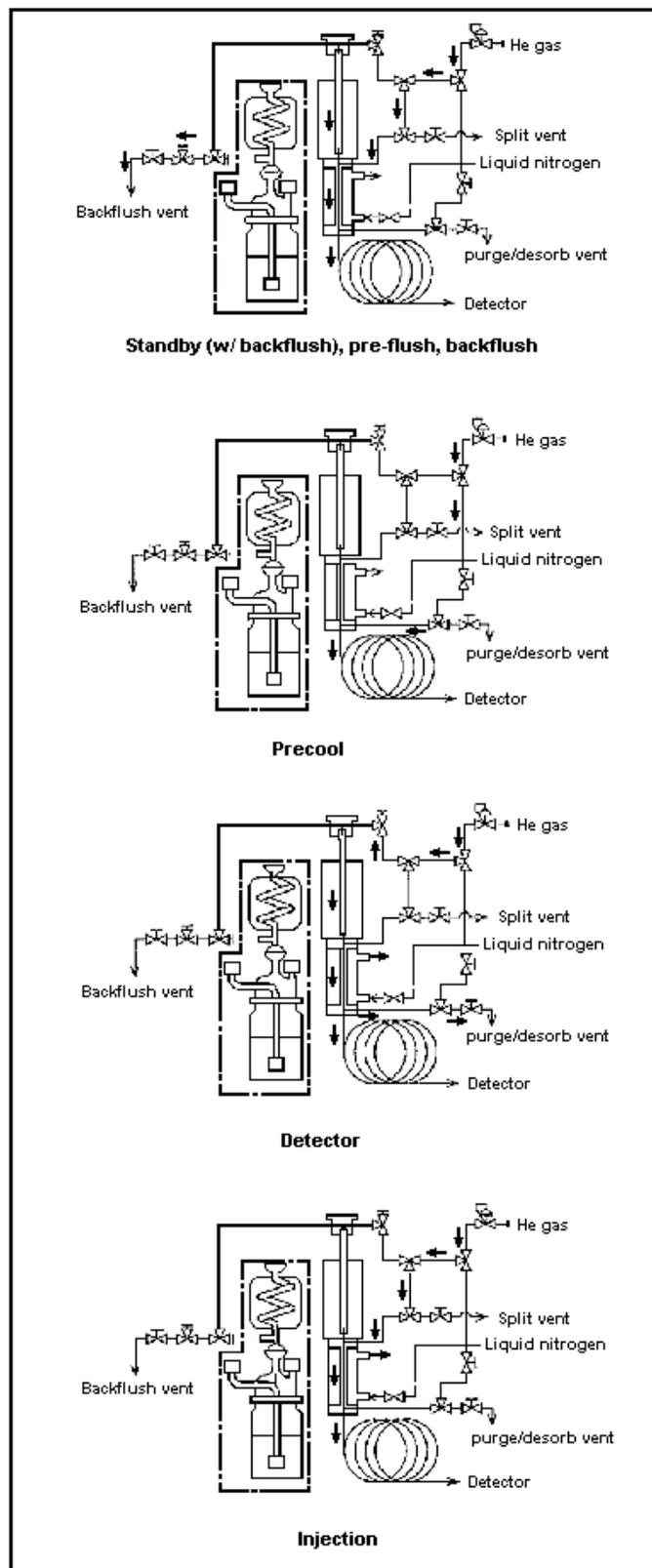


Figure 2 – CP4010 Flow Diagram

GCMS QP-5000	: 151L/sec Turbo Molecular Pump
Column	: DB624 60mX0.32mm I.D. df=1.8µm
Column temp.	: 150°C (2min)–[5°C/min]–250°C (5min)
Carrier gas	: He (75kPa)
I/F Temp.	: 250°C
Ionization Mode	: EI(70eV)
Mass Range	: 35~350
Scan Interval	: 0.5sec
Detector Gain	: 1.4kV

CP4010

PrecoolTemp.	: -150°C
Precool Time	: 5min
Preflush Temp	: 50°C
Preflush Time	: 1min
Desorption Temp.	: 300°C
Desorption Time	: 10min
Injection Temp	: 300°C
Rod Temp.	: 200°C

Table 1 – Analytical Conditions

Results

This system was used to perform qualitative and quantitative analysis of trace components in indoor air. The analytical conditions are listed in Table 1. Figure 3

shows the chromatogram in which about 100 unknown components are identified. The qualitative identification of the main peaks is shown in Table 1.

