BIO-OXYGEN
AUSTRALIA PTY. LIMITED
36 Bennett Place, Castle Hill NSW 2154, Australia
Phone: (61) 2 9899 7059 ABN: 73 003 380 185 Fax: (61) 2 98993161
Email: bio-oxy@bigpond.net.au Web: www.bio-oxygen.com.au

CHEMICAL REPORTS

Chemical Formula of Acenaphthalene ($C_{12}H_8$)

To oxidise 1 molecule of Acenaphthalene you need 1 Oxygen Cluster composed of 8 oxygen molecules ($8xO_2$)

THE UNIVERSITY OF NEWCASTLE
Department of Chemical Engineering
CALLAGHAN NSW 2308 AUSTRALIA
15th September 2012

After oxidation, the end product will be 12 molecules of Carbon Dioxide ($12xCO_2$) and 4 molecules of Water ($4xH_2O$)

Some common Air Pollutants oxidisable by the Bio-Oxygen Process:

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
1	Acenaphthalene	$C_{12}H_8 + 8O_2 \Rightarrow 12CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
2	Acetaldehyde	$CH_3CHO + 2½O_2 \Rightarrow 2CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
3	Acetone	$CH_3COCH_3 + 4O_2 \Rightarrow 3CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
4	Acetonitrile	$CH_3CN + 3¾O_2 \Rightarrow 2CO_2 + 1½H_2O + NO_2$	CO_2, H_2O, NO_2	< 15 sec
5	Acrolein	$CH_2CHCHO + 3½O_2 \Rightarrow 3CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
	Acrylic Resin:			
6	Acrylic acid	$CH_2CHCOOH + 3O_2 \Rightarrow 3CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
7	Methacrylic acid	$CH_3CCH_3COOH + 4¾O_2 \Rightarrow 4CO_2 + 3½H_2O$	CO_2, H_2O	< 5 sec
8	Ethyl acrylate	$CH_2CHCOOC_2H_5 + 6O_2 \Rightarrow 5CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
9	Methyl acrylate	$CH_2CHCOOCH_3 + 4½O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
10	Alcohols #	$ROH + excess\ O_2 \Rightarrow xCO_2 + yH_2O$	CO_2, H_2O	< 5 sec
11	Allyl mercaptan	$CH_2CHCH_2SH + 5½O_2 \Rightarrow 3CO_2 + SO_2 + 3H_2O$	CO_2, H_2O, SO_2	< 10 sec
12	Ammonia	$NH_3 + 1¾O_2 \Rightarrow NO_2 + 1½H_2O$	NO_2, H_2O	< 10 sec
13	Ammonium Hydroxide	$NH_4OH + 1¾O_2 \Rightarrow NO_2 + 2½H_2O$	NO_2, H_2O	< 10 sec
14	Amyl mercaptan	$C_5H_{11}SH + 9O_2 \Rightarrow 5CO_2 + SO_2 + 6H_2O$	CO_2, H_2O, SO_2	< 10 sec
15	Benzene	$C_6H_6 + 7½O_2 \Rightarrow 6CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
16	Benzoic Acid	$C_6H_5COOH + 10½O_2 \Rightarrow 7CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
18	Benzoyl Alcohol	$C_6H_5CH_2OH + 9O_2 \Rightarrow 7CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
19	Benzyl mercaptan	$C_6H_5CH_2SH + 10O_2 \Rightarrow 7CO_2 + SO_2 + 4H_2O$	CO_2, H_2O, SO_2	< 10 sec
20	1,1'- Biphenyl	$C_{12}H_{10} + 14½O_2 \Rightarrow 12CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
21	o-Biphenylene Methane	$C_{13}H_{12} + 16O_2 \Rightarrow 13CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
22	Bromodichloro Methane	$CHBrCl_2 + 1¼O_2 \Rightarrow CO_2 + ½H_2O + ½\ Br_2 + Cl_2$	CO_2, H_2O, Br_2, Cl_2	< 15 sec
23	Butanal	$CH_3CH_2CH_2CHO + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
24	Butane	$C_4H_{10} + 6½O_2 \Rightarrow 4CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
25	2- Butanol	$CH_3CHOHC_2H_5 + 6O_2 \Rightarrow 4CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
26	2- Butenal	$CH_3CHCHCHO + 5O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
27	Butoxyl	$C_7H_{14}O_{3\,+} + 9O_2 \Rightarrow 7CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
28	Butyl Acetate	$CH_3COO(CH_2)\,_2C_2H_5 + 7O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
29	n-Butyl alcohol	$C_4H_9OH + 6O_2 \Rightarrow 4CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
30	n-Butylaldehyde	$CH_3\,(CH_2)\,_2CHO + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
31	iso-Butyraldehyde	$(CH_3)_2CHCHO + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
32	n-Butyric Acid	$CH_3(CH_2)_2COOH + 5O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
33	Butylamine	$C_4H_9NH_2 + 7¾O_2 \Rightarrow 2CO_2 + ½NO_2 + 2¾H_2O$	CO_2, H_2O, NO_2	< 10 sec
34	n- Butyl Mercaptan (1-Butanethiol)	$C_4H_9SH + 7½O_2 \Rightarrow 4CO_2 + 5H_2O + SO_2$	CO_2, H_2O, SO_2	< 10 sec
35	Carbohydrates	$CnHxOy$ + excess $O_2 \Rightarrow nCO_2 + {}^x/_2H_2O$	CO_2, H_2O	< 5 sec
36	Carbon Dioxide	CO_2	No Reaction	
37	Carbon Disulphide	$CS_2 + 3O_2 \Rightarrow CO_2 + 2SO_2$	CO_2, SO_2	< 10 sec
38	Carbon Monoxide	$CO + ½O_2 \Rightarrow CO_2$	CO_2	< 2 sec
39	Carbon Tetrachloride	$CCl_4 + O_2 \Rightarrow CO_2 + 2Cl_2$	CO_2, Cl_2	< 15 sec
40	Carbonyl Sulphide	$COS + 1½O_2 \Rightarrow CO_2 + SO_2$	CO_2, SO_2	< 10 sec
41	4- Carboxy Benzaldehyde	$C_6H_4COOHCHO + 8O_2 \Rightarrow 8CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
42	Chloramine	$NH_2Cl + 1½O_2 \Rightarrow NO_2 + H_2O + ½Cl_2$	NO_2, H_2O, Cl_2	< 5 sec
43	Chlorine	Cl_2	No Reaction	
44	Chlorethane	$CH_3CH_2Cl + 3¼O_2 \Rightarrow 2CO_2 + 2½H_2O + ½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
45	Chloroform	$CHCl_3 + 1¼O_2 \Rightarrow CO_2 + ½H_2O + 1½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
46	Copper-8-Oxy Quinolinolate	$C_{18}H_{14}N_2O_2Cu + 22O_2 \Rightarrow 18CO_2 + 7H_2O + 2NO_2 + CuO$	CO_2, H_2O, NO_2, CuO	< 10 sec
47	Copper Naphthenate	$(C_{10}H_7CH_2COO)_2Cu + 27O_2 \Rightarrow 24CO_2 + 9H_2O + CuO$	CO_2, H_2O, CuO	< 10 sec
48	m-Cresol	$CH_3C_6H_4OH + 8½O_2 \Rightarrow 7CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
49	Crotonaldehyde	$CH_3CHCHCHO + 5O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
50	Crotyl mercaptan	$CH_3(CH)_2CH_2SH + 7O_2 \Rightarrow 4CO_2 + SO_2 + 4H_2O$	CO_2, H_2O, SO_2	< 15 sec
51	Cyclohexane	$C_6H_{12} + 9O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
52	Cyclopentasiloxane	$C_{10}H_{30}Si_5O_5 + 20O_2 \Rightarrow 10CO_2 + 15H_2O + 5SiO_2$	CO_2, H_2O, SiO_2	< 15 sec
53	Cyclotetrasiloxane	$C_8H_{24}Si_4O_4 + 16O_2 \Rightarrow 8CO_2 + 12H_2O + 4SiO_2$	CO_2, H_2O, SiO_2	< 15 sec
54	Dibenzofuran	$C_{12}H_8O + 7½O_2 \Rightarrow 6CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
55	Dibutylamine	$(C_4H_9)_2NH + 13¾O_2 \Rightarrow 8CO_2 + NO_2 + 9½H_2O$	CO_2, H_2O, NO_2	< 15 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
56	1,2- Dichlorobenzene	$C_6H_4Cl_2 + 7O_2 \Rightarrow 6CO_2 + 2H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
57	1,3- Dichlorobenzene	$C_6H_4Cl_2 + 7O_2 \Rightarrow 6CO_2 + 2H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
58	1,4- Dichlorobenzene	$C_6H_4Cl_2 + 7O_2 \Rightarrow 6CO_2 + 2H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
59	1,1- Dichlorethane	$CH_3CHCl_2 + 3O_2 \Rightarrow 2CO_2 + 2H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
60	1,2- Dichlorethane	$CH_2ClCH_2Cl + 3O_2 \Rightarrow 2CO_2 + 2H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
61	1,1- Dichlorethene	$CH_2CCl_2 + 2½O_2 \Rightarrow 2CO_2 + H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
62	Dichloromethane	$CH_2Cl_2 + 1½O_2 \Rightarrow CO_2 + H_2O + Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
63	Diethylene oxide	$(CH_2CH_2)_2O + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
64	1,2- Dihydro Acenaphthalene	$C_{12}H_{10} + 8½O_2 \Rightarrow 12CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
65	2,3- Dihydro Indene	$C_6H_4C_3H_6 + 11½O_2 \Rightarrow 9CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
66	diiso-Propylamine	$(C_3H_7)_2NH + 10¾O_2 \Rightarrow 6CO_2 + NO_2 + 7½H_2O$	CO_2, H_2O, NO_2	< 15 sec
67	1,4- Dimethyl Naphthalene	$C_{12}H_{12} + 9O_2 \Rightarrow 12CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
68	2,7- Dimethyl Naphthalene	$C_{12}H_{12} + 9O_2 \Rightarrow 12CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
69	Dimethyl Phthalate Phlegmatiser	$C_6H_4(COOCH_3)_2 + 10½O_2 \Rightarrow 10CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
70	2,5 Dimethyl Pyrazine	$C_4N_2H_2(CH_3)_2 + 10O_2 \Rightarrow 6CO_2 + 4H_2O + 2NO_2$	CO_2, H_2O, NO_2	< 15 sec
71	Dimethyl disulfide	$(CH_3)_2S_2 + 5½O_2 \Rightarrow 2CO_2 + 2SO_2 + 3H_2O$	CO_2, H_2O, SO_2	< 15 sec
72	Dimethyl Sulfide	$(CH_3)_2S + 4½O_2 \Rightarrow 2CO_2 + 3H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
73	Dimethyl Disulfide	$CH_3SSCH_3 + 5½O_2 \Rightarrow 2CO_2 + 3H_2O + 2SO_2$	CO_2, H_2O, SO_2	< 15 sec
74	Diphenyl Sulfide	$(C_6H_5)_2S + 15½O_2 \Rightarrow 12CO_2 + SO_2 + 5H_2O$	CO_2, H_2O, SO_2	< 15 sec
	Dioxins:			
75	2,2- dithio-bis(2-Ethylhexyl glycolate)	$(C_5H_9C_2H_5CH_2CO_2CH_2OHS)_2 + 28½O_2 \Rightarrow 20CO_2 + 19H_2O + 2SO_2$	CO_2, H_2O, SO_2	< 15 sec
76	3,3’,4,4’,5,5’- Hexachlorobiphenyl	$(C_6H_3Cl_3)_2 + 13½O_2 \Rightarrow 12CO_2 + 3H_2O + 3Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
77	2,3,7,8- Tetrachlorodibenzo-p-dioxin	$Cl_2C_6H_2O_2C_6H_2Cl_2 + 12O_2 \Rightarrow 12CO_2 + 2H_2O + 2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
78	2,3,7,8- Tetrachlorodibenzofuran	$Cl_2C_6H_2OC_6H_2Cl_2 + 12½O_2 \Rightarrow 12CO_2 + 2H_2O + 2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
79	Esters #	$RCOOR' + \text{excess } O_2 \Rightarrow xCO_2 + yH_2O$	CO_2, H_2O	< 5 sec
80	1,2 Ethanediol	$HS(CH_2)_2SH + 4½O_2 \Rightarrow 2CO_2 + 3H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
81	Ethanoic Acid	$CH_3COOH + 2O_2 \Rightarrow 2CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
82	Ethane	$C_2H_6 + 3½O_2 \Rightarrow 2CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
83	Ethanol	$C_2H_5OH + 3O_2 \Rightarrow 2CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
84	Ethyl Acetate	$CH_3COOC_2H_5 + 5O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
85	Ethyl Acrylate	$CH_2CHCOOC_2H_5 + 6O_2 \Rightarrow 5CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
86	Ethyl Alcohol	$C_2H_5OH + 3O_2 \Rightarrow 2CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
87	Ethylamine	$C_2H_5NH_2 + 4¾O_2 \Rightarrow 2CO_2 + NO_2 + 3½H_2O$	CO_2, H_2O, NO_2	< 15 sec
88	Ethylbenzene	$C_6H_5C_2H_5 + 10½O_2 \Rightarrow 8CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
89	Ethylene	$C_2H_4 + 3O_2 \Rightarrow 2CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
90	Ethylene Oxide	$C_2H_4O + 2½O_2 \Rightarrow 2CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
91	Ethylene Glycol Mono Propyl Ether	$C_3H_7OC_2H_4OH + 7O_2 \Rightarrow 5CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
92	2- Ethyl hexanol	$C_5H_{10}C_2H_5CH_2OH + 12O_2 \Rightarrow 8CO_2 + 9H_2O$	CO_2, H_2O	< 5 sec
93	2- Ethylhexyl Thioglycolate	$C_4H_9C_2H_5C_2H_3CO_2CH_2SH + 15O_2 \Rightarrow 10CO_2 + 10H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
94	Ethyl Mercaptan (Ethanethiol)	$C_2H_5SH + 4½O_2 \Rightarrow 2CO_2 + 3H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
95	m- Ethyl Toluene	$C_6H_4CH_3C_2H_5 + 12O_2 \Rightarrow 9CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
96	o- Ethyl Toluene	$C_6H_4CH_3C_2H_5 + 12O_2 \Rightarrow 9CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
97	Formaldehyde	$HCO_3CH + O_2 \Rightarrow 2CO_2 + H_2O$	CO_2, H_2O	< 5 sec
98	Formaldehyde polymer	$(-(CxHyNz) + (HCHO)n-) + \text{excess } O_2 \Rightarrow \sim[(CO_2) + (H_2O) + (NO_2)]$	CO_2, H_2O, NO_2	< 15 sec
99	Furfural	$(OC_4H_3)CHO + 5O_2 \Rightarrow 5CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
100	Glycine	$C_2H_5NO_2 + 3¼O_2 \Rightarrow 2CO_2 + 2½H_2O + NO_2$	CO_2, H_2O, NO_2	< 15 sec
101	Heptanal	$CH_3(CH_2)_5CHO + 10O_2 \Rightarrow 7CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
102	Heptane	$CH_3(CH_2)_5CH_3 + 11O_2 \Rightarrow 7CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
103	n- Heptane	$CH_3(CH_2)_5CH_3 + 11O_2 \Rightarrow 7CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
104	n- Heptylaldehyde	$CH_3(CH_2)_5CHO + 10O_2 \Rightarrow 7CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
105	Hexachlorobenzene	$C_6Cl_6 + 6O_2 \Rightarrow 6CO_2 + 3Cl_2$	CO_2, Cl_2	< 15 sec
106	Hexachlorobutadiene	$CCl_2CClCClCCl_2 + 4O_2 \Rightarrow 4CO_2 + 3Cl_2$	CO_2, Cl_2	< 15 sec
107	Hexaldehyde	$CH_3(CH_2)_4CHO + 8½O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
108	Hexanal	$CH_3(CH_2)_4CHO + 8½O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
109	n- Hexanal	$CH_3(CH_2)_4CHO + 8½O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
110	Hexane	$CH_3(CH_2)_4CH_3 + 9½O_2 \Rightarrow 6CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
111	n- Hexane	$CH_3(CH_2)_4CH_3 + 9½O_2 \Rightarrow 6CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
112	Hydrocarbon Mixture	$CxHy + \text{excess } O_2 \Rightarrow xCO_2 + ½\, yH_2O$	CO_2, H_2O	< 5 sec
113	Hydrochloric Acid	$4HCl + O_2 \Rightarrow 2H_2O + 2Cl_2$	H_2O, Cl_2	< 15 sec
114	Hydrogen Sulphide	$H_2S + 1½O_2 \Rightarrow H_2O + SO_2$	H_2O, SO_2	< 15 sec
115	Hydroxyproline	$C_5H_9NO_3 + 6¾O_2 \Rightarrow 5CO_2 + 4½H_2O + NO_2$	CO_2, H_2O, NO_2	< 15 sec
116	Indene	$C_6H_4C_3H_4 + 11O_2 \Rightarrow 9CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
117	Indole	$C_6H_4(CH)_2NH + 10¾O_2 \Rightarrow 8CO_2 + NO_2 + 3½H_2O$	CO_2, H_2O, NO_2	< 15 sec
118	Methacrylaldehyde	$CH_2C(CH_3)CHO + 5O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
119	Methacrylic Acid	$CH_3CCH_3COOH + 4¾O_2 \Rightarrow 4CO_2 + 3½H_2O$	CO_2, H_2O	< 5 sec
120	Methane	$CH_4 + 2O_2 \Rightarrow CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
121	Methanol	$CH_3OH + 1½O_2 \Rightarrow CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
122	1- Methoxy -2- Propyl Acetate	$CH_3OCH_2CH(CH_3)OC(O)CH_3 + 9O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
123	Methyl Acrylate	$CH_2CHCOOCH_3 + 4½O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
124	Methyl Ethyl Ketone	$CH_3COC_2H_5 + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
125	Methyl Mercaptan (Methanethiol)	$CH_3SH + 3O_2 \Rightarrow CO_2 + 2H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
126	1- Methyl Naphthalene	$C_{10}H_7CH_3 + 13½O_2 \Rightarrow 11CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
127	2- Methyl Naphthalene	$C_{10}H_7CH_3 + 13½O_2 \Rightarrow 11CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
128	2- Methyl polyoxyalkylamine	$(\text{-}O(CH_3)_2CnHnNH\text{-}) + \text{excess } O_2 \Rightarrow \sim [(CO_2) + (H_2O) + (NO_2)]$	CO_2, H_2O, NO_2	< 15 sec
129	2- Methyl -1- Propene	$(CH_3)_2CCH_2 + 6O^2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
130	Methylamine	$CH_3NH_2 + 3¼O_2 \Rightarrow CO_2 + NO_2 + 2½H_2O$	CO_2, H_2O, NO_2	< 15 sec
131	2- Methylbutanal	$CH_3CH_2CH(CH_3)CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
132	3- Methylbutanal	$(CH_3)_2CHCH_2CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
133	2- Methylbutyraldehyde	$CH_3CH_2CH(CH_3)CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
134	Methylcyclohexane	$C_6H_{11}CH_3 + 10½O_2 \Rightarrow 7CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec
135	Methylcyclopentane	$CH_3C_5H_9 + 11O2 \Rightarrow 8CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
136	Methyl isobutyl ketone	$CH_3COCH_2CH(CH_3)_2 + 8½O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
137	2- Methylpropanal	$(CH_3)_2CHCHO + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
138	2- Methylpropenal	$CH_2C(CH_3)CHO + 5O_2 \Rightarrow 4CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
139	4- Methyl tricyclo(5,2,1,0) dec-4-ene	$C_{11}H_{16} + 15O_2 \Rightarrow 11CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
140	MEK Peroxide	$CH_3COOC_2H_5 + 5O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
141	Naphthalene	$C_{10}H_8 + 12O_2 \Rightarrow 10CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
142	Natural Gas	Natural Gas consists of methane, ethane, propane, butane, and higher hydrocarbons	CO_2, H_2O	< 5 sec
143	Nitric Acid	$4HNO_3 \Rightarrow 2H_2O + 4NO_2 + O_2$	H_2O, NO_2, O_2	< 15 sec
144	Nitric Oxide	$2NO + O_2 \Rightarrow 2NO_2$	NO_2	< 15 sec
145	Nitrogen Dioxide	NO_2	No Reaction	
146	Nitrous Oxide	$N_2O + 1½O_2 \Rightarrow 2NO_2$	NO_2	< 15 sec
147	n- Nonane	$CH_3(CH_2)7CH_3 + 14O_2 \Rightarrow 9CO_2 + 10H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
148	Octachlorostyrene	$C_6Cl_5CClCCl_2 + 8O_2 \Rightarrow 8CO_2 + 4Cl_2$	CO_2, Cl_2	< 15 sec
149	Octahydro-exo-4,7-methano-1H-indene	$C_{10}H_{16} + 9O_2 \Rightarrow 5CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
150	Octanal	$CH_3(CH_2)_6CHO + 11½O_2 \Rightarrow 8CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
151	Octane	$CH_3(CH_2)_6CH_3 + 12½O_2 \Rightarrow 8CO_2 + 9H_2O$	CO_2, H_2O	< 5 sec
152	n- Octane	$CH_3(CH_2)_6CH_3 + 12½O_2 \Rightarrow 8CO_2 + 9H_2O$	CO_2, H_2O	< 5 sec
153	n- Octylaldehyde	$CH_3(CH_2)_6CHO + 11½O_2 \Rightarrow 8CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
154	Organic Nitrogen	$N + O_2 \Rightarrow NO_2$	NO_2	< 15 sec
155	Ozone	$O_3 + ½ O_2 \Rightarrow 2O_2$	O_2	< 2 sec
156	Pentanal	$CH_3(CH_2)_3CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
157	n- Pentanal	$CH_3(CH_2)_3CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
158	Pentane	$CH_3(CH_2)_3CH_3 + 8O_2 \Rightarrow 5CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
159	n- Pentane	$CH_3(CH_2)_3CH_3 + 8O_2 \Rightarrow 5CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
160	1,5 Pentanediamine	$H_2N(CH_2)_5NH_2 + 10½O_2 \Rightarrow 5CO_2 + 7H_2O + 2NO_2$	CO_2, H_2O, NO_2	< 15 sec
161	Phenanthrene	$C_{14}H_{10} + 16½O_2 \Rightarrow 14CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
162	Phenol	$C_6H_5OH + 7O_2 \Rightarrow 6CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
163	iso-Phorone Diamine	$C_9H_{14}O(NH_2)_2 + 15O_2 \Rightarrow 9CO_2 + 9H_2O + 2NO_2$	CO_2, H_2O, NO_2	< 15 sec
164	Phosphoric Acid	$2H_3PO_4 \Rightarrow 3H_2O + P_2O_5$	H_2O, P_2O_5	< 15 sec
165	Phthalic Acid	$C_6H_4(COOH)_2 + 6½O_2 \Rightarrow 8CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
166	Polychlorinated biphenyls (PCBs)	$CxHyClz + excess\ O_2 \Rightarrow xCO_2 + {}^y/_2H_2O + {}^z/_2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
167	Polychlorinated dibenzofurans	$CxHyClzOw + excess\ O_2 \Rightarrow xCO_2 + {}^y/_2H_2O + {}^z/_2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
168	Polychlorinated dibenzo-para-dioxins	$CxHyClzOw + excess\ O_2 \Rightarrow xCO_2 + {}^y/_2H_2O + {}^z/_2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
169	Polyester Resins	$(-COC_6H_4COOCH_2CHOHCH_2OOCC_6H_4CO-) + excess\ O_2 \Rightarrow \sim[(CO_2) + (H_2O)]$	CO_2, H_2O	< 5 sec
170	Proline	$NHC_4H_7COOH + 7¼O_2 \Rightarrow 5CO_2 + 4½H_2O + NO_2$	CO_2, H_2O, NO_2	< 15 sec
171	Propanal	$CH_3CH_2CHO + 4½O_2 \Rightarrow 3CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
172	Propane	$C_3H_8 + 5O_2 \Rightarrow 3CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
173	iso- Propanol	$C_3H_7OH + 4½O_2 \Rightarrow 3CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
174	n- Propanol	$C_3H_7OH + 4½O_2 \Rightarrow 3CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
175	2- Propanol	$C_3H_7OH + 4½O_2 \Rightarrow 3CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
176	2- Propenal	$CH_2CHCHO + 3½O_2 \Rightarrow 3CO_2 + 2H_2O$	CO_2, H_2O	< 5 sec
177	Propionaldehyde	$CH_3CH_2CHO + 4½O_2 \Rightarrow 3CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
178	Propionic Acid	$C_2H_5COOH + 3½O_2 \Rightarrow 3CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
179	n- Propyl Acetate	$CH_3COOC_3H_7 + 6½O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
180	n- Propyl Benzene	$C_6H_5C_3H_7 + 12O_2 \Rightarrow 9CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
181	Propyl Mercaptan	$C_3H_7SH + 6O_2 \Rightarrow 3CO_2 + 4H_2O + SO_2$	CO_2, H_2O, SO_2	< 15 sec
182	Propylene Glycol Methyl Ether Acetate	$C_6H_{12}O_3 + 7½\ O_2 \Rightarrow 6CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
183	Pyridine	$C_5H_5N + 7¼O_2 \Rightarrow 5CO_2 + NO_2 + 2½H_2O$	CO_2, H_2O, NO_2	< 15 sec
184	Quinoline	$C_9H_7N + 11¾O_2 \Rightarrow 9CO_2 + NO_2 + 3½H_2O$	CO_2, H_2O, NO_2	< 15 sec
185	iso- Quinoline	$C_9H_7N + 11¾O_2 \Rightarrow 9CO_2 + NO_2 + 3½H_2O$	CO_2, H_2O, NO_2	< 15 sec
186	Radon	Rn	No Reaction	
187	Respirable Suspended Particles *	$CnHxOy$ + excess $O_2 \Rightarrow nCO_2 + {}^{X}/_{2}\ H_2O$	CO_2, H_2O	Particle size dependent
188	Skatole	$C_9H_9N + 12¼O_2 \Rightarrow 9CO_2 + NO_2 + 4½H_2O$	CO_2, H_2O, NO_2	< 15 sec
189	Styrene	$C_6H_5CH{:}CH_2 + 10O_2 \Rightarrow 8CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
190	Sodium Hydroxide	NaOH	No Reaction	
191	Sulphur	$S + O_2 \Rightarrow SO_2$	SO_2	< 15 sec
192	Sulfur Dioxide	SO_2	No Reaction	
193	Sulfur Hexafluoride	SF_6	No Reaction	
194	Sulphuric Acid	$2H_2SO_4 \Rightarrow 2H_2O + 2SO_2 + O_2$	H_2O, $2SO_2$, O_2	< 15 sec
195	Terephthalic Acid (TPA)	$C_6H_4(COOH)_2 + 7½O_2 \Rightarrow 8CO_2 + 3H_2O$	CO_2, H_2O	< 5 sec
196	Tetrachloroethane	$C_2H_2Cl_4 + 2½O_2 \Rightarrow 2CO_2 + H_2O + 2Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
197	Tetrachloroethene	$C_2Cl_4 + 2O_2 \Rightarrow 2CO_2 + 2Cl_2$	CO_2, Cl_2	< 15 sec
198	Tetrahydrofuran (THF)	$C_4H_8O + 5½O_2 \Rightarrow 4CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
199	1,2,3,4 Tetrahydro Naphthalene	$C_{10}H_{12} + 8O_2 \Rightarrow 10CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
200	Thiocresol	$CH_3C_6H_4SH + 10O_2 \Rightarrow 7CO_2 + SO_2 + 4H_2O$	CO_2, H_2O, SO_2	< 15 sec
201	Thiophenol	$C_6H_5SH + 8½O_2 \Rightarrow 6CO_2 + SO_2 + 3H_2O$	CO_2, H_2O, SO_2	< 15 sec
202	Toluene	$C_6H_5CH_3 + 9O_2 \Rightarrow 7CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
203	p- Toluic Acid	$C_6H_4COOHCH_3 + 9O_2 \Rightarrow 8CO_2 + 4H_2O$	CO_2, H_2O	< 5 sec
204	TOC (Total Organic Carbon)	$CxHyOz$ + excess $O_2 \Rightarrow xCO_2 + {}^{y}/_{2}H_2O$	CO_2, H_2O	< 5 sec
205	Trichlorethylene	$CHClCCl_2 + 2¼O_2 \Rightarrow 2CO_2 + ½H_2O + 1½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
206	1,1,1- Trichlorethane	$CH_3CCl_3 + 2¾O_2 \Rightarrow 2CO_2 + 1½H_2O + 1½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
207	1,1,2- Trichlorethane	$CH_3CCl_3 + 2¾O_2 \Rightarrow 2CO_2 + 1½H_2O + 1½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
208	Tricyclo(5,2,1,0) dec-3-ene	$C_{10}H_{14} + 8½O_2 \Rightarrow 10CO_2 + 7H_2O$	CO_2, H_2O	< 5 sec

