

Odour Abatement in Food Processing Industry

1. Background : -

Molasses, a thick and dark syrup produced as a by-product of the sugar-making process, can sometimes emit a strong, unpleasant odour. The unpleasant odour of molasses comes from sulfur compounds or fermentation. Intense and prolonged odour exposure can cause respiratory problems such as coughing, throat irritation and shortness of breath. Strong unpleasant odour triggers headaches, nausea, vomiting.

One of our client, uses molasses as a fermentation raw material to manufacture additives for bakery, distillery, food and pharmaceutical sectors. During the manufacturing process, raw materials undergo anaerobic digestion and are heated to 70-80°C. The wastewater collected in high COD MEE tank emits foul odour.



2. Challenges: -

To neutralize & completely eliminate the foul odours generated in equalization tank of ETP. The odours are because of its typical fermentation process which uses molasses as its raw material.



2.1. Odour sources : -

No.	Odour Sources	Area (m ²)
1	High COD MEE Feed tanks (3 No's)	1500
2	Equalization tank (1 No's)	250
3	Vacuum pump vents (2 No's)	20

2.2. Malodorous gases identified :

No.	Gas Name	Chemical Formula
1	Acetaldehyde	CH ₃ COH
2	Acetic Acid	CH ₃ COOH
3	Ammonia	NH ₃
4	Ethanol	C ₂ H ₅ OH
5	Hydrogen Sulphide	H ₂ S
6	Methyl Mercaptan	CH ₄ S
7	Methyl sulphide	CH ₃ S
8	Propionic Acid	CH ₃ CH ₂ COOH
9	Trimethylamine	(CH ₃) ₃ N
10	TVOC	Volatile organic compounds
11	Sulphur dioxide	SO ₂

3. Technical Solution: -

Amalgam Biotech solved the problem by undertaking :

- 1) Onsite odour audit (with realtime gas analysis)
- 2) Onsite pilot plant trial

Technology Deployed :

- 1) Mist/FOG generating High pressure machine (FOG Cannon)
- 2) OdoServe - Odour neutralizing chemical

Amalgam FOG cannon is a wheel mounted machine, capable of covering the entire surface area of these tanks with its high FOG throwing capacity about 30-60 feet, in 0-60 degree angle of rotation. FOG cannon fine mist nozzles provide < 50 microns sized water droplet. We have recommended them to operate this fogging machine whenever they feel odour, by diluting the 1 litre of 'OdoServe- Gold BI' to 1000 times with soft water.

The FOG cannon is operated intermittently at 20 mins/Hr, which translates to 8 hours machine operation over a 24 hour time duration. Under such conditions, OdoServe Gold BI gave a performance removal efficiency of 75 - 95%

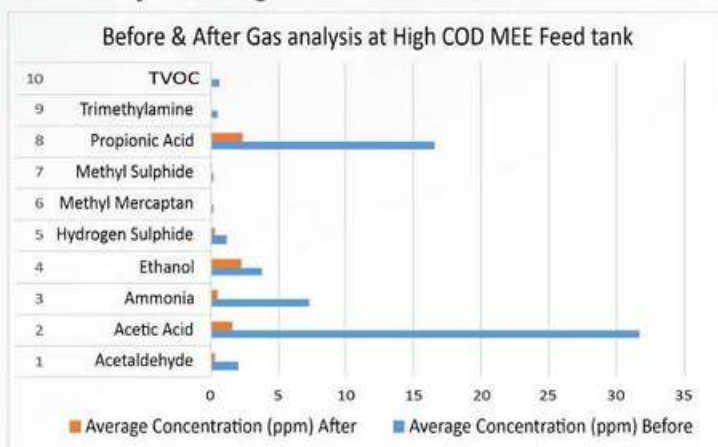
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4. Results: - Measurement of concentrations of odorous compounds / gases done by on-site gas analyser. The instrument has a range of 0.1 ppm to 20,000 ppm.

