



Volatile Organic Compound Analysis & Testing for Odour Removal Efficiencies Using ANOTEC 0307

Testing Authorities:

AUSTRALIAN NUCLEAR SCIENCE
& TECHNOLOGY ORGANISATION



LUCAS HEIGHTS SCIENCE & TECHNOLOGY CENTRE, NEW ILLAWARRA RD, LUCAS HEIGHTS, NSW, AUSTRALIA



THE UNIVERSITY OF
NEW SOUTH WALES
SYDNEY • AUSTRALIA



Furniture Manufacturing Factory- Efficacy Testing for Anotec Odour Control

AUSTRALIAN NUCLEAR SCIENCE
& TECHNOLOGY ORGANISATION



LUCAS HEIGHTS SCIENCE & TECHNOLOGY CENTRE, NEW ILLAWARRA RD, LUCAS HEIGHTS, NSW, AUSTRALIA

COMPOUND (ppb)	STACK	ANOTEC
carbonylsulphide	9.96	0.2
sulphurdioxide	4.49	0.12
dimethylsulphide	0.68	<0.01
carbondisulphide	13.92	0.57
acetaldehyde	71.27	22.13
2-methylpropanal	1.73	0.16
methanol	128.5	83.28
ethanol	5,836	64.06
i-propanol	4,356	17.12
propanol	1.97	<0.02
t-butanol	4.16	0.79
i-butanol	2,319	7.14
butanol	644	1.96
3-methylbutanol	140	0.5
acetone	642	13.86
2-butanone	4,140	13.67
3-buten-2-one	1.79	0.04
2,3-butandione	0.44	0.08
methylisobutylketone	6.73	0.04
ethylacetate	1,586	1.77
butylacetate	49.5	0.15
freon 11	0.92	0.52
freon 113	0.15	0.14
dichloromethane	48.5	8.27
1,2-dichloroethane	8.8	0.22
chloroform	22.5	1.47
1,1,1-trichloroethane	22.3	1.82
carbontetrachloride	0.24	0.09
trichloroethylene	30.5	0.63
i-pentane	7.89	2.1
pentane	1.11	0.65
2-methylpentane	21.1	2.65
3-methylpentane	23.2	5.83
hexane	98.1	8.29
benzene	65.9	6.85
methylhexanes	291	2.11
heptane	453	1.07
methylcyclopentane	103	2.68
cyclohexane	434	2.08
methylcyclohexane	1,329	3.4
octane	325	0.29
toluene	2,998	0.35
ethylbenzene	703	0.6
m,p-xylenes	324	0.65
o-xylenes	70.6	0.17
nonane	49.2	0.06
decane	3.7	0.07
undecane	1.56	0.05
TOTAL	27394.41	296.53

Dr. David Stone, ANSTO



**Industrial Emissions - Efficacy Testing for
Anotec Odour Control**

COMPONENT (ppb)	RAW ODOUR	ANOTEC	% REMOVAL
1-chloro-1, 1 difluoroethane	2314.9	109.3	95.28
Dimethyl sulfide	0.3	0.1	66.00
Dimethyl disulfide	0.2	0.1	50.00
Carbon disulfide	6.2	0.47	92.42
Sulfur dioxide	6.6	0.9	86.36
Carbonyl sulfide	11.3	3.7	67.26
Acetaldehyde	249.1	5	97.99
Methanol	40	9.2	77.00
Ethanol	85.6	19.8	76.87
i-propanol	8.2	1.7	79.27
t-butanol	22.8	4.5	80.26
Acetone	121.3	14.5	88.05
2-butanone	93.7	17.1	81.75
3-buten-2-one	5.1	1	80.39
Ethyl acetate	3.9	1	74.36
2-methyl propanol	1.3	0.05	96.15
Butanal	40.6	6.3	84.48
Hexanal	19	2	89.47
Pyrrolidine	43.3	5	88.45
Propane	47.9	12.1	74.74
Methyl propane	85.1	22.1	74.03
Butane	10.4	0.9	91.35
Methyl butane	5.58	0.57	89.78
Pentane	25.9	1.1	95.75
2-methyl pentane	5.23	0.57	89.10
3-methyl pentane	280.3	52.1	81.41
Hexane	174.9	2.2	98.74
Benzene	4.1	0.32	92.20
Methyl cyclopentane	7.84	0.8	89.80
Cyclo hexane	17.25	0.7	95.94
Methyl hexane	261.8	25.31	90.33
Heptane	73.8	11.5	84.42

* Average removal efficiency >84.35%


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Jewellery Manufacture / Solvents Efficacy Testing for Anotec Odour