No	Pollutant	Chemical Reaction	Final Products	Reaction Time
209	Trichloromethane	$CHCl_3 + 1¼O_2 \Rightarrow CO_2 + ½H_2O + 1½Cl_2$	CO_2, H_2O, Cl_2	< 15 sec
210	Triethylamine	$(C_2H_5)3N + 10¾O_2 \Rightarrow 6CO_2 + NO_2 + 7½H_2O$	CO_2, H_2O, NO_2	< 15 sec
211	Triethylene tetramine	$H_2NCH_2(CH_2NHCH_2)_2CH_2NH_2 + 14½\ O_2 \Rightarrow 6CO_2 + 9H_2O + 4NO_2$	CO_2, H_2O, NO_2	< 15 sec
212	Trimethylamine	$(CH_3)_3N + 6¼\ O_2 \Rightarrow 3CO_2 + 4½H_2O + NO_2$	CO_2, H_2O, NO_2	< 15 sec
213	1,2,4 Trimethylbenzene	$C_6H_3(CH_3)_3 + 12O_2 \Rightarrow 9CO_2 + 6H_2O$	CO_2, H_2O	< 5 sec
214	2,2,4 Trimethylpentane	$(CH_3)_2CHCH_2C(CH_3)_3 + 12½O_2 \Rightarrow 8CO_2 + 9H_2O$	CO_2, H_2O	< 5 sec
215	Triquinacene	$C_{10}H_{10} + 7½O_2 \Rightarrow 10CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
216	iso-Valeraldehyde	$(CH_3)_2CHCH_2CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
217	n- Valderaldehyde	$CH_3(CH_2)_3CHO + 7O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
218	iso- Valeric Acid	$(CH_3)_2CHCH_2COOH + 6½O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
219	n- Valeric Acid	$CH_3(CH_2)_3COOH + 6½O_2 \Rightarrow 5CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec
220	Volatile Organic Compounds	$CxHy$ + excess $O_2 \Rightarrow xCO_2 + {}^{y}/_{2}H_2O$	CO_2, H_2O	< 5 sec
221	Wax (consists of Esters & Alcohols) #	RCOOR’ + excess $O_2 \Rightarrow xCO_2 + yH_2O$	CO_2, H_2O	< 5 sec
		ROH + excess $O_2 \Rightarrow xCO_2 + yH_2O$	CO_2, H_2O	< 5 sec
222	White Spirits	$C_{10}H_{16} + 14O_2 \Rightarrow 10CO_2 + 8H_2O$	CO_2, H_2O	< 5 sec
223	Xylenes	$C_6H_4CH_3CH_3 + 10½O_2 \Rightarrow 8CO_2 + 5H_2O$	CO_2, H_2O	< 5 sec

Notes: * Airborne respirable particles are predominantly carbon compounds (organic) and are more regularly oxidisable. The oxidation reaction times are dependent on particle size, density, concentration, and reaction rate constants. The organic pollutants such as those listed above are generally volatile whereas inorganic pollutants normally exist as solid particles (powders) and are subject to fall-out. The concentrations of any airborne inorganic pollutants therefore will be broadly insignificant.

\# R, R’ are abbreviated forms of CxHy

Report compiled and submitted by:

John Waanders, B.E., M.Eng.Sc., C.Eng., F.I.Chem.E., F.I.E.Aust., C.P.Eng.
Conjoint Fellow, Chemical Engineering, The University of Newcastle.

タイメック株式会社　御中

"BIO-OXYGEN"

AIR PURIFICATION

AIR STERILIZATION &

ODOUR CONTROL EQUIPMENT

TEST REPORT

SEPTEMBER 12, 2005

conducted by:
CHUGAI TECHNOS CORPORATION
R & D TEST LABORATORY
KANTO
JAPAN

1. <u>Purpose</u>

Performance tests were conducted on the "Bio-Oxygen" Air Purification, Air Sterilization & Odour Control Equipment for the removal of various Chemical Fumes and Vapours.

2. <u>Testing Details</u>

The Bio-Oxygen equipment was tested for the removal of the following individual Chemical Fumes & Vapours:

- Ammonia, Acetaldehyde, Hydrogen Sulfide, Acetic Acid and Formaldehyde were each prepared and tested separately.

- Formaldehyde was included because it is one of the causes of 'Sick Building Syndrome'

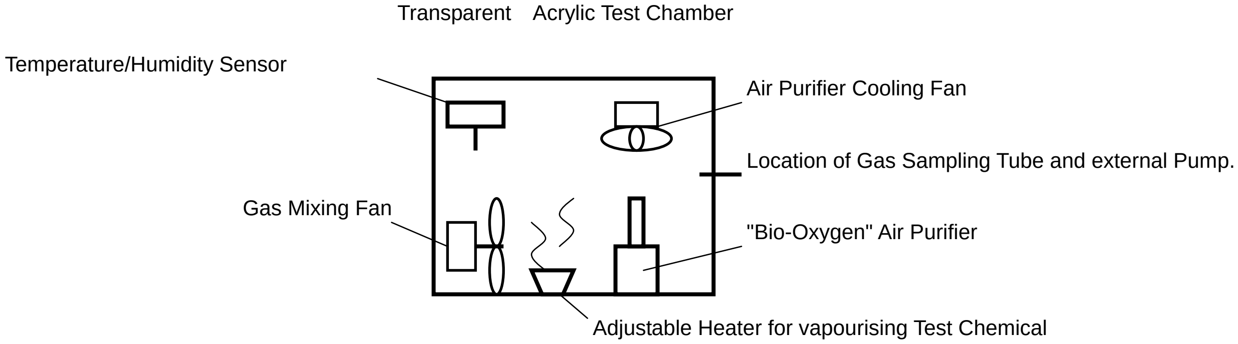
3. <u>Testing Method</u>

3.1 Testing Equipment

The configuration of the testing equipment is shown in Drawing 3.1.1.

The tests were conducted in a hermetically sealed acrylic test chamber with a capacity of 1 m3 (1m x 1m x 1m). Inside the chamber was a 'Bio-Oxygen' Air Purifier Model 8000/5, Heater for vapourising the test chemical, Gas Mixing Fan, Temperature & Humidity Sensor and a 6 mm hole for inserting a 'Gastec' Gas Test Tube which was connected to an external 'Gastec' Gas Pump.

Equipment tested: "Bio-Oxygen" Model 8000/5



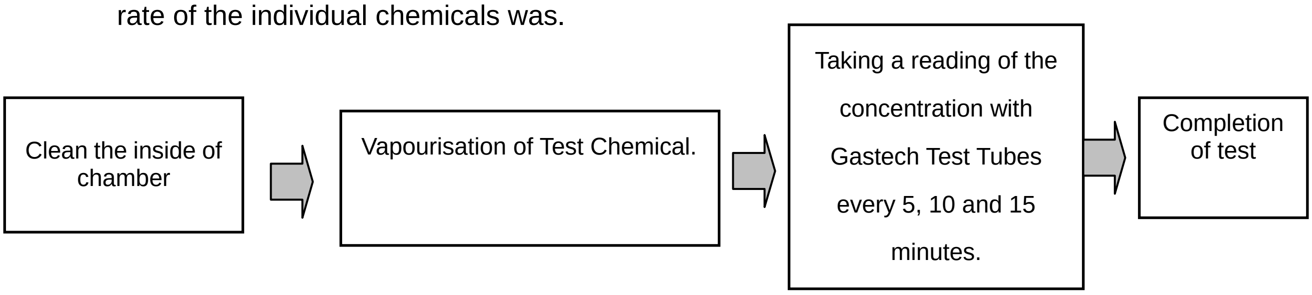
Drawing 3.1.1 Configuration of Test Equipment

3.2 Testing Procedure

A flow diagram showing the testing procedure for each test is indicated in Drawing 3.2.1.

Each chemical test was conducted twice to demonstrate the repeatability of the tests:
2 tests with the 'Bio-Oxygen' unit turned 'off' and
2 tests with the 'Bio-Oxygen' unit turned 'on'.

The reason for testing with the Bio-Oxygen unit turned 'off' was to establish what the natural decay rate of the individual chemicals was.



Drawing 3.2.1. Test Procedure Flow Chart

3.3 Test Specifications

The target chemical concentration for each chemical is shown in Table 3.3.1.
Separate tests were conducted for each chemical.

Table 3.3.1 Chemical and Target Concentration and Chemical Vapourisation Method

Chemical to be tested	Target Concentration (ppm)	Chemical Vapourisation Method
Ammonia (NH_3)	30	25% Ammonia vaporized by steam.
Acetaldehyde (CH_3CHO)	20	90% Acetaldehyde heated and vaporized.
Hydrogen Sulfide (H_2S)	20	0.1 mol of Hydrochloric Acid was added to NaHS (powdered) and the Hydrogen Sulfide vapourized.
Acetic Acid (CH_3COOH)	20	99.7% liquid heated and vaporized.
Formaldehyde (HCHO)	3	36~38% liquid heated and vaporized.

3.4 Measuring of the Chemical Vapour under test

(1) Measuring Method

The measuring method for each chemical is shown in Table 3.4.1.