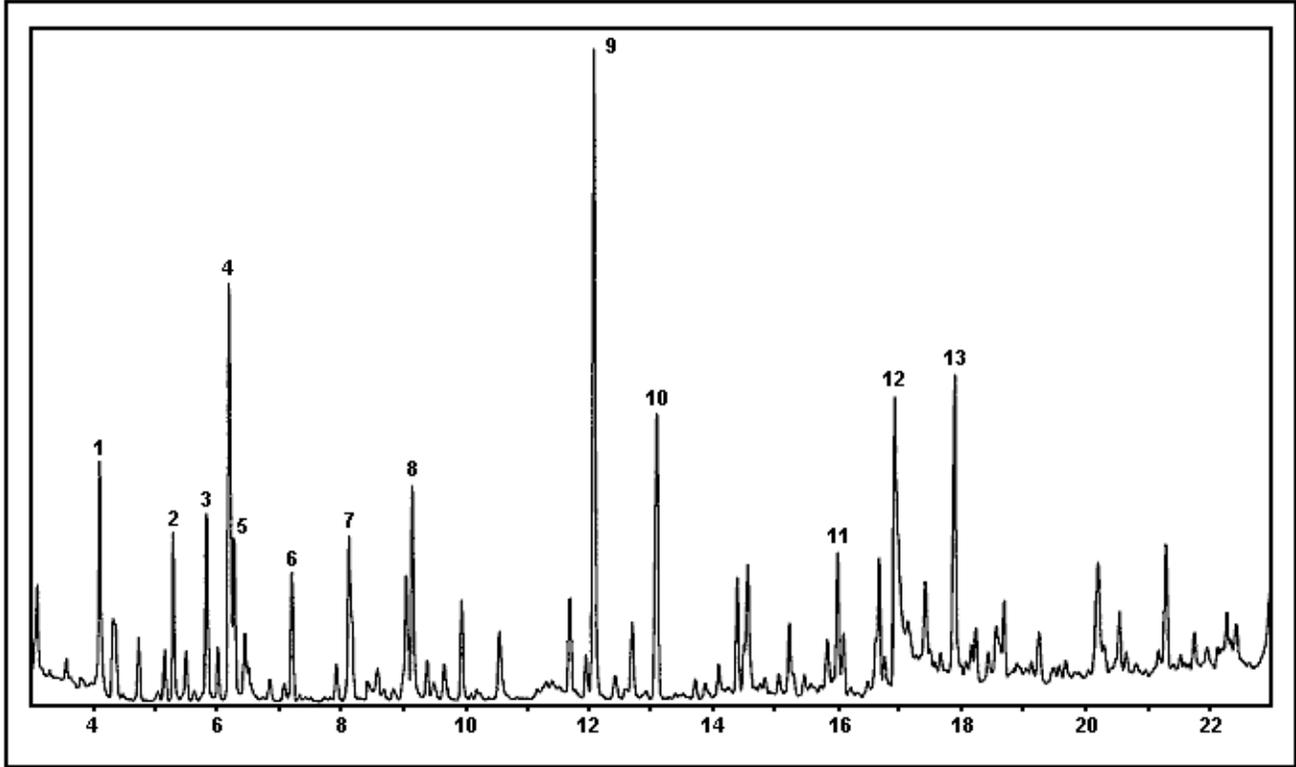


Figure 3 – Total Ion Chromatogram in Room Air

1	Acetaldehyde
2	Ethanol
3	Acetone
4	Acetonitrile
5	Acetic acid methyl ester
6	Hexane
7	2-Butanone
8	Acetic acid
9	Toluene : 34ppb
10	Hexanal
11	Cyclohexanone
12	2-Propanol
13	Limonene

Table 2 – Compounds in Air