Component (ppb)	Direct Spray	Ambient
ethyl acrylate	112	2.2
methyl methacrylate	11	0.4
acetone	1301	16.1
hexane	120	3.2
ethanol	66	4.9
i-butanol	1367	8.5
butanol	1160	5.5
2-butanone	234	22.3
methyl isobutylketone	160	0.7
methylfuran	2.39	0
benzene	28	8
toluene	1179	21.5
ethyl benzene	2464	3
m- and p- xylene	7238	6.7
o-xylene	2983	2.1
chloroform	1824	22.5
1,1,1-trichloroethane	11.64	0.2
tetrachloromethane	7.89	2.1
trichloroethane	4283	375
tetrachloroethane	381	3.5
TOTAL	24932.92	508.4



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MEK - Efficacy Testing for Anotec Odour Control

COMPONENT (ppb)	RAW	TREATED with ANOTEC 0307
acetaldehyde	480.5	7.9
methanol	35	2
ethanol	93.2	11.3
i-propanol	15.6	0.1
t-butanol	25.4	3.1
acetone	132.2	10.3
2-butanone	103.8	12
3-buten-2-one	10.2	0.1
ethyl acetate	8.1	0.1
2-methyl propanol	6.9	0.2
butanal	52	3.3
hexanal	41	1
benzene	6.2	0.1
toluene	18.3	0.8
ethyl benzene	4.25	0.1
m-and p- xylene	5.9	0.72
o-xylene	0.32	0
dichloro methane	8.7	0.05
trichlorofluoromethane	0.59	0.01
1,1,2-trichloro-a,2,2- trichloroethane	0.45	0.09
bromodichloromethane	0.6	0.02



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**Phosphate Plant - Efficacy Testing for Anotec
Odour Control**

COMPONENT (ppm)	RAW ODOUR	ANOTEC	% REMOVAL
Sulfur dioxide	1.1	0.25	77.27
Carbonyl sulfide	2.2	1	54.55
Carbon disulfide	0.05	0.008	84
Dimethyl sulfide	1.9	0.6	68.42
Methyl ethyl disulfide	0.01	0.002	80
Methyl propyl disulfide	0.02	0.003	85
Methyl mercaptan	0.26	0.04	85
Methyl ethyl sulfide	0.7	0.009	98.71
Methyl isopropyl sulfide	0.2	0.003	98.5
Methyl propyl sulfide	0.01	0.001	90
Difluoro dimethyl silane	0.7	0.3	57
Iodomethane	0.04	0.01	75
2-methyl propanol	0.3	0.06	80
2-methyl 2-propenal	2.6	0.9	65.38
Butanal	0.06	0.04	33.33
Furan	2.1	0.9	57.14
2-methyl furan	0.6	0.07	88.33
Acetone	9	2.8	68.89
3-buten-2-one	4.7	0.1	97.87
2,3-butanedione	0.5	0.04	92
2-butanone	1.7	0.3	82.35
Methanol	32	2	93.75
Ethanol	9.1	1	89.01
i-propanol	2.8	0.9	67.86
Propanol	0.4	0.2	50
2-methyl pentane	3.8	0.9	76.31
3-methyl pentane	2.5	1.03	58.8
Hexane	4.7	0.9	80.85
Methyl cyclopentane	1.5	0.8	46.67
2-methyl hexane	0.5	0.09	82
Heptane	1.9	0.3	84.21
Methyl cyclohexane	1.6	0.5	68.75
Toluene	1.3	0.3	76.92
Ethyl benzene	0.3	0.1	66.67
m,p xylenes	0.7	0.004	99.42
o xylenes	1.3	0.6	53.84
Trimethyl cyclohexanes	0.4	0.2	50
Octane	0.2	0.2	
Nonane	0.3	0.1	66.67
C8-11 alkanes	1.3	0.9	30.77


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Plastic Moulding Factory -Efficacy Testing for Anotec Odour Control