Table 3.4.1 Measuring Method for each Chemical

Gas Tested	Testing Method	Number of Pump Strokes and Measuring Range of 'Gastec' Test Tubes
Ammonia (NH_3)	Gastec Ammonia Detection Tube No.3L	1 Pump Strokes = 1 - 30 ppm 2 Pump Strokes = 0.5 - 1 ppm
Acetaldehyde (CH_3CHO)	Gastec Acetaldehyde Detection Tube No.92L	1 Pump Stroke = 1 - 20 ppm
Hydrogen Sulfide (H_2S)	Gastec Hydrogen Sulfide Detection Tube No. 4LK	1 Pump Stroke = 2 - 20 ppm 2 Pump Strokes = 1 - 2 ppm
Acetic Acid (CH_3COOH)	Gastec Acetic Acid Detection Tube No.81L	1/2 Pump Stroke = 10 - 25 ppm 1 Pump Stroke = 0.25 - 10 ppm
Formaldehyde (HCHO)	Gastec Formaldehyde Detection Tube No. 91L	5 Pump Strokes = 0.1 - 5 ppm

<u>Accuracy of Measurements</u>
In order to increase the accuracy of the Gastec measuring tubes, after the appropriate number of pump strokes was taken and no discoloration of the test tube was recorded then the number of pump strokes was increased to 10 strokes so as to extend the detection range of the tubes but nevertheless in spite of the extra pump strokes still no discoloration was recorded. The reaction of the Gastec tubes to the chemicals is not linear but is exponential and therefore with 10 pump strokes the detection range and accuracy is many more times more than at the appropriate number of strokes and therefore that result was taken as 100% reduction.

(2) Number of Measurements
Each test was done twice (1st and 2nd test) to show the repeatability of the tests.
Initially, each chemical was tested twice with the "Bio-Oxygen" unit turned 'off'. Readings of the chemical concentration were taken after exactly 0 minutes, 5 minutes, 10 minutes and 15 minutes.

Thereafter, each chemical was tested twice with the "Bio-Oxygen" unit turned 'on'. Readings of the chemical concentration were taken exactly after 0 minutes, 5 minutes, 10 minutes and 15 minutes.

4. Test Results

The speed and efficiency with which each chemical was removed by the Bio-Oxygen unit is shown in Table 4.

Bio-Oxygen removed 100% of the Acetaldehyde, Acetic Acid and Formaldehyde in 5 minutes, i.e. the concentration dropped to zero (0) ppm in 5 minutes.

Bio-Oxygen removed 100% of Hydrogen Sulfide in 15 minutes, i.e. the concentration of Hydrogen Sulfide dropped to zero (0) ppm in 15 minutes

In the case of Ammonia, Bio-Oxygen removed 99.2% of the Ammonia in 15 minutes, i.e the concentration dropped to 0.50 ppm in one test and in the other test it dropped to zero ppm (average 0.25 ppm) in 15 minutes.

Table 4. Summary of 'Bio-Oxygen' Equipment Performance Test Results

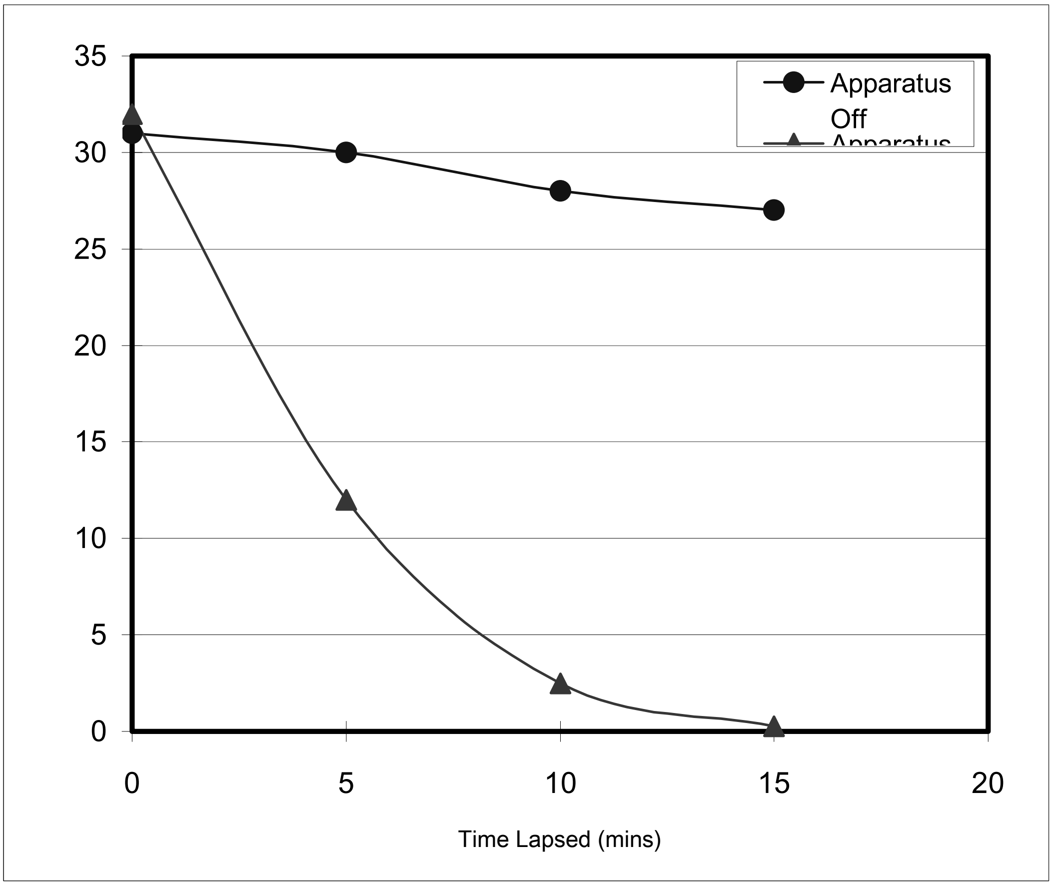
Chemical	*Without Bio-Oxygen	With Bio-Oxygen	% Reduction	Remarks
Ammonia	31 ppm	0.25 ppm	99.2%	See Table 4.1, & Graph 4.1.
Acetaldehyde	24 ppm	0 ppm	100%	See Table 4.2, & Graph 4.2.
Hydrogen Sulfide	20 ppm	0 ppm	100%	See Table 4.3, & Graph 4.3.
Acetic Acid	21 ppm	0 ppm	100%	See Table 4.4, & Graph 4.4.
Formaldehyde	3 ppm	0 ppm	100%	See Table 4.5, & Graph 4.5.

* Results were taken after 15 minutes

AMMONIA

Table 4.1 Ammonia Concentration Measuring Results

Time Lapsed	Bio-Oxygen 'Off' (ppm)			**Bio-Oxygen 'On' (ppm)**		
(min.)	1st Test	2nd Test	Average	**1st Test**	**2nd Test**	**Average**
0	32	30	31	**34**	**30**	**32**
5	31	29	30	**14**	**10**	**12**
10	28	28	28	**4.0**	**1.0**	**2.5**
15	27	27	27	**0.5**	**0**	**0.25**
Temp. (°C)	28	27	--	32	33	--
Humidity (RH%)	73	75	--	51	48	--

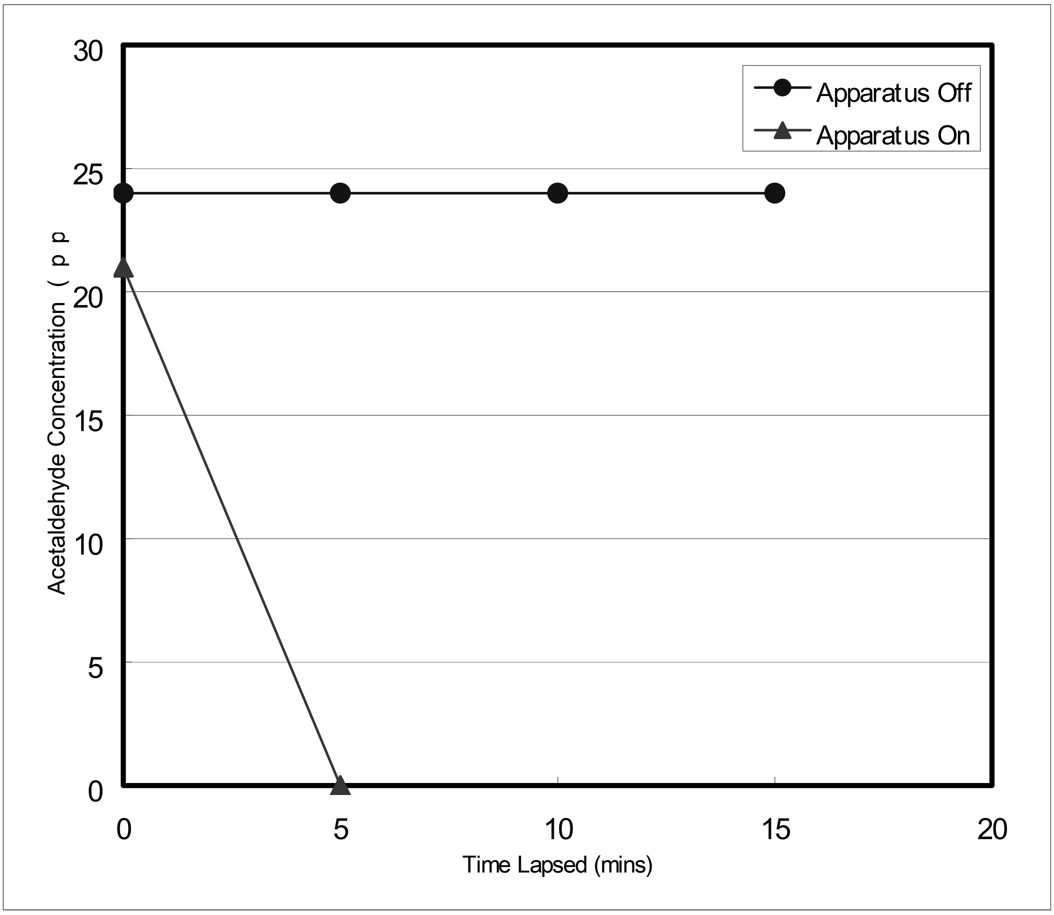


Drawing 4.1 Ammonia Concentration Changes

ACETALDEHYDE

Table 4.2 Acetaldehyde Concentration Measuring Results

Time Lapsed	Bio-Oxygen 'Off' (ppm)			**Bio-Oxygen 'On' (ppm)**		
(min.)	1st Test	2nd Test	Average	**1st Test**	**2nd Test**	**Average**
0	24	24	24	**20**	**22**	**21**
5	24	24	24	**0**	**0**	**0**
10	24	24	24	**0**	**0**	**0**
15	24	24	24	**0**	**0**	**0**
Temp. (°C)	30	29	--	32	32	--
Humidity (RH%)	60	63	--	53	52	--

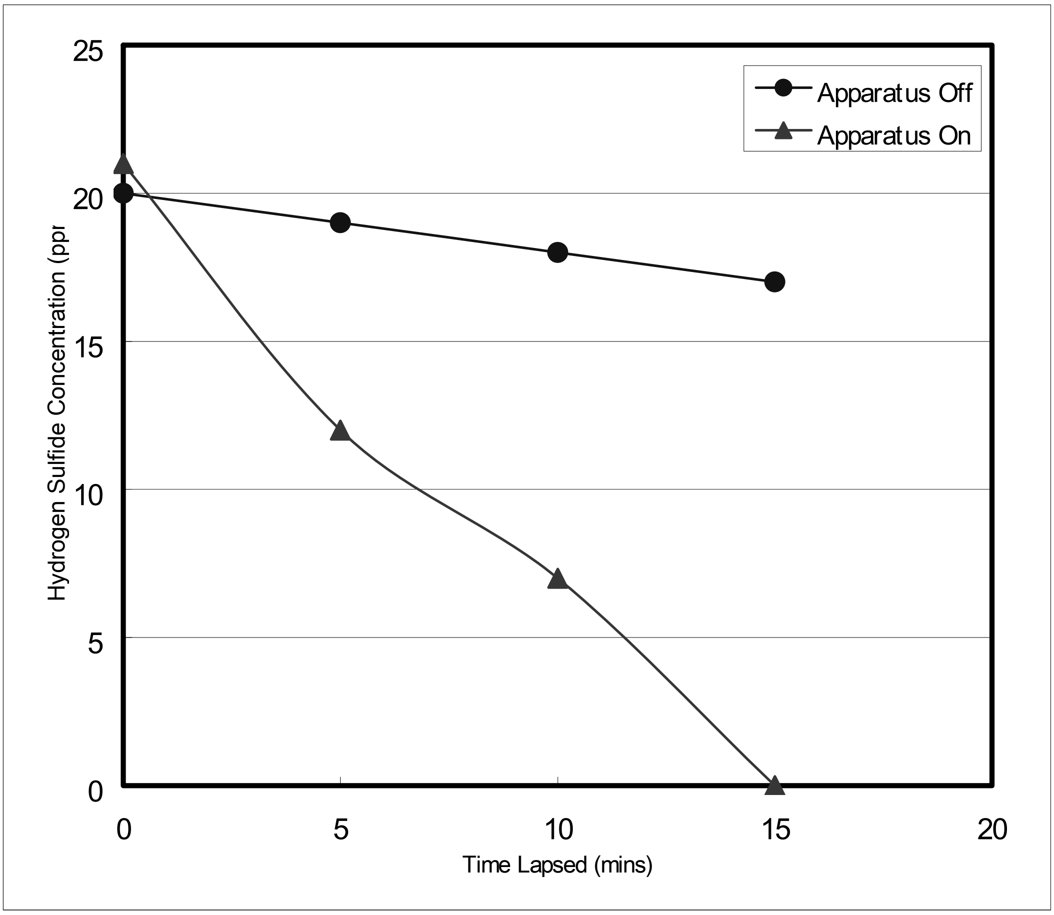


Drawing 4.2 Acetaldehyde Concentration Changes

HYDROGEN SULFIDE

Table 4.3 Hydrogen Sulfide Concentration Measuring Results

Time Lapsed	Bio-Oxygen 'Off' (ppm)			**Bio-Oxygen 'On' (ppm)**		
(min.)	1st Test	2nd Test	Average	**1st Test**	**2nd Test**	**Average**
0	16	24	20	**20**	**19**	**21**
5	15	23	19	**12**	**10**	**12**
10	14	22	18	**8.0**	**6.0**	**7.0**
15	13	21	17	**0**	**0**	**0**
Temp. (°C)	29	28	--	29	32	--
Humidity (RH%)	67	73	--	57	52	--

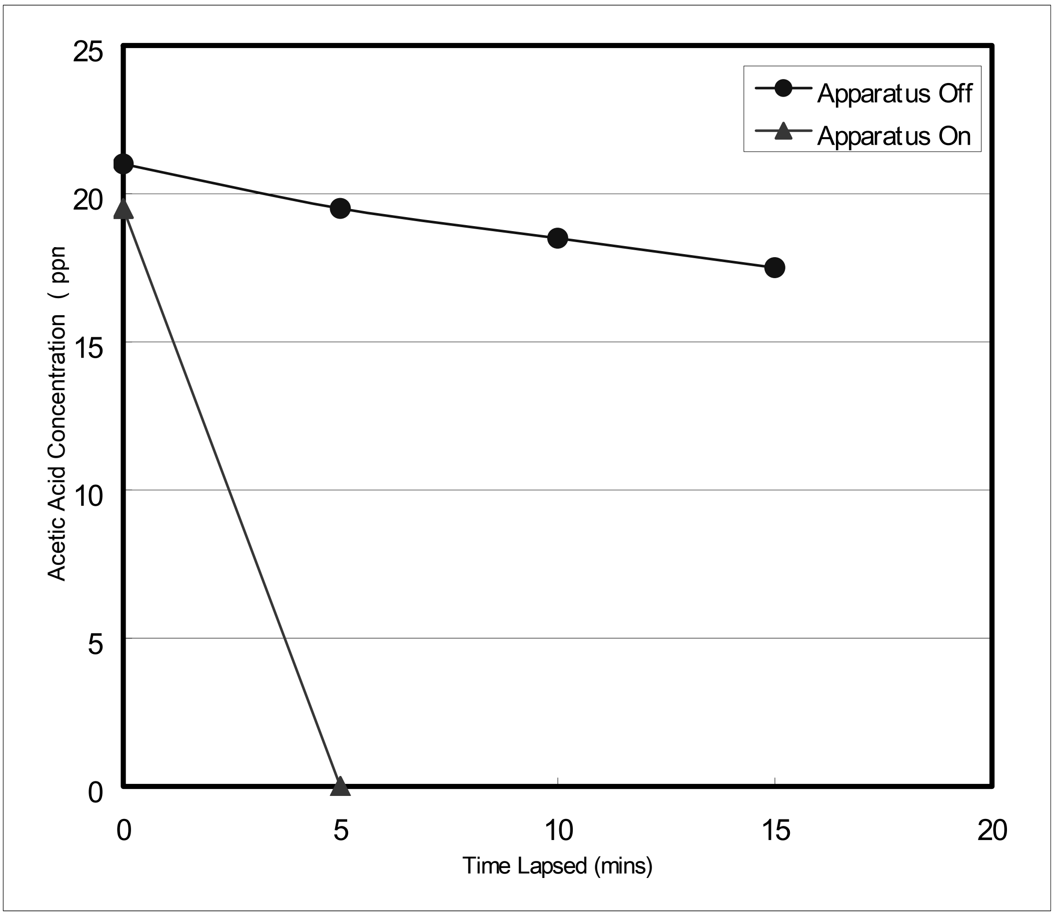


Drawing 4.3 Hydrogen Sulfide Concentration Changes

ACETIC ACID

Table 4.4 Acetic Acid Concentration Measuring Results

Time Lapsed	Bio-Oxygen 'Off' (ppm)			**Bio-Oxygen 'On' (ppm)**		
(min.)	1st Test	2nd Test	Average	**1st Test**	**2nd Test**	**Average**
0	22	20	21	**19**	**20**	**19.5**
5	20	19	19.5	**0**	**0**	**0**
10	19	18	18.5	**0**	**0**	**0**
15	18	17	17.5	**0**	**0**	**0**
Temp. (°C)	32	33	--	34	34	--
Humidity (RH%)	47	46	--	43	40	--