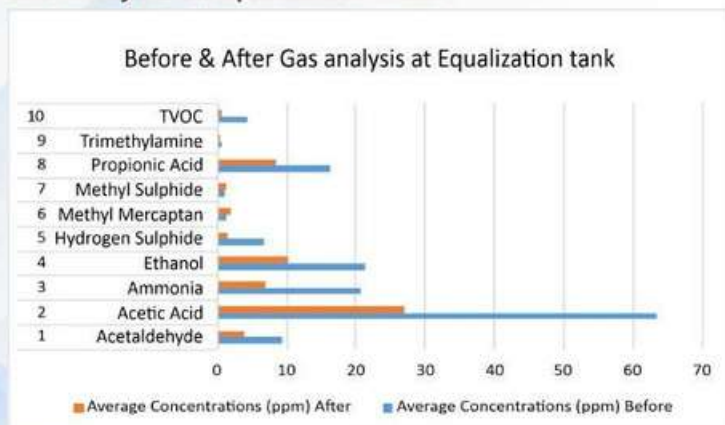
A.1. High COD MEE feed tank: -

Sr.	Compound Name	Average Concentration (ppm)		% Reduction
		Before	After	
1	Acetaldehyde	2.06	0.27	87.07
2	Acetic Acid	31.73	1.62	94.91
3	Ammonia	7.31	0.50	93.16
4	Ethanol	3.77	2.29	39.31
5	Hydrogen Sulphide	1.21	0.34	71.76
6	Methyl Mercaptan	0.22	0.06	72.73
7	Methyl Sulphide	0.20	0.02	91.67
8	Propionic Acid	16.52	2.33	85.93
9	Trimethylamine	0.53	0.00	100.00
10	TVOC	0.66	0.00	100.00

A.1.1. Graphical presentation of Before & After Gas analysis at High COD MEE Feed tank:



A.2.1. Graphical presentation of Before & After Gas analysis at Equalization tank :



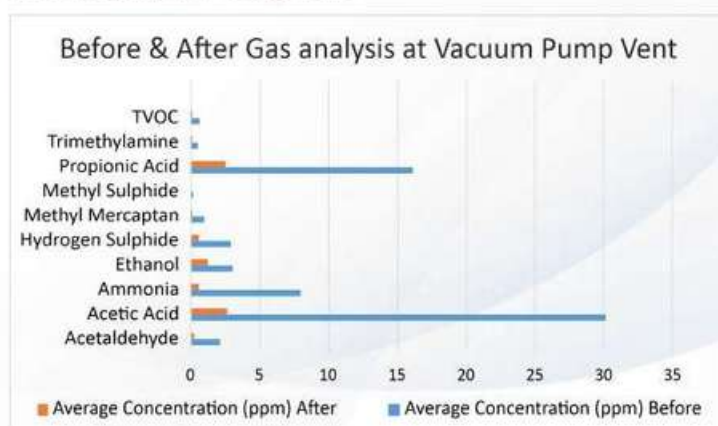
A.2. Equalization tank : -

Sr.	Compound Name	Average Concentration (ppm)		% Reduction
		Before	After	
1	Acetaldehyde	9.34	3.87	58.56
2	Acetic Acid	63.50	26.94	57.57
3	Ammonia	20.60	7.03	65.90
4	Ethanol	21.41	10.13	52.70
5	Hydrogen Sulphide	6.70	1.58	76.42
6	Methyl Mercaptan	1.25	1.91	-53.00
7	Methyl Sulphide	1.12	1.27	-13.52
8	Propionic Acid	16.42	8.43	48.68
9	Trimethylamine	0.65	0.34	47.25
10	TVOC	4.34	0.54	87.48

A.3. Vacuum Pump Vent

Sr.	Compound Name	Average Concentration (ppm)		% Reduction
		Before	After	
1	Acetaldehyde	2.09	0.22	89.47
2	Acetic Acid	30.13	2.62	91.30
3	Ammonia	7.99	0.6	92.49
4	Ethanol	3.01	1.23	59.14
5	Hydrogen Sulphide	2.91	0.55	81.10
6	Methyl Mercaptan	0.95	0.09	90.53
7	Methyl Sulphide	0.2	0.05	75.00
8	Propionic Acid	16.11	2.51	84.42
9	Trimethylamine	0.53	0.1	81.13
10	TVOC	0.66	0.1	84.85

A.3.1. Vacuum Pump Vent



5. Summary : - Ammonia reduction achieved 93% and TVOC 100% reduction at High COD MEE feed tank . In equalization tank, TVOC reduction is 87 %, H₂S 76% reduced after fogging of OdoServe. Gas analysis done before and after implementing the odour control solution show a significant reduction in the concentrations of odorous gases, ranging from 75% to 90%.

Considering the wind velocity and direction, installing a misting system around the entire tank could further improve odour reduction.

Odour mitigation achieved at the client location is excellent and the FOG Odour Control system has proven to be an effective technical solution !!