COMPOUND	RAW	TREATED
1-chloro-1,1-difluoroethane	2314.9	652.6
dimethyl sulfide	0.3	0.1
dimethyl disulfide	0.2	0.1
carbonyl disulphide	6.2	4.7
sulfur dioxide	6.6	0.9
carbonyl sulfide	11.3	3.7
acetaldehyde	249.1	10
methanol	40	20.2
ethanol	85.6	36.7
i-propanol	8.2	2.7
t-butanol	22.8	4.5
acetone	121.3	37.2
2-butanone	93.7	17.1
3-buten-2-one	5.1	1
ethylacetate	3.9	1
2-methylpropanal	1.3	0.7
butanal	40.6	11.8
hexanal	19	9
pyrrolidine	43.3	8
propane	47.9	16.7
methylpropane	85.1	35.5
butane	10.4	3.8
methylbutane	5.58	0.57
pentane	25.9	3.21
2-methylpentane	5.23	3.28
3-methylpentane	280.3	102.1
hexane	174.9	50.5
benzene	4.1	1.14
methylcyclopentane	7.84	2.93
cyclohexane	17.25	5.46
methylhexanes	261.8	63.6
heptane	73.8	15.4
methylcyclohexane	1.86	0.96
branched C7 alkanes	29.5	5.9
branched C8 alkanes	158.9	33.2
octane	34	6.18
nonane	3.29	0.25
branched C9 alkanes	164.1	34.9
toluene	10.1	2.92
ethylbenzene	3.46	0.88
m-and p-xylene	2.26	0.69
o-xylene	0.64	0.14



Plastic Moulding Factory -Efficacy Testing for Anotec Odour Control

COMPOUND	RAW	TREATED
dichloromethane	4.3	2.78
trichlorofluoromethane	0.86	0.33
1,1,2-trichloro-1,2,2-trifluoroeth	0.34	0.11
bromodichloromethane	0.13	0.03
1,1-dichloroethane	0.65	0.64
1,2-dichloroethene	0.04	0.03
chloroform	3.08	2.81
tetrachloromethane	0.27	0.21
tetrachloroethene	0.06	0.02
1-chloro-1, 1 difluroethane	2314.9	652.6
dimethyl sulfide	0.3	0.1
dimethyl disulfide	0.2	0.1
carbon disulfide	6.2	4.7
sulfur dioxide	6.6	0.9
carbonyl sulfide	11.3	3.7
acetaldehyde	249.1	10
methanol	40	20.2
ethanol	85.6	36.7
i-propanol	8.2	2.7
t-butanol	22.8	4.5
acetone	121.3	37.2
2-butanone	93.7	17.1
3-buten-2-one	5.1	1
ethyl acetate	3.9	1
2-methyl propanol	1.3	0.7
butanal	40.6	11.8
hexanal	19	9
pyrrolidine	43.3	8
propane	47.9	16.7
methyl propane	85.1	35.5
butane	10.4	3.8
methyl butane	5.58	0.57
pentane	25.9	3.21
2-methyl pentane	5.23	3.28
3-methyl pentane	280.3	102.1
hexane	174.9	50.5
benzene	4.1	1.14
methyl cyclopentane	7.84	2.93
cyclo hexane	17.25	5.46
methylhexanes	261.8	63.6

heptane	73.8	15.4
methylcyclohexane	1.86	0.96
branched C7 alkanes	29.5	5.9
branched C8 alkanes	158.9	33.2
octane	34	6.18
nonane	3.29	0.25
branched C9 alkanes	164.1	34.9
toluene	10	2.92
ethyl benzene	3.46	0.88
m-and p- xylene	2.26	0.69
o-xylene	0.64	0.14
dichloro methane	4.3	2.78
trichlorofluoromethane	0.86	0.33
1,1,2-trichloro-a,2,2-trichloroethane	0.34	0.11
bromodichloromethane	0.13	0.03
1,1-dichloroethane	0.65	0.64
1,2-dichloroethene	0.04	0.03
chloroform	3.08	2.81
tetrachloromethane	0.27	0.21
tetrachloroethene	0.06	0.02
TOTAL	4491.2	1219.17



Dr. David Stone, ANSTO



**Poultry Farm - Efficacy Testing for
Anotec Odour Control**

COMPONENT (ppm)	RAW ODOUR	ANOTEC	% REMOVAL
Hydrogen sulfide	<0.02	<0.001	95
Methyl mercaptan	0.2	<0.001	99.86
Carbonylsulfide	37.96	0.52	98.63
Sulfur dioxide	<0.01	<0.001	90
Dimethyl sulfide	2.24	<0.001	99.95
Acetaldehyde	26.32	0.98	96.27
Butanal	3.12	0.23	92.62
Methanol	2.42	0.05	97.93
Ethanol	128.63	2.3	98.21
i-propanol	116.25	1.98	98.29
Acetone	396.12	3.45	98.12
Ethylacetate	1.85	0.75	59.62
Methylamine	3.2	<0.05	98.43
Trimethylamine & Ammonia	2.96	<0.05	98.31
Urea	23.62	1.32	94.41
Benzene	11.12	0.98	91.18
C8-C9 alkanes	0.51	<0.001	99.83
Cyclohexane	1.65	<0.05	96.96
Valeryl acetates	52.48	3.56	95.71
Pinenes	52.48	3.56	93.21