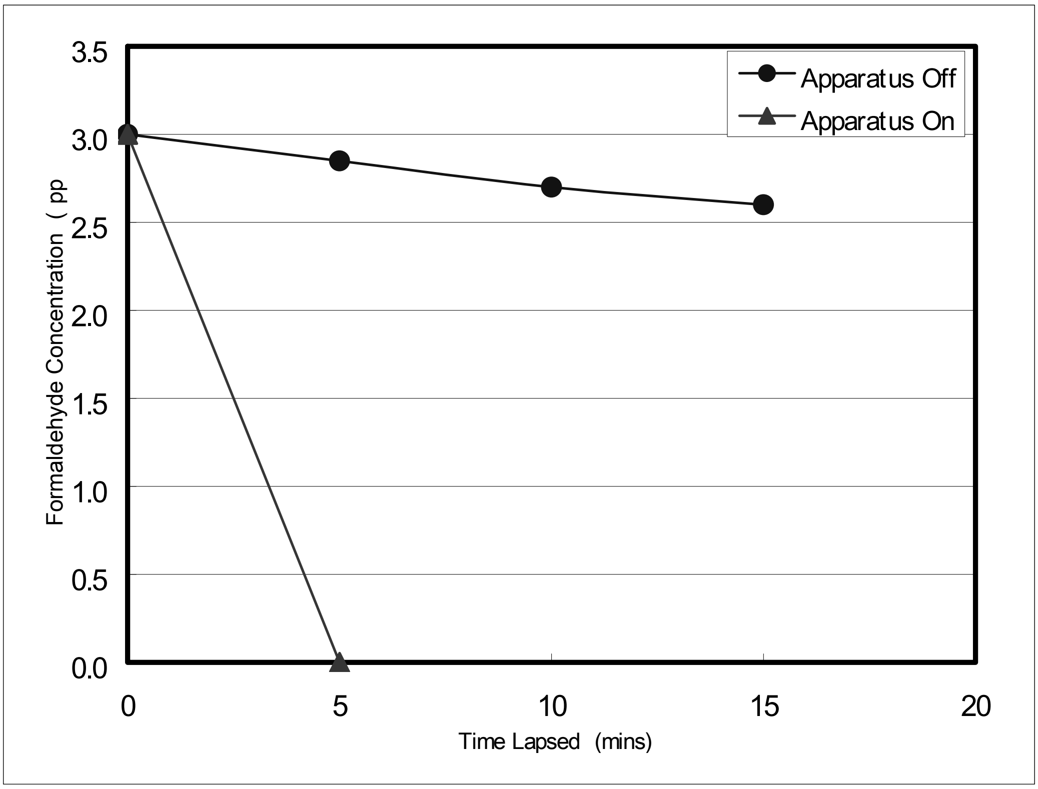


Drawing 4.4 Acetic Acid Concentration Changes

FORMALDEHYDE

Table 4.5 Formaldehyde Concentration Measuring Results

Time Lapsed	Bio-Oxygen 'Off' (ppm)			**Bio-Oxygen 'On' (ppm)**		
(min.)	1st Test	2nd Test	Average	**1st Test**	**2nd Test**	**Average**
0	3.0	3.0	3.0	**3.0**	**3.0**	**3.0**
5	2.8	2.9	2.85	**0**	**0**	**0**
10	2.6	2.8	2.7	**0**	**0**	**0**
15	2.5	2.7	2.6	**0**	**0**	**0**
Temp. (°C)	32	33	--	33	35	--
Humidity (RH%)	47	44	--	44	37	--



Drawing 4.5 Formaldehyde Concentration Changes

Test conducted by
Taizo Uchimura
CHUGAI TECHNOS CORPORATION

Gastec Data Sheets 3L, 92L, 4LK, 81L, 91L available on request

No. L2605

TEST REPORT

Serial No. 2007-165

Applicant :	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.LTD
Sample Description :	Bio-Oxygen Generator
Test Type :	Ammonia
Report Date :	5 June 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Sample Description	Bio-Oxygen Generrator
Applicant	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.
Test Date	18 May 2007

Test Result:

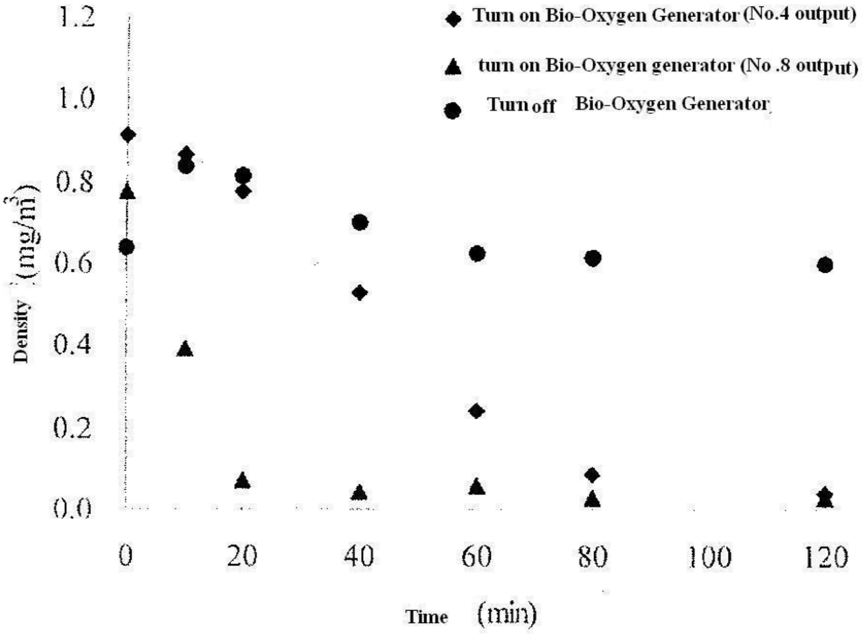
Time (min)	Anmonia (mg/m^3)		
	Turn off Bio-Oxygen Generotor	Turn on Bio-Oxygen Generator (No.8 output)	Turn on Bio-Oxygen Generator (No.4 output)
0	0.640	0.774	0.912
10	0.836	0.393	0.865
20	0.811	0.073	0.773
40	0.699	0.040	0.528
60	0.624	0.056	0.239
80	0.615	N.D. No detection	0.086
120	0.600	N.D.	0.037
2 hour Degradation rate	28.2	96.1	95.9
Detection Limit	0.03		

Audit:	李玉武 Yuwu Li	Approval:	Lusan Huan
Reporter:	张辉 Hui Zhang	Issue Date:	2007 年 6 月 5 日

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Bio-Oxygen Generator for Ammonia removal efficiency comparison chart



Experiment Description:

The purpose of this study was to test Bio-Oxygen Generator for the removal of ammonia in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of ammonia in the box, 1 hour after the two cases, respectively (a, turn off Bio-Oxygen Generator; b, turn on Bio-Oxygen generator) sampling and analysis ammonia concetration in the box. Both cases, by comparing the test date, detect the Bio-Oxygen Generator to remove ammonia contribution.

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Test Conditions:

Time (min)	turn off Bio-Oxygen Generator			turn on Bio-Oxygen Generator(No.4 output)		
	Temperature (℃)	Presure (kPa)	Relitive humility (%)	Temperature (℃)	Presure (kPa)	Relitive humility (%)
0	32.0	100.20	38.0	30.0	100.40	42.0
10	32.0	100.20	38.0	32.0	100.40	40.0
20	32.0	100.20	36.0	32.0	100.40	40.0
40	32.0	100.20	36.0	30.0	100.40	42.0
60	34.0	100.20	34.0	30.0	100.40	42.0
80	34.0	100.20	34.0	30.0	100.40	42.0
120	32.0	100.20	36.0	30.0	100.40	42.0

Appendix: Standard and method of detection and detection limit

Test Items	Method of detection	Detection Limit
Ammonia (mg/m³)	GB/T 18204.25-2 Indophenol blue spectrophotometric method	0.03
(N/A)		

2006001736E

No. L2605

TEST REPORT

Serial No. 2007-187

Applicant :	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.LTD
Sample Description :	Bio-Oxygen Generator
Test Type :	Benzene
Report Date :	26 June 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

National Research Center for Environmental Analysis and Measurements

TEST REPORT

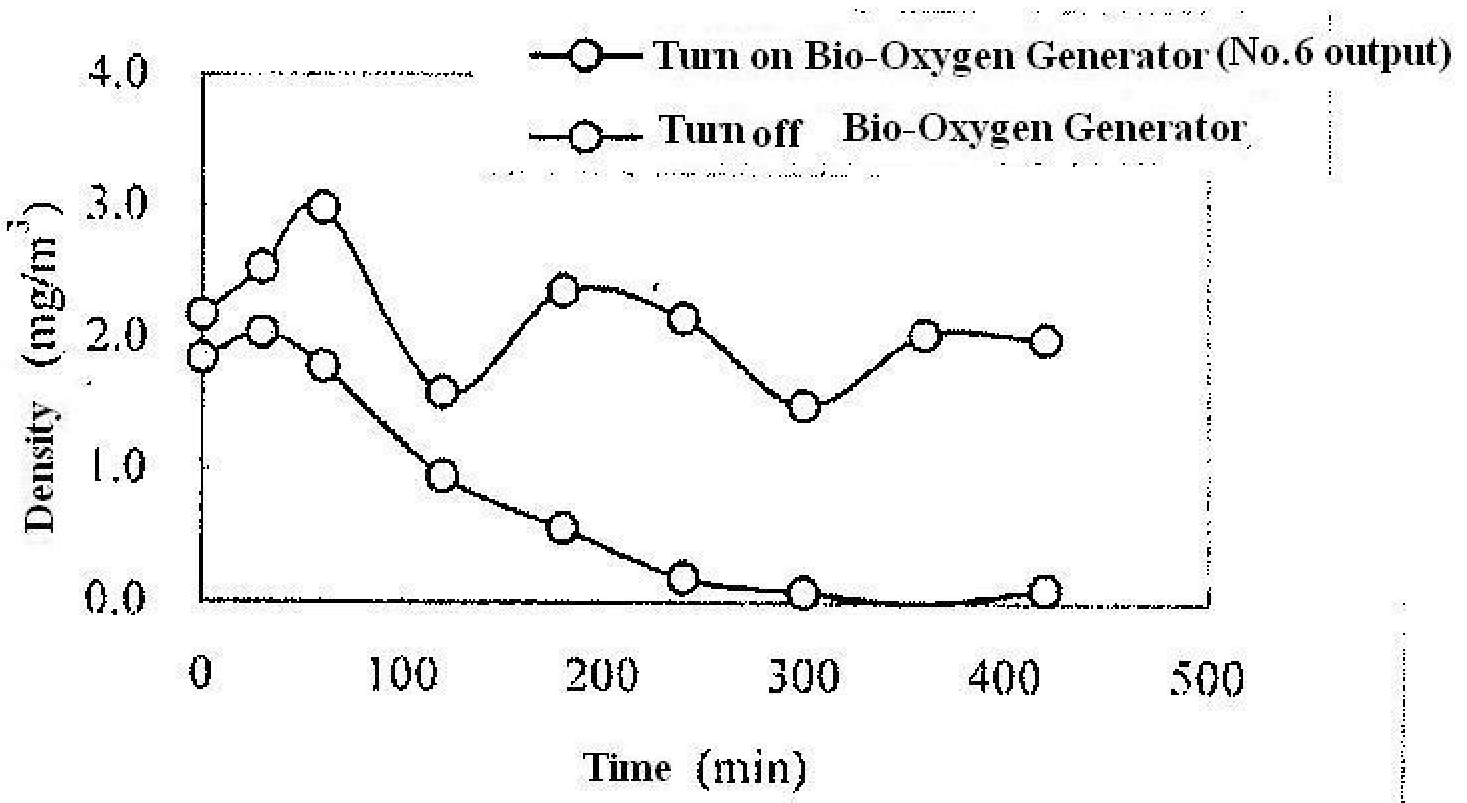
Serial No.2007-165 page 1 of 3

Sample Description	Bio-Oxygen Generrator
Applicant	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.
Test Date	18 May 2007

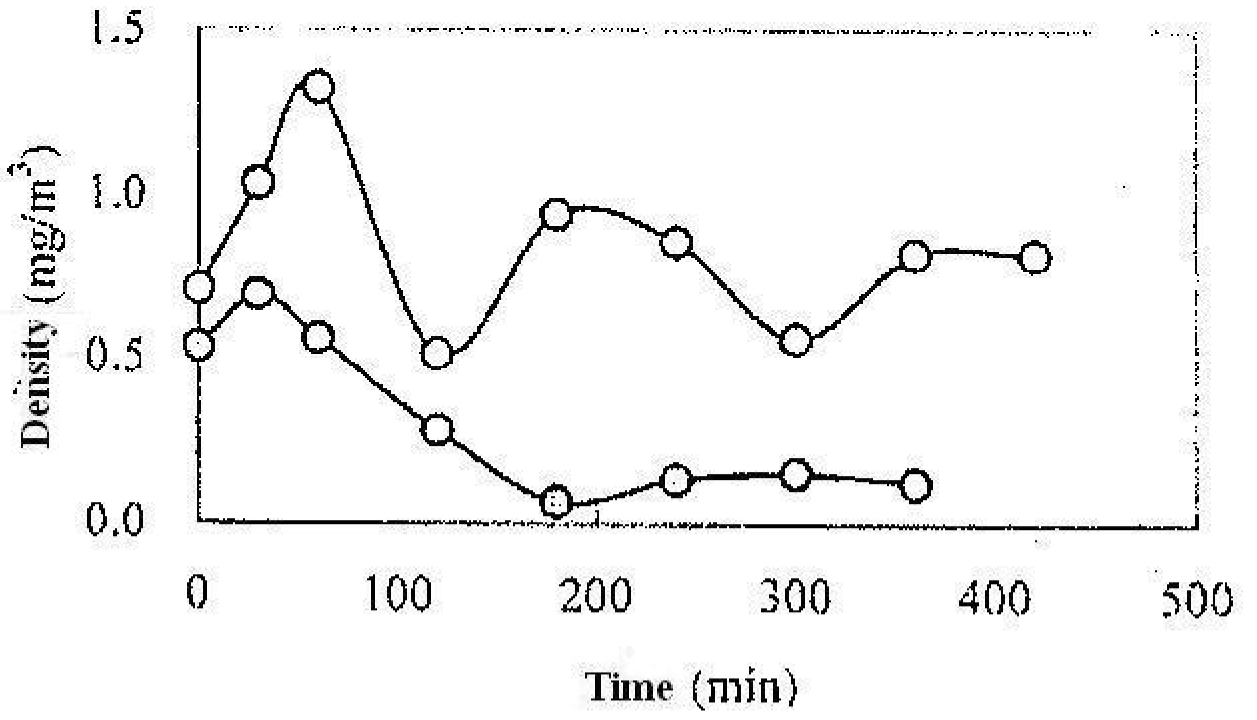
Time (min)	Benzene test results (mg/m^3)					
	turn off Bio-Oxygen generator			turn on Bio-Oxygen Generator		
	Benzene	Toluene	Xylene	Benzene	Toluene	Xylene
0	2.18	0.712	0.161	1.84	0.536	0.111
30	2.53	1.04	0.304	2.04	0.696	0.283
60	2.98	1.32	0.516	1.78	0.561	0.171
120	1.58	0.514	0.178	0.951	0.283	0.096
180	2.36	0.944	0.316	0.560	0.065	0.020
240	2.15	0.861	0.270	0.184	0.134	0.032
300	1.49	0.561	0.153	0.075	0.153	0.061
360	2.03	0.822	0.261	--	0.123	0.035
420	2.00	0.822	0.264	0.099	--	--
3-4 hour Degradation rate (%)	32.9	37.7	48.8	95.1	82.3	87.6
Detection Limit	0.005					

Auldit:	李玉武 Yuwu LI	**Aproval:**	黄业茹 Sanlu Huang
Reporter:	张辉 **Hui Zhang**	**Issue Date:**	2007 年 6 月 26 日

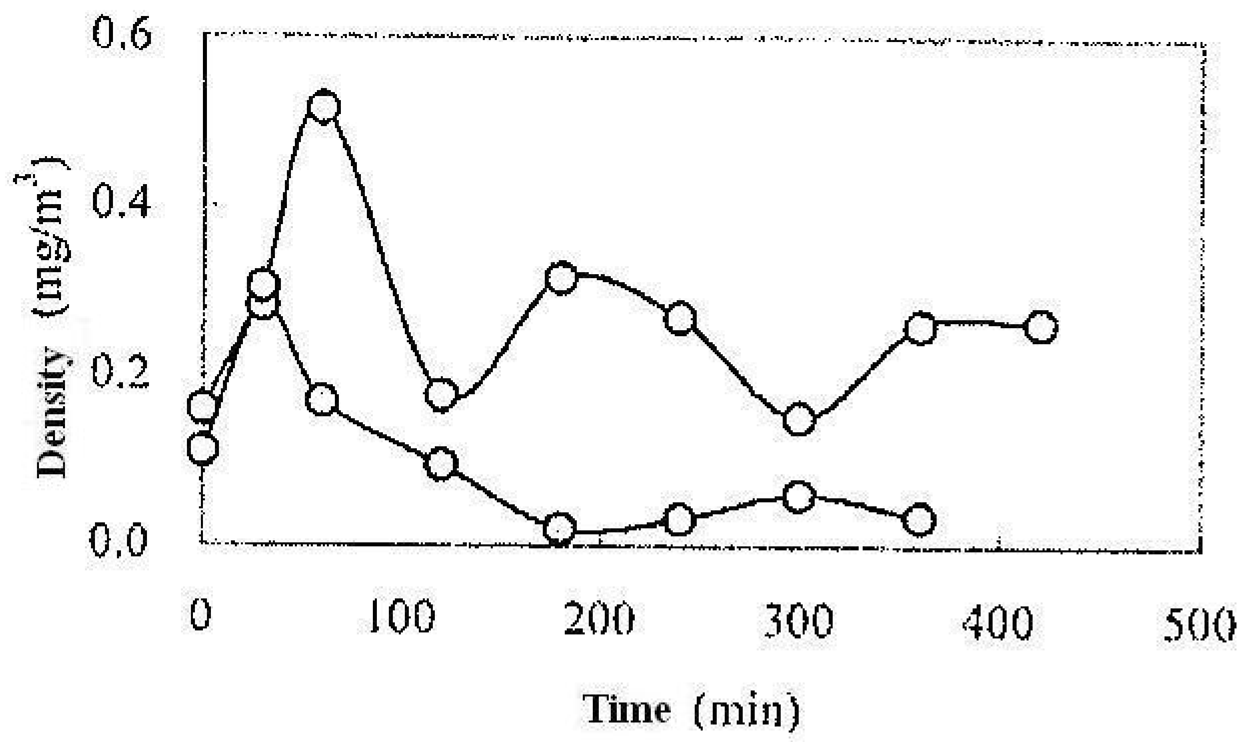
Bio-Oxygen Generator for Benzene removal efficiency comparison chart



Bio-Oxygen Generator for Tuluene removal efficiency comparison chart



Bio-Oxygen Generator for Xylene removal efficiency comparison chart



TEST REPORT

Experiment Description:

The purpose of this study was to test Bio-Oxygen Generator for the removal of **Benzene** in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of **Benzene** in the box, 1 hour after the two cases, respectively (a, turn off Bio-Oxygen Generator; b, turn on Bio-Oxygen generator) sampling and analysis **Benzene** concetration in the box. Both cases, by comparing the test date, detect the Bio-Oxygen Generator to remove **Benzene** contribution.

Test Conditions:

Time	turn off Bio-Oxygen Generator			turn on Bio-Oxygen Generator		
(min)	Temperature (℃)	Presure (kPa)	Relitive humility (%)	Temperature (℃)	Presure (kPa)	Relitive humility (%)
0	36.0	100.30	36.0	35.0	100.80	36.0
30	35.0	100.30	35.0	35.0	100.80	36.0
60	35.0	100.30	35.0	33.0	100.80	36.0
120	35.0	100.20	35.0	36.0	100.80	34.0
180	34.0	100.15	34.0	36.0	100.80	34.0
240	34.0	100.15	34.0	35.0	100.60	36.0
300	34.0	100.15	34.0	35.0	100.60	36.0
360	34.0	100.15	34.0	35.0	100.50	36.0
420	34.0	100.15	34.0	34.0	100.55	37.0

Appendix: Standard and method of detection and detection limit

Test Items	Method of detection	Detection Limit
Benzene (mg/m^3)	GB/T 18883-2002 Appendix B gas chromatography	0.005
(N/A)		

TEST REPORT

Serial No. 2007-159

Applicant	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.LTD
Sample Description :	Bio-Oxygen Generator
Test Type :	Formaldehyde
Report Date :	25 May 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Serial No.2007-159 page 1 of 3

Sample Description	Bio-Oxygen Generrator
Applicant	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.,LTD
Test Date	18 May 2007

Test Result:

Test Time (min)	Formaldehyde (mg/m^3)	
	Turn off Bio-Oxygen Generator	Turn on Bio-Oxygen Genarator
0	1.66	1.72
10	1.58	1.11
20	1.50	0.425
40	1.43	0.094
60	1.40	0.113
80	1.35	0.084
120	1.22	0.024
2 hour Degradation rate	26.5 (%)	98.5 (%)
Detection Limit	0.02	

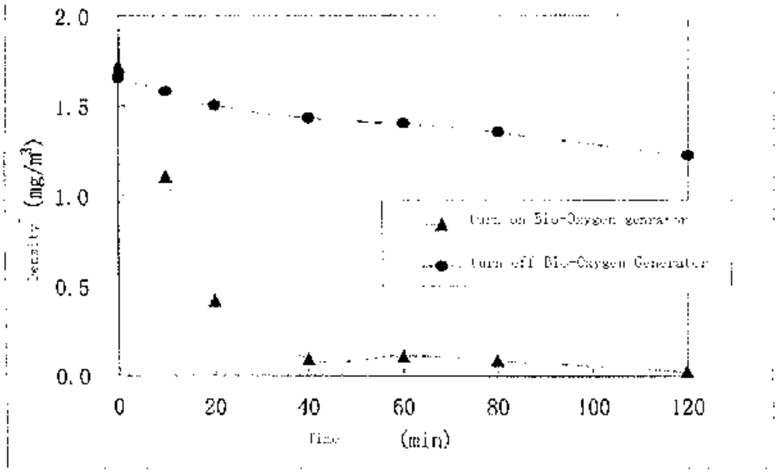
Audit	李玉武 Yuwu Li	Approval:	Lusan Huan
Reporter:	张辉 Hui Zhang	Issue Date:	2007 年 5 月 25 日

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Serial No.2007-159 page 2 of 3

Bio Oxygen Generator for formaldehyde removal efficiency comparison chart



Experiment Description:

The purpose of this study was to test Bio Oxygen Generator for the removal of formaldehyde in the air.The experiments was caried out in a sealed box of the net capacity 1m^3.The release of a certain density of formaldehyde in the box., 1 hour after the two cases, respectively (a. turn on Bio-oxygen generator b.turn off Bio-oxygen generator) sampling and analysis Formaldehyde concentration in the sealed box. Both cases,by comparing the test data , detect the Bio oxygen generator to remove Formaldehyde contribution.

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Serial No.2007-159 page 3of3

Test Conditions:

Time (min)	Turn off Bio-oxygen Generator			Turn on Bio-oxygen Generator		
	Tempreture (℃)	Presure (kPa)	Relitive Humility (%)	Tempreture (℃)	Presure (kPa)	Relitive Humility (%)
0	25.0	99.75	26.0	26.0	99.90	24.0
10	25.0	99.75	26.0	26.0	99.90	24.0
20	25.0	99.75	26.0	26.0	99.90	24.0
40	25.0	99.75	26.0	26.0	99.90	24.0
60	25.0	99.75	26.0	25.0	99.90	24.0
80	25.0	99.75	26.0	25.0	99.90	26.0
120	25.0	99.75	26.0	25.0	99.90	26.0

Appendix: Standard and method of detection and detection limit

Test items	Method of detection	Detection Limit
Fomaldehyde (mg/m*3)	GB/T 18204.26 Phenol reagent spectrophotometry	0.02
(N/A)		

No. L2605

TEST REPORT

Serial No. 2007-191

Applicant :	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.LTD
Sample Description :	Bio-Oxygen Generator
Test Type :	Total Volatile Organic Compounds (TVOC)
Report Date :	11 July 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Sample Description	Bio-Oxygen Generrator
Applicant	BEIJING BIO-OXYGEN ENVIRONMENTAL PROTECTION SCIENCE TECHNOLOGY CO.
Test Date	18 May 2007

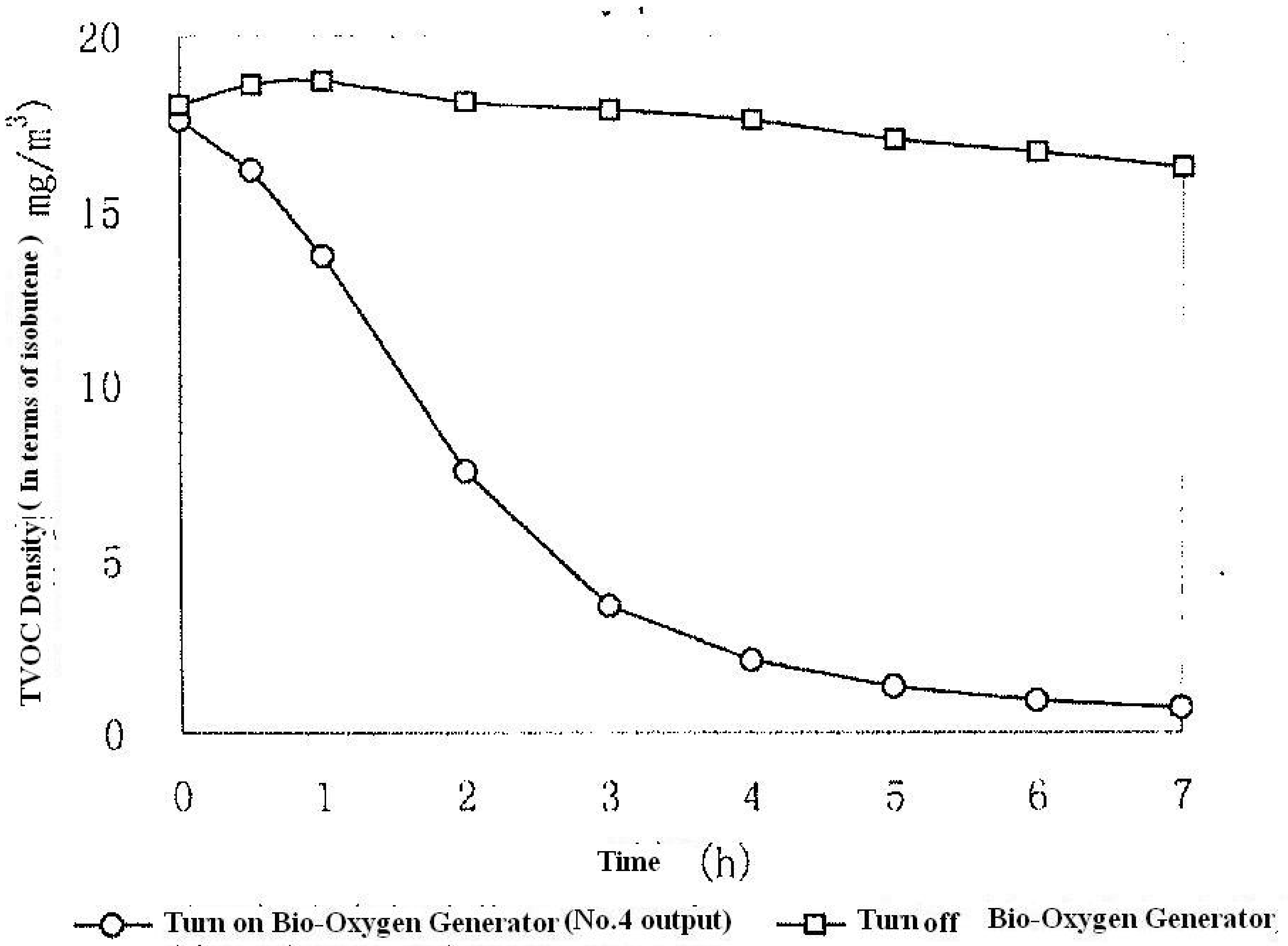
Time (hour)	TVOC (In terms of isobutene) Results (mg/m^3)	
	Turn off Bio-Oxygen Generotor	Turn on Bio-Oxygen Generotor
	TVOC Direct Reading Instrument	TVOC Direct Reading Instrument
0	18.0	17.5
0.5	18.6	16.1
1	18.7	13.7
2	18.1	7.07
3	17.9	3.64
4	17.6	2.09
5	17.0	1.32
6	16.7	0.917
7	16.2	0.699
7 hour Degradation rate (%)	10.0	96.0

Time (Hour)	Total Volatile Organic Compounds (TVOC) Gas chromatography measurements (mg/m^3)		
	Turn off Bio-Oxygen Generotor	Turn on Bio-Oxygen Generotor	
	The first experiment	The first experiment	The second experiment
0	17.6	15.2	46.2
7	12.0	13.5	13.5
7 hour Degradation rate (%)	31.8	11.2	70.8

Audit:	李玉武 Yuwu Li	Approval:	黄 Sanmu Huang
Reporter:	张辉 Hui Zhang	Issue Date:	2007 年 7 月 11 日

TEST REPORT

Bio-Oxygen Generator for TVOC (In terms of isobutene) removal efficiency comparison chart



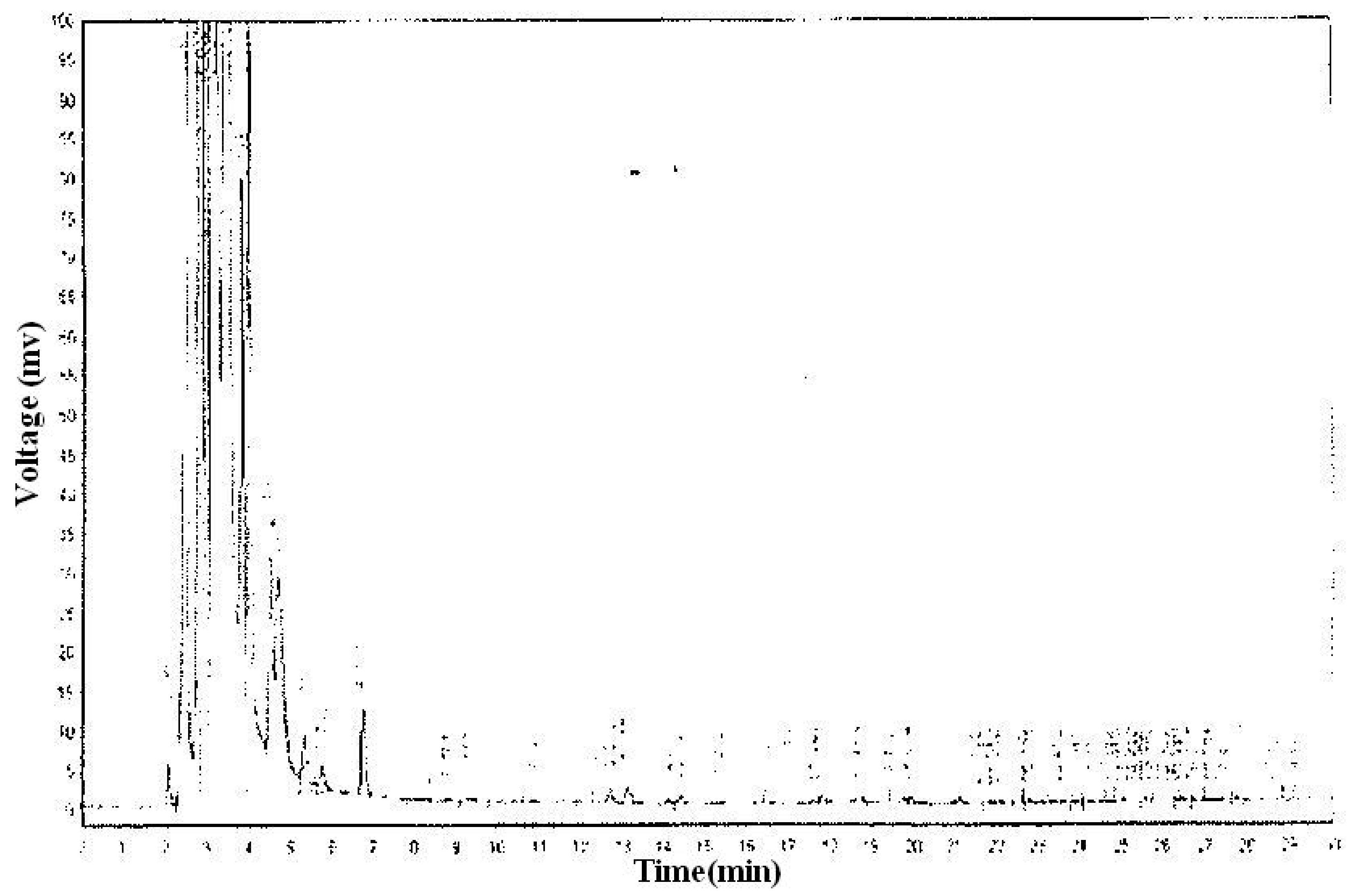
Experiment Description:

The purpose of this study was to test Bio-Oxygen Generator for the removal of **TVOC** in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of **TVOC** in the box, 1 hour after the two cases, respectively (a, turn off Bio-Oxygen Generator; b, turn on Bio-Oxygen generator) sampling and analysis **TVOC** concetration in the box (**Detection of " TVOC " direct-reading instrument In terms of isobutene**). Both cases, by comparing the test date, detect the Bio- Oxygen Generator to remove **TVOC** contribution.

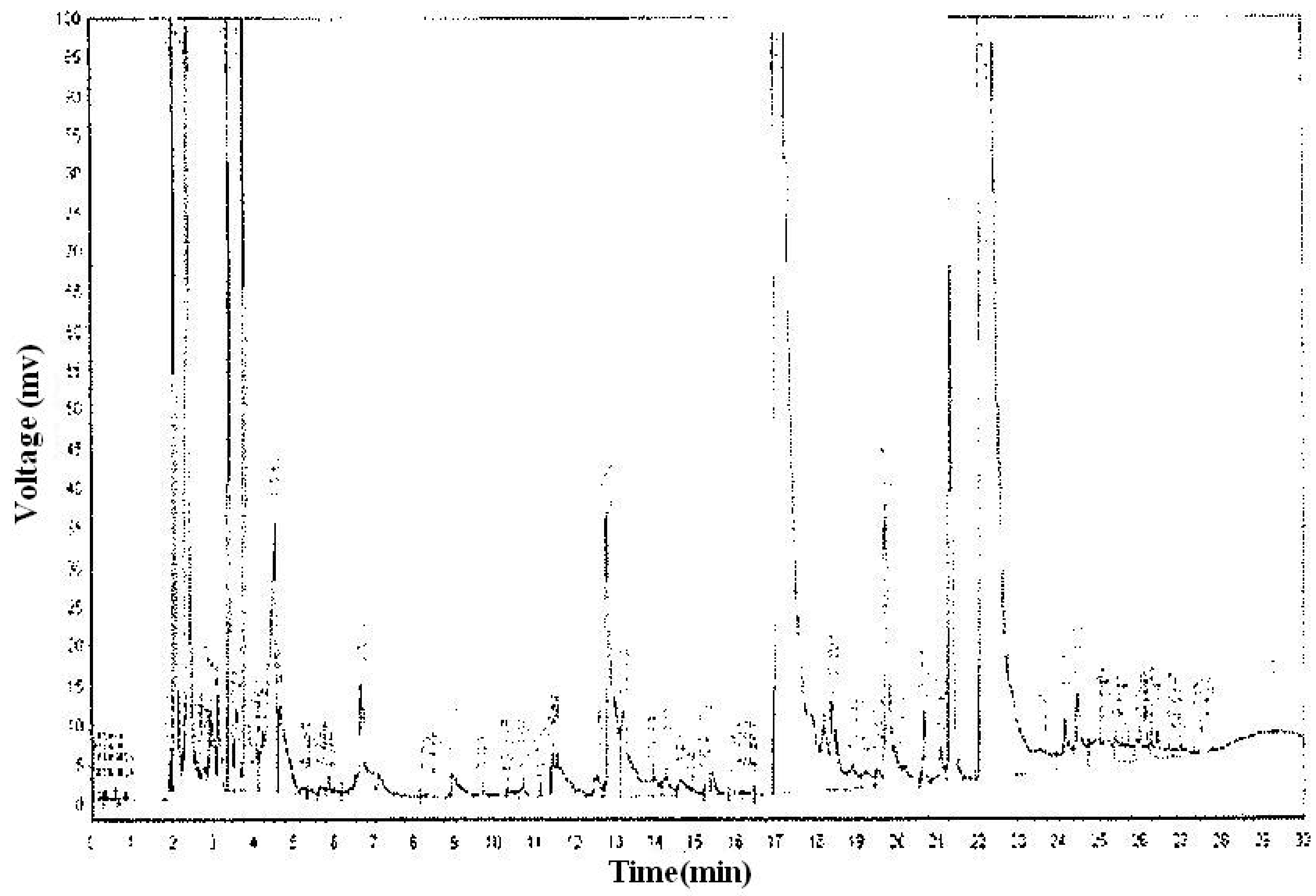
TEST REPORT

The comparison of TVOC concentration in the sealed box before and after using the Bio-Oxygen Generator (the first experiment):

a. **before the Bio-Oxygen Generator been turn on**



b. **after the Bio-Oxygen Generator been turn on for 7 hours**



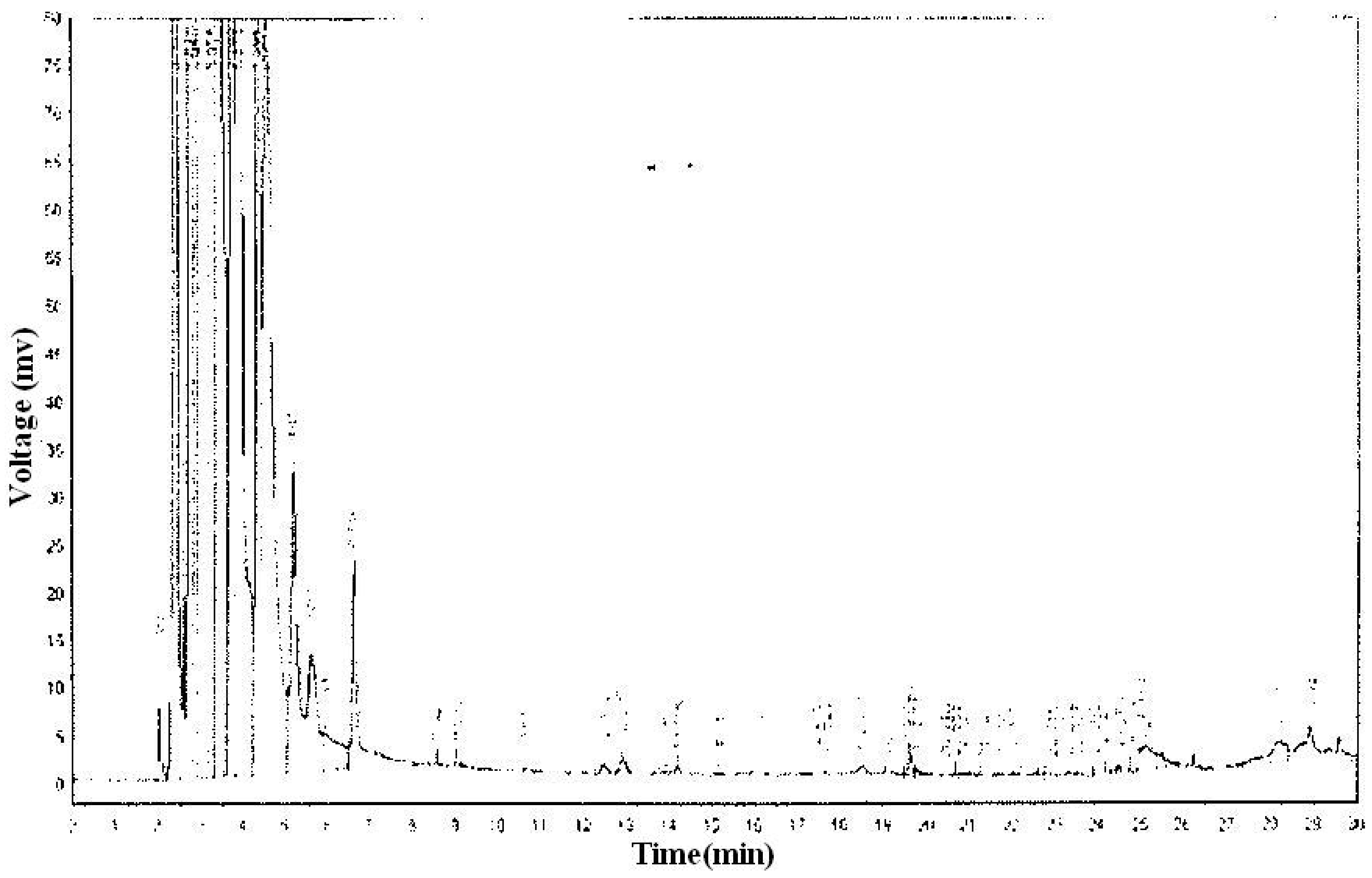
Experiment Description:

The purpose of this study was to test Bio-Oxygen Generator for the removal of **TVOC** in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of **TVOC** in the box, 1 hour after the two cases, respectively (a, turn off Bio-Oxygen Generator; b, turn on Bio-Oxygen generator) sampling and analysis **TVOC** concetration in the box(**Detection of " TVOC " direct-reading instrument In terms of isobutene**). Both cases, by comparing the test date, detect the Bio- Oxygen Generator to remove **TVOC** contribution.