Dr David Stone, ANSTO

**SEWAGE PUMPING STATION - STACK
EMISSIONS ODOUR ANALYSIS**

Anotec Pty Ltd.			
Component (ppb)	Raw Odour	Treated with Anotec 0307	Odour Removal Efficiency (%)
Hydrogen Sulfide	1316	1.8	99.86
Sulfur dioxide	2	0	
Methyl mercaptan	625.5	0.3	99.96
Dimethyl sulfide	179.3	1.6	99.10
Ethyl mercaptan	0.4	0	
Carbon disulfide	27.1	3.9	85.60
Carbonyl sulfide	66	9.1	86.60
Propyl mercaptan	1.7	0	
Calculated Odour Strength (ODU)			
Component	Odour Threshold (ppb)	Raw Odour (Untreated)	Anotec 0307 (Treated)
Hydrogen Sulfide	0.3	4387	6
Sulfur dioxide	0.1	6255	3
Methyl mercaptan	0.9	199	2
Dimethyl sulfide	0.2	2	0
Ethyl mercaptan	20	1	<0.5
Carbon disulfide	100	<0.5	<0.5
Propyl mercaptan	0.2	9	0



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**Sewage Stack Testing - Efficacy Testing for
Anotec Odour Control**

COMPONENT (ppm)	RAW ODOUR	ANOTEC	% REMOVAL
1,1,1 trichloroethane	1	<0.001	99.9
2-methyl pentane	2	<0.001	99.95
2-methylbutane	0.7	0.03	95.71
3-methyl pentane	9	<0.001	99.99
Acetone	3	<0.001	99.97
Benzene	2	<0.001	99.95
C3-alkylbenzenes	4.2	0.015	99.64
C7-C11 alkanes	58.26	9.2	84.20
Carbon disulfide	1.07	0.02	98.13
Carbonyl sulfide	3	<0.001	99.96
Chloroform	3.67	0.65	82.29
Cyclohexane	1	<0.001	99.9
Dimethyl sulfide	7	0.06	99.14
Heptane	2	<0.001	99.95
Hexane	7	0.95	86.43
Hydrogen sulfide	31	2.4	92.26
Limonene	0.7	<0.001	99.86
Methylamine	4.2	<0.05	98.81
Ammonia *Kitagawa	7	1	85.71
m,p xylene	5	0.2	96
Methyl cyclohexane	3	<0.001	99.97
Methyl cyclopentane	5	<0.001	99.98
Methyl hexanes	13	0.96	92.62
Methyl mercaptan	13	1.09	91.62
Nonane	3	<0.001	99.97
o-xylene	2	<0.001	99.95

Dr. David Stone

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**Taree Sewage Treatment- Pipe
Efficacy Testing for Anotec Odour**

Components (ppb)	PVC PIPE INTO AIRVAC	Anotec
Hydrogen sulfide	1536	79.9
Sulfur dioxide	9.8	1
Methyl mercaptan	1254.2	2.6
di-methyl sulfide	384.9	101.6
carbon disulfide	49.3	9.2
carbonyl sulfide	124.3	13.7
di-methyl di-sulfide	70.9	17.9
i-propylmercaptan	6.6	0.2
propylmercaptan	1.6	0.2
s-butyl mercaptan	49.7	1.7
i-butylmercaptan	11.5	0.1

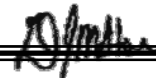


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Efficacy Testing for Anotec Odour Control

COMPONENT (ppb)	RAW	TREATED with ANOTEC 0307
1-chloro-1, 1 difluoroethane	2314.9	109.3
dimethyl sulfide	0.3	0.1
dimethyl disulfide	0.2	0.1
carbon disulfide	6.2	4.7
sulfur dioxide	6.6	0.9
carbonyl sulfide	11.3	3.7
acetaldehyde	249.1	5
methanol	40	9.2
ethanol	85.6	19.8
i-propanol	8.2	1.7
t-butanol	22.8	4.5
acetone	121.3	14.5
2-butanone	93.7	17.1
3-buten-2-one	5.1	1
ethyl acetate	3.9	1
2-methyl propanol	1.3	0.7
butanal	40.6	6.3
hexanal	19	2
pyrrolidine	43.3	5
propane	47.9	12.1
methyl propane	85.1	22.1
butane	10.4	0.9
methyl butane	5.58	0.57
pentane	25.9	1.1
2-methyl pentane	5.23	0.57
3-methyl pentane	280.3	52.1
hexane	174.9	22
benzene	4.1	0.32
methyl cyclopentane	7.84	0.8
cyclo hexane	17.25	0.7
methylhexanes	261.8	25.31
heptane	73.8	11.5
methylcyclohexane	1.86	0.32
branched C7 alkanes	29.5	5.9
branched C8 alkanes	158.9	33.2
octane	34	4.18
nonane	3.29	0.25
branched C9 alkanes	164.1	14.9
toluene	10	1.92
ethyl benzene	3.46	0.88
m-and p- xylene	2.26	0.69
o-xylene	0.64	0.14
dichloro methane	4.3	0.078
trichlorofluoromethane	0.86	0.33
11,2-trichloro-a,2,2-trichloroethane	0.34	0.11
bromodichloromethane	0.13	0.03
1,1-dichloroethane	0.65	0.04
1,2-dichloroethene	0.04	0.02
chloroform	3.08	0.81
tetrachloromethane	0.27	0.01
tetrachloroethene	0.06	0.02