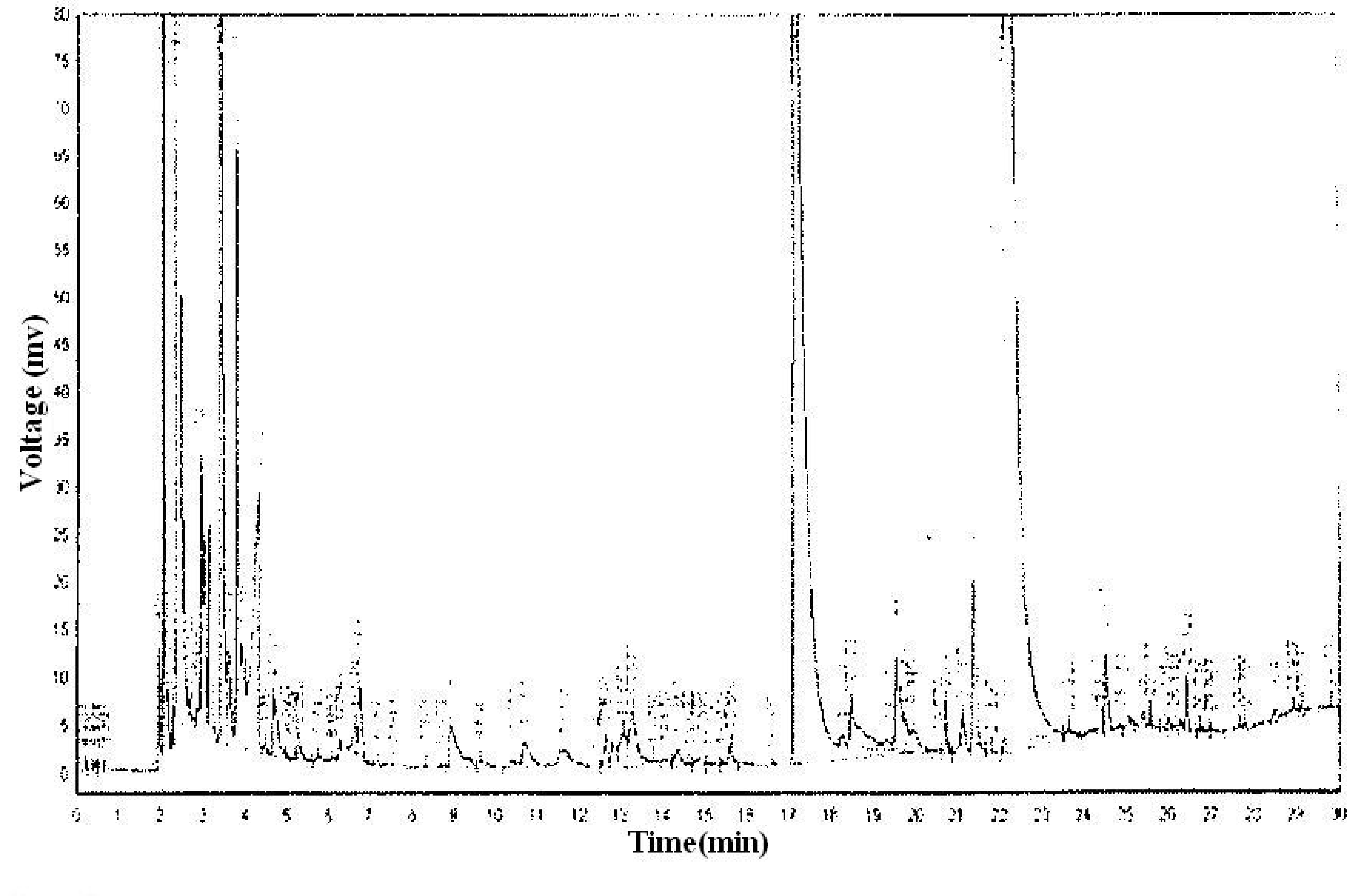
TEST REPORT

The comparison of TVOC concentration in the sealed box before and after using the Bio-Oxygen Generator (the second experiment):

a. **before the Bio-Oxygen Generator been turn on**



b. **after the Bio-Oxygen Generator been turn on for 7 hours**



Experiment Description:

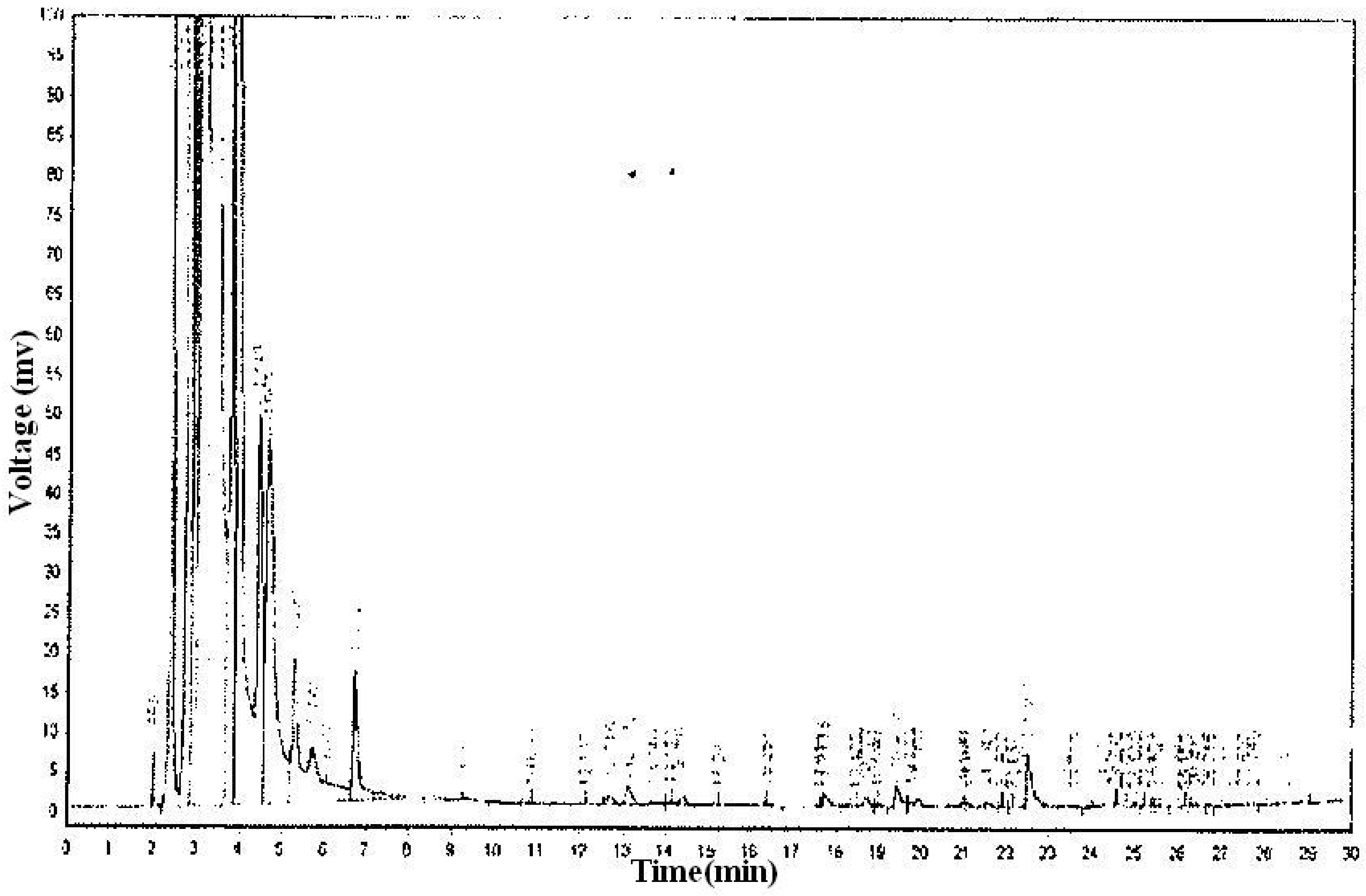
The purpose of this study was to test Bio-Oxygen Generator for the removal of **TVOC** in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of **TVOC** in the box, 1 hour after the two cases, respectively (a, turn off Bio-Oxygen Generator; b, turn on Bio-Oxygen generator) sampling and analysis **TVOC** concetration in the box (**Detection of " TVOC " direct-reading instrument In terms of isobutene**). Both cases, by comparing the test date, detect the Bio- Oxygen Generator to remove **TVOC** contribution.

National Research Center for Environmental Analysis and Measurements

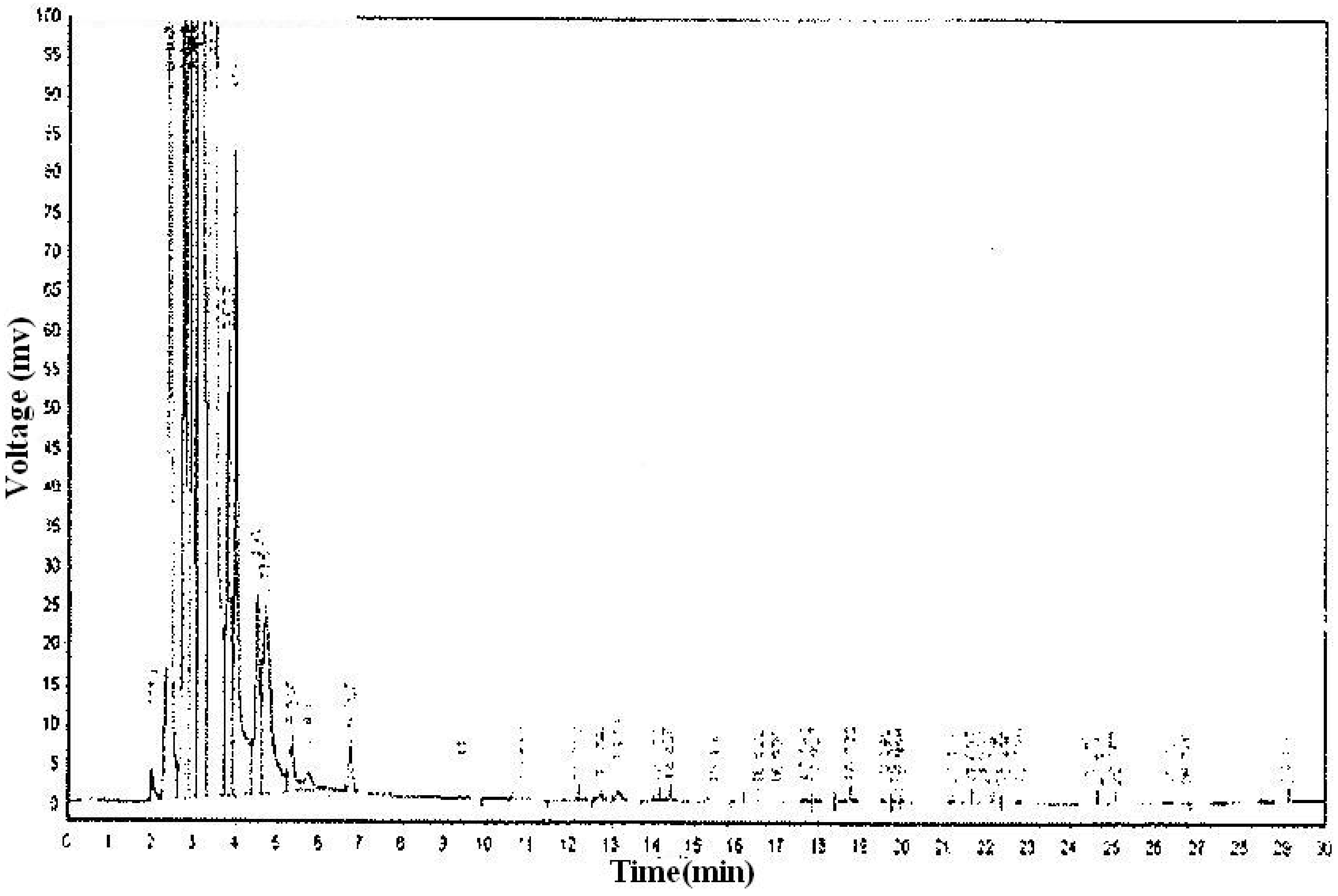
TEST REPORT

The comparison of TVOC concentration in the sealed box before and after non-using the Bio-Oxygen Generator

a, **Beginning of the experiment**



b, **After 7 hours:**



Experiment Description:

The purpose of this study was to test Bio-Oxygen Generator for the removal of TVOC in the air. The experiments was carried out in a sealed box of the net capicity 1m*3. The release of a certain desity of TVOC in the box, 1 hour after the two cases, respectively (a, **beginning of the experiment** b, **after 7 hours**) sampling and analysis TVOC concetration in the box (**Detection of " TVOC " direct-reading instrument In terms of isobutene**). Both cases, by comparing the test date, detect **natural degradation of TVOC in the Sealed box .**

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Test conditions:

Time (hour)	Turn on Bio Oxygen Generator			Turr off Bio Oxygen Generator		
	Temperature (℃)	Presure (kPa)	Relitive Humility (%)	Temperature (℃)	Presure (kPa)	Relitive Humility (%)
0	28.0	100.70	42.0	27.0	100.80	53.0
0.5	29.0	100.70	40.0	27.0	100.80	53.0
1	29.0	100.70	39.0	28.0	100.80	52.0
2	30.0	100.70	39.0	28.0	100.80	50.0
3	30.0	100.50	38.0	28.0	100.80	50.0
4	30.0	100.50	38.0	28.0	100.75	50.0
5	30.0	100.50	37.0	28.0	100.70	50.0
6	31.0	100.50	36.0	30.0	100.70	49.0
7	31.0	100.50	36.0	30.0	100.70	49.0

(N/A)

National Research Center for Environmental Analysis and Measurements

TEST REPORT

Appendix: Standard and method of detection and detection limit

Test Items	Method of detection	Detection Limit
TVOC(mg/m^3)	GB/T18883-2002 《Indoor Air Quality Standard》 Appendix C Gas Chromatography	5.0×10^{-5}

(N/A)

2006000796E

No. L2605

检 测 报 告

TEST REPORT

(2007)字 第(165)号

Serial No. 2007-165

委托单位： Applicant	北京氧泰环保科技有限公司
样品名称： Sample Description	氧生空气净化器 Bio-Oxygen Generator
检测类别： Test Type	委托检测 Ammonia
报告日期： Report Date	2007年6月5日 5 June 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

国家环境分析测试中心 检测报告专用章

国家环境分析测试中心

检测报告单

（2007）字第（165）号　第（1）页　共（3）页

样品名称	氧生空气净化器
委托单位	北京氧泰环保科技有限公司
收样日期	2007年5月18日

检测结果：

使用时间（min）	氨（mg/m^3）		
	未使用氧生空气净化器	使用氧生空气净化器（第8档）	使用氧生空气净化器（第4档）
0	0.640	0.774	0.912
10	0.836	0.393	0.865
20	0.811	0.073	0.773
40	0.699	0.040	0.528
60	0.624	0.056	0.239
80	0.615	N.D.	0.086
120	0.600	N.D.	0.037
2小时降解率	28.2	96.1	95.9
检出限	0.03		