Dr. David Stone, ANSTO




**SIMULATED WIND TUNNEL ANALYSIS
FOR SEWAGE GAS ODOURS**

Anotec Pty Ltd.			
Component (ppm)	Raw Odour	Treated with Anotec 0307	Treated with Anotec 0307 + Fragrant Signature
Hydrogen Sulfide	0.566	0.000	0.000
Acetaldehyde	9.181	0.000	0.000
Methylamine	3	<0.05	<0.05
2-butenal	5.63	0.77	0.26
Butanol	40.54	0.79	0.32
ODOUR (OU)			
Hydrogen Sulfide	2832.35	0	0
Acetaldehyde	1636.36	0	0
Methylamine	300	0	0
2-butenal	938.29	128.37	43.91
Butanol	506.76	9.84	4.02
TOTAL ODOUR	6214	139	48



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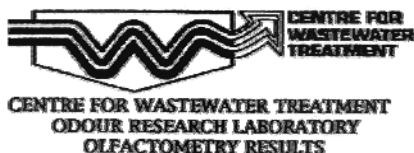
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CLIENT: Anotec Pty Limited
(Contact: Ms. Victoria Zavras)

LOCATION: McCains Furniture - Lewisham

ODOUR SOURCE	ODOUR DILUTION UNIT (ODU)*
Exhaust Stack Solvent Emissions - Raw Odour: Inlet	55,000
Exhaust Stack Solvent Emissions - Treated with Anotec Odour Control	2050

T.J. Schulz. Manager





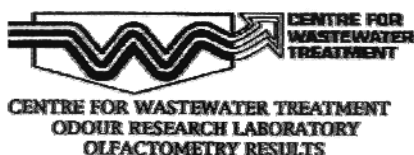
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CLIENT: Anotec Pty Limited
(Contact: Chief Chemist)

LOCATION: Plastics Factory - St. Peters

ODOUR SOURCE	ODOUR DILUTION UNIT (ODU)*
Oven - Raw Odour: Inlet	43,228
Oven - Treated with Anotec Odour Control	1,236

T.J. Schulz. Manager





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CLIENT: Anotec Pty Limited
(Contact: Victoria - Director)

LOCATION: Taree Sewage Treatment Plant

ODOUR SOURCE	ODOUR DILUTION UNIT (ODU)*
Digester - Raw Odour: Inlet	94,235
Digester - Treated with Anotec Odour Control	1284

T.J. Schulz. Manager



CENTRE FOR WASTEWATER TREATMENT
ODOUR RESEARCH LABORATORY
OLFACTOMETRY RESULTS



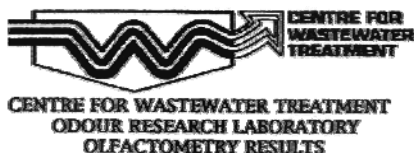
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CLIENT: Anotec Pty Limited
(Contact: Ms. Victoria Zavras Director)

LOCATION: Poultry Shed – Wollondilly Council

ODOUR SOURCE	ODOUR DILUTION UNIT (ODU)*
Raw Odour: Inlet	22,569
Outlet - Treated with Anotec Odour Control	894

T.J. Schulz. Manager



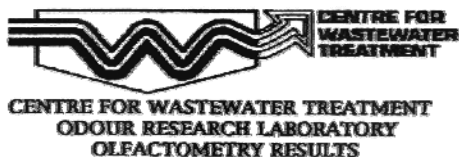


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CLIENT: Anotec Pty Limited
(Contact: Ms. Victoria Zavras)

LOCATION: Laboratory Testing

ODOUR SOURCE	ODOUR DILUTION UNIT (ODU)*
Sewage Stack - Raw Odour: Inlet	18227
Sewage Stack - Treated with WATER only	4092
Sewage Stack - Treated with Anotec Odour Control	1736



T.J. Schulz. Manager

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