审　　核：李玉武　　　批　　准：黄业茹

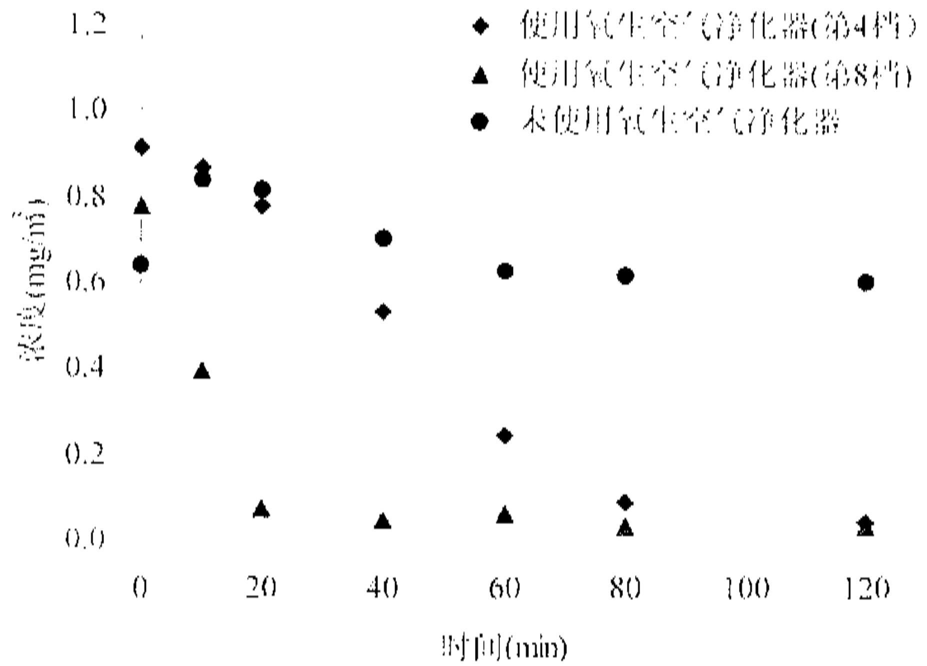
报告编制：张辉　　　签发日期：2007　年　6　月　5　日

国家环境分析测试中心

检测报告单

(2007)产第(159)号 第(2)页 共(3)页

氧生空气净化器对氨去除效果对比图



实验说明：

本实验目的是测试氧生空气净化器对空气中氨的去除效果。实验在净容积$1m^3$封闭密封箱内进行，在箱内释放一定浓度氨，1小时后分别对两种情况（a. 不使用氧生空气净化器；b. 使用氧生空气净化器）采样分析密封箱内氨浓度变化，通过两种情况的测试数据对比检测氧生空气净化器对氨去除的贡献。

检测报告单

实验条件：

使用时间（min）	未使用富生空气净化器			使用富生空气净化器（第4档）		
	温度（℃）	压力（kPa）	相对湿度（%）	温度（℃）	压力（kPa）	相对湿度（%）
0	32.0	100.20	38.0	30.0	100.40	42.0
10	32.0	100.20	38.0	32.0	100.40	40.0
20	32.0	100.20	36.0	32.0	100.40	40.0
40	32.0	100.20	36.0	30.0	100.40	42.0
60	34.0	100.20	34.0	30.0	100.40	42.0
80	34.0	100.20	34.0	30.0	100.40	42.0
120	32.0	100.20	36.0	30.0	100.40	42.0

附录：检测方法标准及方法检出限

检测项目	检测方法	检出限
氨（mg/m³）	GB/T 18204.25-2000 靛酚蓝分光光度法	0.03

（以下空白）

2006000796E

No. L2605

检 测 报 告

TEST REPORT

(2007)字 第(187)号
Serial No. 2007-187

委托单位： Applicant	北京氧泰环保科技有限公司
样品名称： Sample Description	氧生空气净化器 Bio-Oxygen Generator
检测类别： Test Type	委托检测 Benzene
报告日期： Report Date	2007年6月26日 26 June 2007

国家环境分析测试中心
National Research Center for Environmental Analysis and Measurements

国家环境分析测试中心

检测报告单

（2007）字第（187）号　第（1）页　共（3）页

样品名称	氧生空气净化器
委托单位	北京氧泰环保科技有限公司
收样日期	2007年5月18日

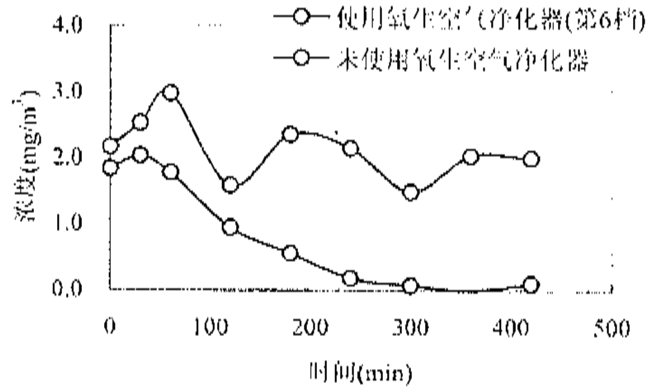
使用时间（min）	苯系物检测结果(mg/m^3)					
	未使用氧生空气净化器			使用氧生空气净化器		
	苯	甲苯	二甲苯	苯	甲苯	二甲苯
0	2.18	0.712	0.161	1.84	0.536	0.111
30	2.53	1.04	0.304	2.04	0.696	0.283
60	2.98	1.32	0.516	1.78	0.561	0.171
120	1.58	0.514	0.178	0.951	0.283	0.096
180	2.36	0.944	0.316	0.560	0.065	0.020
240	2.15	0.861	0.270	0.184	0.134	0.032
300	1.49	0.561	0.153	0.075	0.153	0.061
360	2.03	0.822	0.261	--	0.123	0.035
420	2.00	0.822	0.264	0.099	--	--
3-4小时降解率（%）	32.9	37.7	48.8	95.1	82.3	87.6
检出限	0.005					

审　核：[signature]	批　准：[signature]
报告编制：张辉	签发日期：2007年6月26日

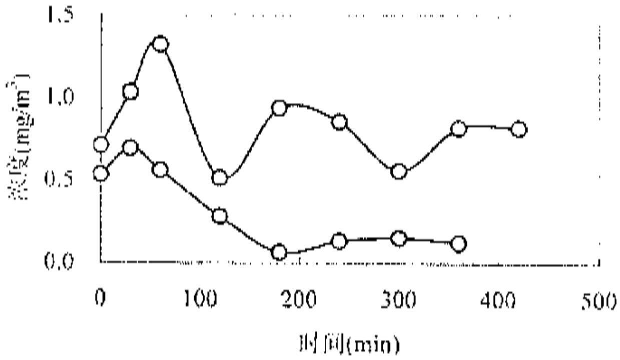
国家环境分析测试中心

检测报告单

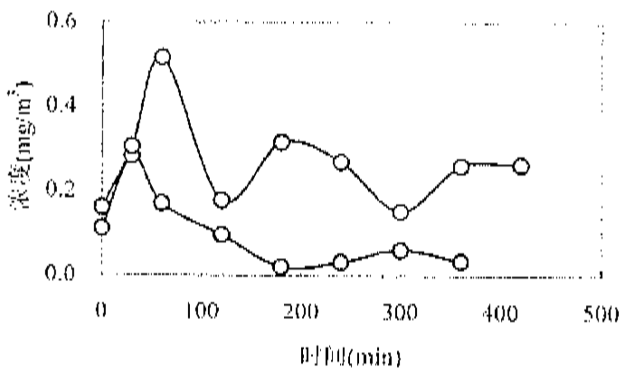
氧生空气净化器对苯去除效果对比图



氧生空气净化器对甲苯去除效果对比图



氧生空气净化器对二甲苯去除效果对比图



国家环境分析测试中心

检测报告单

(2007)字第(187)号 第(3)页 共(3)页

实验说明：

本实验目的是测试氧生空气净化器对空气中苯系物的去除效果。实验在净容积为 $1m^3$ 封闭密封箱内进行。在箱内释放一定浓度苯系物，分别对两种情况(a. 不使用氧生空气净化器；b. 使用氧生空气净化器）采样分析密封箱内苯系物浓度变化。通过两种情况的测试数据对比，检测氧生空气净化器对苯系物去除的贡献。

实验条件：

使用时间 (min)	未使用氧生空气净化器			使用氧生空气净化器		
	温度 (℃)	压力 (kPa)	相对湿度 (%)	温度 (℃)	压力 (kPa)	相对湿度 (%)
0	36.0	100.30	36.0	35.0	100.80	36.0
30	35.0	100.30	35.0	35.0	100.80	36.0
60	35.0	100.30	35.0	33.0	100.80	36.0
120	35.0	100.20	35.0	36.0	100.80	34.0
180	34.0	100.15	34.0	36.0	100.80	34.0
240	34.0	100.15	34.0	35.0	100.60	36.0
300	34.0	100.15	34.0	35.0	100.60	36.0
360	34.0	100.15	34.0	35.0	100.50	36.0
420	34.0	100.15	34.0	34.0	100.55	37.0

附录：检测方法标准及方法检出限

检测项目	检测方法	检出限
苯系物 (mg/m^3)	GB/T 18883-2002 附录 B 气相色谱法	0.005

（以下空白）

CMA 2006000796E

CNAL No. L2605

检 测 报 告

TEST REPORT

(2007)字 第(159)号
Serial No. 2007-159

委托单位： Applicant	北京氧泰环保科技有限公司
样品名称： Sample Description	氧生空气净化器 Bio-Oxygen Generator
检测类别： Test Type	委托检测 Formaldehyde
报告日期： Report Date	2007年5月25日 25 May 2007

国家环境分析测试中心
National Research Center for Environmental Analysis and Measurements

国家环境分析测试中心

检测报告单

(2007)字第(159)号　第(1)页　共(3)页

样品名称	氧生空气净化器
委托单位	北京氧泰环保科技有限公司
收样日期	2007年5月18日

检测结果：

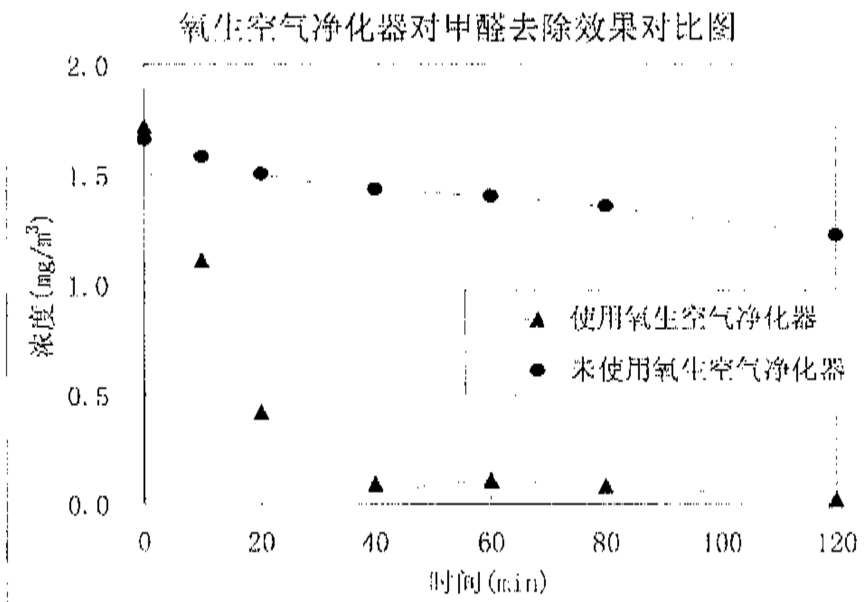
使用时间（min）	甲醛（mg/m^3）	
	未使用氧生空气净化器	使用氧生空气净化器
0	1.66	1.72
10	1.58	1.11
20	1.50	0.425
40	1.43	0.094
60	1.40	0.113
80	1.35	0.084
120	1.22	0.024
2小时降解率	26.5（%）	98.5（%）
检出限	0.02	

审　核：（签名）	批　准：（签名）
报告编制：张辉	签发日期：2007年5月25日

国家环境分析测试中心

检测报告单

(2007)字第(159)号　第(2)页 共(3)页



实验说明：

本实验目的是测试氧生空气净化器对空气中甲醛的去除效果。实验在净容积 $1m^3$ 封闭密封箱内进行。在箱内释放一定浓度甲醛，1 小时后分别对两种情况（a. 不使用氧生空气净化器；b. 使用氧生空气净化器）采样分析密封箱内甲醛浓度变化。通过两种情况的测试数据对比,检测氧生空气净化器对甲醛去除的贡献。

国家环境分析测试中心

检测报告单

(2007)字第(159)号 第(3)页 共(3)页

实验条件：

使用时间（min）	未使用氧生空气净化器			使用氧生空气净化器		
	温度（℃）	压力（kPa）	相对湿度（%）	温度（℃）	压力（kPa）	相对湿度（%）
0	25.0	99.75	26.0	26.0	99.90	24.0
10	25.0	99.75	26.0	26.0	99.90	24.0
20	25.0	99.75	26.0	26.0	99.90	24.0
40	25.0	99.75	26.0	26.0	99.90	24.0
60	25.0	99.75	26.0	25.0	99.90	24.0
80	25.0	99.75	26.0	25.0	99.90	26.0
120	25.0	99.75	26.0	25.0	99.90	26.0

附录：检测方法标准及方法检出限

检测项目	检测方法	检出限
甲醛（mg/m^3）	GB/T 18204.26 酚试剂分光光度法	0.02
（以下空白）		

No. L2870

检 测 报 告

TEST REPORT

(2007)字 第(191)号
Serial No. 2007-191

委托单位： Applicant	北京氧泰环保科技有限公司	
样品名称： Sample Description	氧生空气净化器	Bio-Oxygen Generator
检测类别： Test Type	委托检测	Total Volatile Organic Compounds (TVOC)
报告日期： Report Date	2007 年 7 月 11 日	11 July 2007

国家环境分析测试中心

National Research Center for Environmental Analysis and Measurements

国家环境分析测试中心

检测报告单

(2007)字第(191)号 第(1)页 共(7)页

样品名称	氧生空气净化器
委托单位	北京氧泰环保科技有限公司
收样日期	2007年5月18日

使用时间（小时）	TVOC（以异丁烯计算）检测结果(mg/m^3)	
	未使用氧生空气净化器	使用氧生空气净化器
	TVOC 直读仪	TVOC 直读仪
0	18.0	17.5
0.5	18.6	16.1
1	18.7	13.7
2	18.1	7.07
3	17.9	3.64
4	17.6	2.09
5	17.0	1.32
6	16.7	0.917
7	16.2	0.699
7小时降解率（%）	10.0	96.0

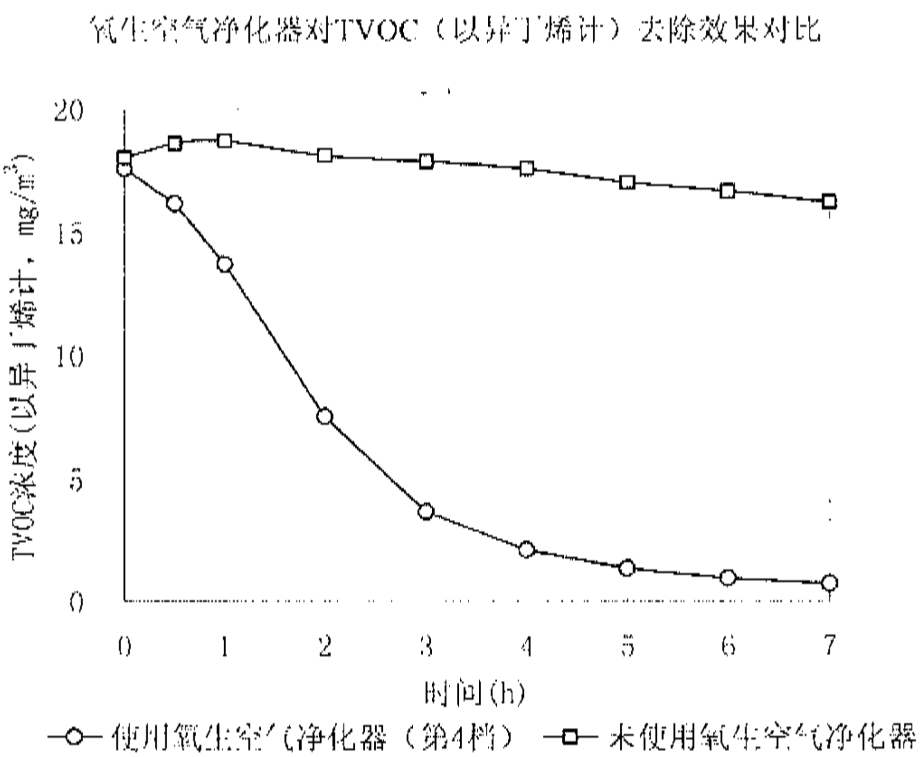
使用时间（小时）	总挥发性有机化合物（TVOC）气相色谱法检测结果(mg/m^3)		
	未使用氧生空气净化器	使用氧生空气净化器	
	第一次实验	第一次实验	第二次实验
0	17.6	15.2	46.2
7	12.0	13.5	13.5
7小时降解率（%）	31.8	11.2	70.8

审 核：	批 准：
报告编制：张辉	签发日期：2007 年 7 月 11 日

国家环境分析测试中心

检测报告单

(2007)字第(191)号　第(2)页　共(7)页



实验说明：

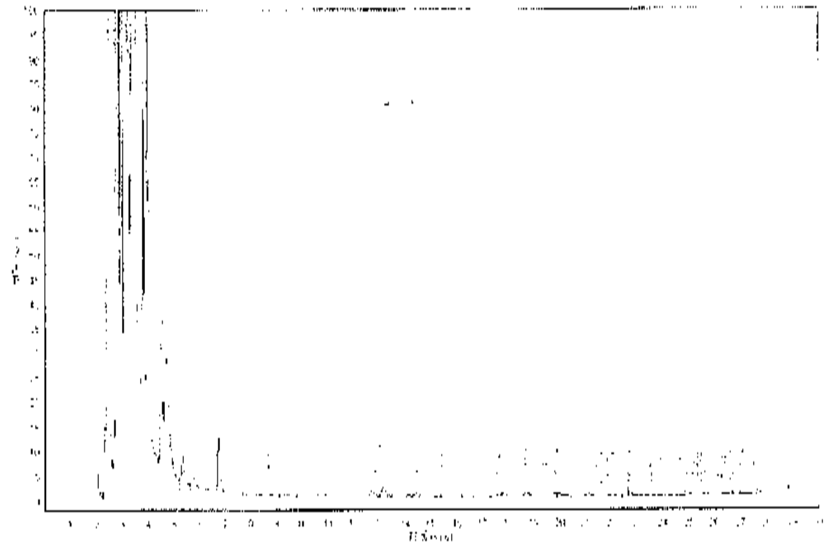
本实验目的是测试氧生空气净化器对空气中 TVOC 的去除效果。实验在净容积为 $1m^3$ 密封箱内进行。在箱内释放一定浓度有机溶剂胶粘剂，分别对两种情况（a．不使用氧生空气净化器；b．使用氧生空气净化器）采样分析密封箱内 TVOC 浓度变化(直读仪检测，以异丁烯计)。通过两种情况的测试数据对比，检测氧生空气净化器对 TVOC 去除的贡献。

国家环境分析测试中心

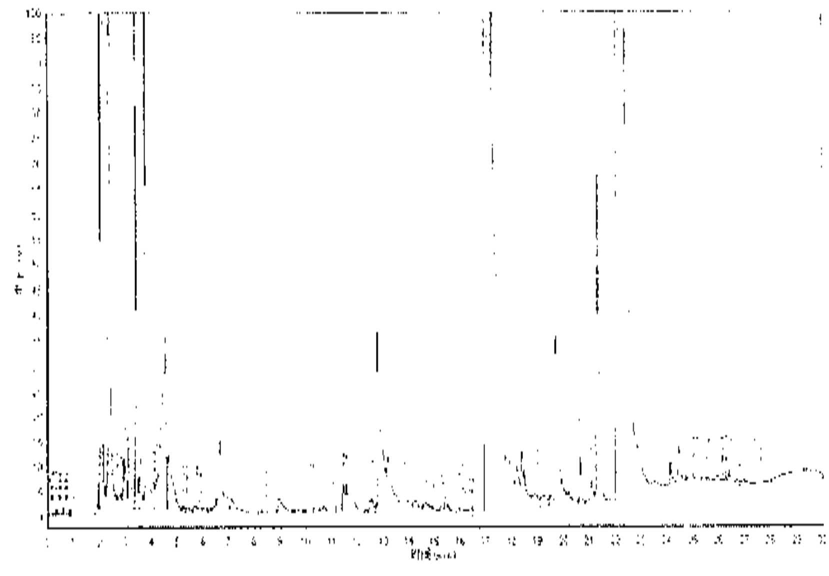
检测报告单

使用氧生空气净化器前后密封箱内TVOC浓度变化比较（第1次实验）

a. 使用前



b. 使用氧生空气净化器7小时后



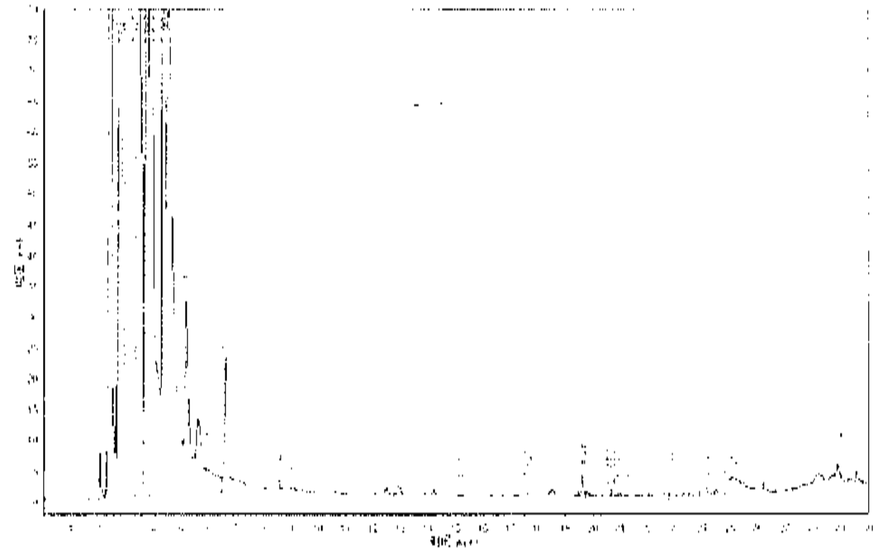
实验说明：

本实验目的是测试氧生空气净化器对空气中TVOC的去除效果。实验在净容积为1m³密封箱内进行，在箱内释放一定浓度有机溶剂胶粘剂，分别对两种情况（a. 不使用氧生空气净化器；b. 使用氧生空气净化器7小时后）采样分析密封箱内TVOC浓度变化（气相色谱法检测）。通过两种情况的测试数据对比检测氧生空气净化器对TVOC去除的贡献。

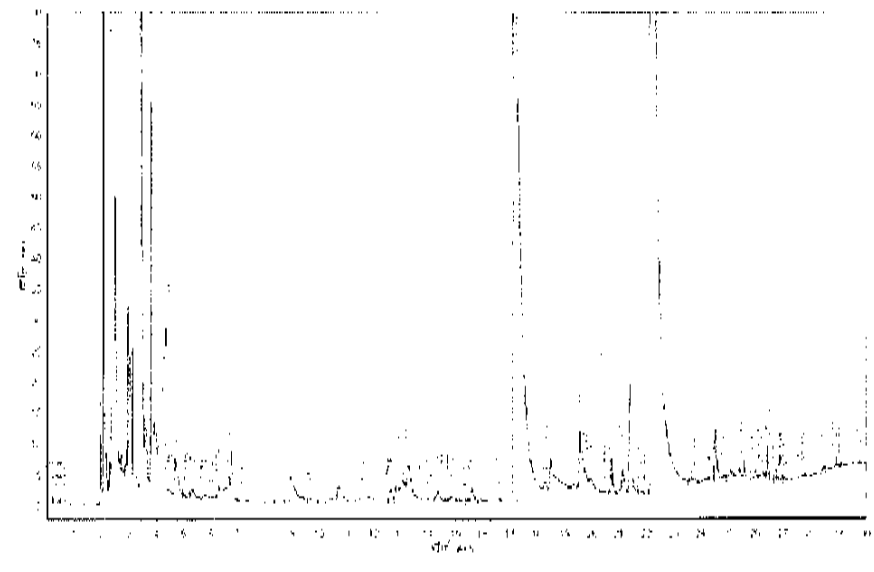
检测报告单

使用氧生空气净化器前后密封箱内TVOC浓度变化比较（第2次实验）：

a. 使用前



b. 使用氧生空气净化器7小时后



实验说明：

本实验目的是测试氧生空气净化器对空气中TVOC的去除效果，实验在净容积为1m³密封箱内进行，在箱内释放一定浓度有机溶剂胶粘剂，分别对两种情况（a. 不使用氧生空气净化器；b. 使用氧生空气净化器7小时后）采样分析密封箱内TVOC浓度变化（气相色谱法检测），通过两种情况的测试数据对比,检测氧生空气净化器对TVOC去除的贡献。

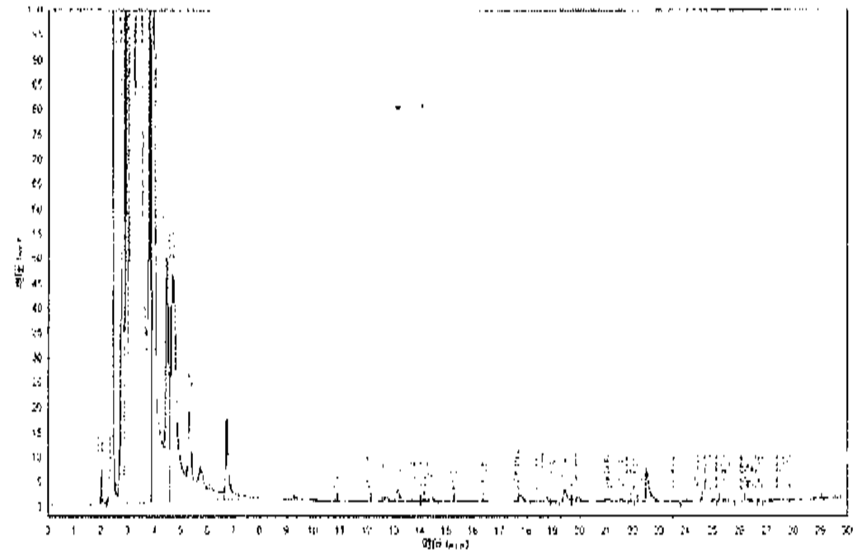
国家环境分析测试中心

检测报告单

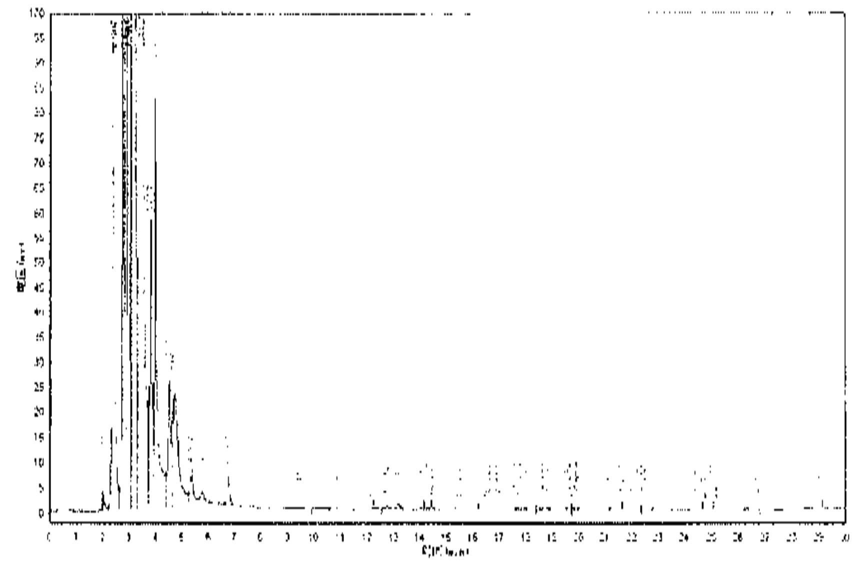
（2007）字第（191）号　第（5）页 共（7）页

未使用氧生空气净化器7小时前后密封箱内TVOC浓度变化比较：

a. 实验开始



b. 7小时后



实验说明：

本实验目的是测试氧生空气净化器对空气中TVOC的去除效果。实验在净容积为1m^{3}密封箱内进行。在箱内释放一定浓度有机溶剂胶粘剂，分别对不使用氧生空气净化器的两种情况（a. 实验开始；b. 7小时后）采样分析密封箱内TVOC浓度变化（气相色谱法检测）。通过两种情况的测试数据对比，检验密封箱自然降解情况。

国家环境分析测试中心

检测报告单

实验条件：

使用时间（小时）	使用氧生空气净化器			未使用氧生空气净化器		
	温度（℃）	压力（kPa）	相对湿度（%）	温度（℃）	压力（kPa）	相对湿度（%）
0	28.0	100.70	42.0	27.0	100.80	53.0
0.5	29.0	100.70	40.0	27.0	100.80	53.0
1	29.0	100.70	39.0	28.0	100.80	52.0
2	30.0	100.70	39.0	28.0	100.80	50.0
3	30.0	100.50	38.0	28.0	100.80	50.0
4	30.0	100.50	38.0	28.0	100.75	50.0
5	30.0	100.50	37.0	28.0	100.70	50.0
6	31.0	100.50	36.0	30.0	100.70	49.0
7	31.0	100.50	36.0	30.0	100.70	49.0

（以下空白）

国家环境分析测试中心

检测报告单

(2007)字 第(191)号 第(7)页 共(7)页

附录：检测方法标准及方法检出限

检测项目	检测方法	检出限
TVOC(mg/m^3)	GB/T18883-2002 《室内空气质量标准》附录C气相色谱法	5.0×10^{-5}

（以下空白）

DEPARTMENT OF MINERAL RESOURCES
MINE SAFETY UNIT

THE MONITORING OF CARBON DIOXIDE IN A SEALED ROOM WITH AND WITHOUT BIO-OXYGEN

on 16-17 th MARCH , 1994

BIO-OXYGEN AUSTRALIA PTY. LIMITED

24 MARCH 1994

MINE SAFETY
TEST REPORT No.94/345b
This is a re-issue of Test Report 94/345

P.O. Box 76 LIDCOMBE NSW 2141

GAS ANALYSIS REPORT 94/345b

Introduction

Bio-Oxygen Australia Pty. Limited contracted the services of the Mine Safety Unit to undertake analysis of the decay rate of carbon dioxide with and without the Bio-oxygen activated oxygen generator.

Method

The test was carried out at the premises of Bio-Oxygen Australia Pty.Ltd. on 16-17 March 1994. The sample point was located at the middle of a sealed room whose dimensions were approximately 7m x 3m x 3m. The Bio-Oxygen equipment consisted of an Activated Oxygen Generator and a Fan. The fan provided air circulation in the room and could be activated separately.

Air samples were drawn through a Thomas gas sampling pump to a Horiba PIR-2000 Carbon Dioxide analyser and then returned to the sealed room.. A Grant Sqirrel Data Logger was connected to the Horiba PIR-2000 to continuously monitor and record CO2 levels. Carbon dioxide was introduced to the sealed room as mentioned above until it reached a concentration of about 1.2% CO_2 and was then monitored over two 450 minute periods.

The first carbon dioxide monitoring run was conducted with the Bio-Oxygen device turned on for about one and half hours at the beginning of the run. The Bio-Oxygen generator was turned off for the rest of the first run to monitor any after-effect produced by the generator.

The second carbon dioxide monitoring run was conducted without the Bio-Oxygen device and was used as reference to compare against the first run.

I was present during the whole of the first run. The second run was conducted overnight in the care of by Bio-Oxygen personnel but with the Data Logger continuing to record.

The temperature and humidity in the sealed room was average 23.5°C and 53%RH.

Results

The results of the tests are shown in Table-1 and Figure-1.

Testing Officer : H. P. Phan

National Association of Testing Authorities, Australia
NATA ENDORSED DOCUMENT
This document may not be reproduced except in full.

----
for G.Fawcett
Manager
Mine Safety Unit

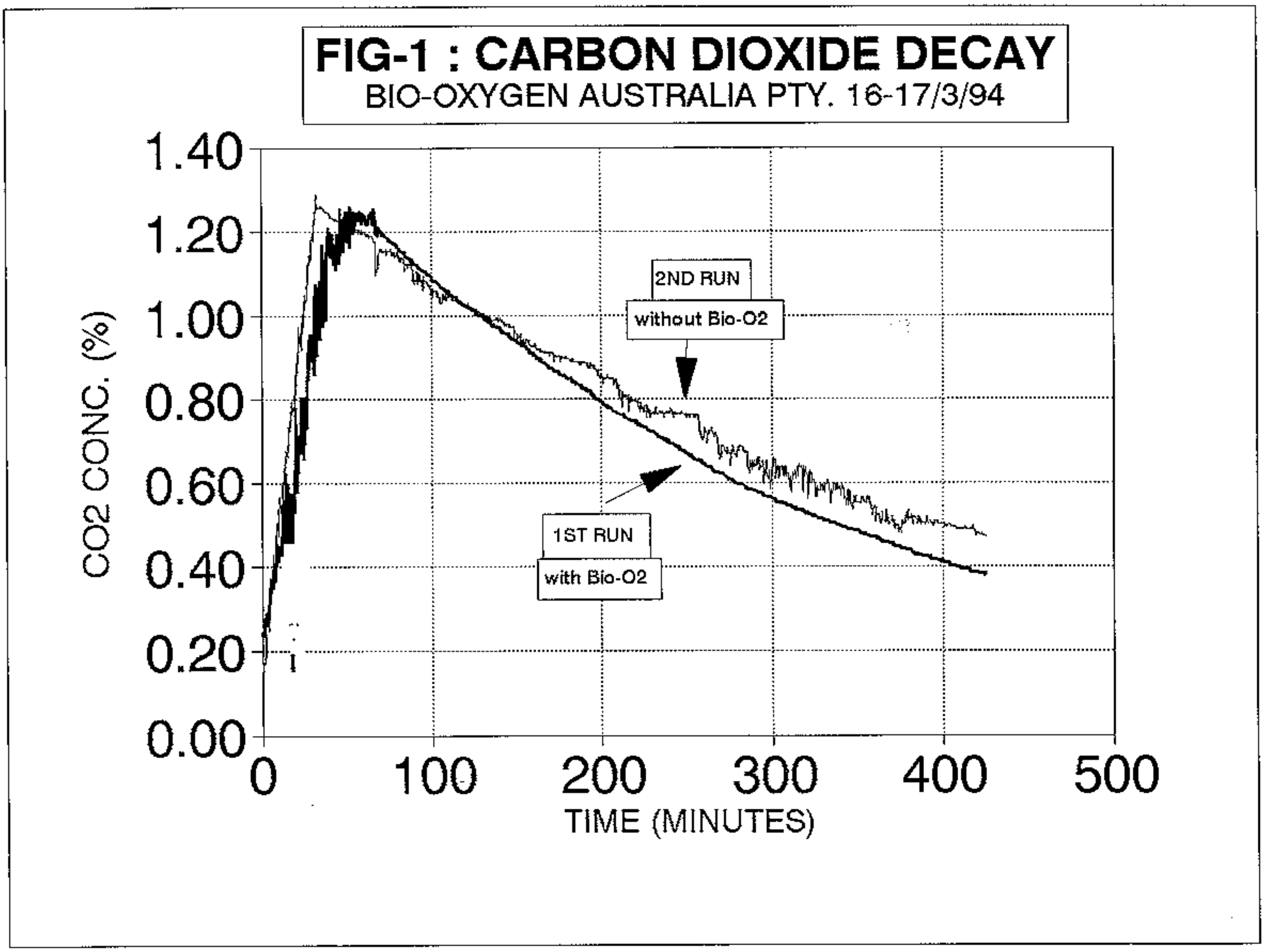


FIG-1 : CARBON DIOXIDE DECAY
BIO-OXYGEN AUSTRALIA PTY. 16-17/3/94
CO2 CONC. (%)
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0
100
200
300
400
500
TIME (MINUTES)
2ND RUN
without Bio-O2
1ST RUN
with Bio-O2

Mr John B. Waanders
Laboratory Manager, Department of Chemical Engineering
The University of Newcastle, Callaghan, NSW 2308
Phone: (02) 4921 6103 - Fax: (02) 4921 8692 - Mob: 0412 872 983
Email: John.Waanders@newcastle.edu.au

14th October 2005

Client: Bio-Oxygen Aust Pty Ltd
36 Bennett Place, Castle Hill, 2154

Report – Effect of the Bio-Oxygen purifiers on Static Electricity.

Introduction:
There had been reports that in situations where Bio-Oxygen Air Purification systems were in place that there was a noticeable absence of the accumulation of static charge. The comments came from patrons at Clubs who had reported sparking from static electricity when playing poker machines, but the sparking had ceased after the Bio-Oxygen Units were installed and operating. The phenomena was investigated by setting up an electroscope in an enclosure and charging it with static electricity, then examining the effects with and without the presence of Bio-Oxygen units.

Experimental Procedure
A gold leaf electroscope was used in the investigation and it was charged by use of a Van de Graaff generator which produces static electrical charge by means of a rotating insulating belt The procedure was to charge the electroscope with the generator and time how long the charge would remain in the electroscope after ceasing operation of the generator. In this situation the electroscope showed maximum dilation of the gold leaf of 90 degrees from the vertical, and which over a period of 2 minutes dropped to a dilation of 45 degrees from the vertical.The process was repeated a number of times to quantify the results. It must be noted also that while the Van de Graaff generator was operating the charge on the electroscope remained at a maximum dilation of 90 degrees.

Having completed this series of tests the Bio-Oxygen Air Purifier was turned on and allowed to stabilize for a period of 15 minutes. After 15 minutes of operation of the Bio-Oxygen units the Van de Graaff generator was turned on and the electroscope was charged as previously. The observations of this procedure showed that the electroscope was unable to hold any substantial charge. In other words, during the operation of the Bio-Oxygen units, the electroscope was unable to hold enough charge to cause the dilation of the gold leaf any more than 30 degrees whilst the Van de Graaff was operating continually. When the Van de Graff generator was turned off the charge in the electroscope had disappeared, leaving the gold leaf to hang vertically (at 0 degrees). This test was repeated a number of times with the same results being obtained each time.

To confirm the effects of the Bio-Oxygen units they were turned off, and the test was repeated. It was observed that even after the Bio-Oxygen units were not operating the electroscope was unable to hold any substantial charge from the Van de Graff generator due to the lasting effects of the Bio-Oxygen units within the enclosure. As time progressed however, the electroscope was able to build up some charge and this charge continued to increase as time elapsed. Once the presence of the Bio-Oxygen particles had disappeared the electroscope was able to reach full charge again.

Results
These observations proved conclusively that the Bio-Oxygen Air Purifiers were most effective in eradicating and removing any electrical charge caused by the generation of static electricity.

John Waanders

John Waanders BE, MEngSc, CEng, FIChemE, FIEAust, CPEng.
Laboratory Manager, Chemical Engineering