Supplementary Materials

Table S1. Toxicity Value of hazardous VOCs from biogas digestate storage[1]

Chemical Name	Assessment Type	Critical Effect or Tumor Type	Weight of Evidence (WOE) Characterization	Toxicity Value Type	Toxicity Value
1,2-Dichloroethane	Cancer	Hemangiosarcomas	B2[2]	IUR[6]	2.6×10^{-5} per ug/m^3
1,1,2-Trichloroethane	Cancer	Hepatocellular carcinoma	C[3]	IUR	1.6×10^{-5} per ug/m^3
Tetrachloroethane	Cancer	Hepatocellular adenoma or carcinoma	C	IUR	7.4×10^{-6} per ug/m^3
Vinyl chloride	Cancer	Liver angiosarcomas, angiomas, hepatomas, and neoplastic nodules	A[4]	IUR	4.4×10^{-6} per ug/m^3
Carbon tetrachloride	Cancer	Pheochromocytoma	L[5]	IUR	6×10^{-6} per ug/m^3
Benzene	Cancer	Leukemia	A	IUR	7.8×10^{-6} & 2.2×10^{-6} per ug/m^3
	Noncancer	Decreased lymphocyte count	n/a	RfC[7]	3×10^{-2} mg/m^3
Dichloromethane	Cancer	Hepatocellular carcinomas or adenomas, bronchoalveolar carcinomas or adenomas	L	IUR	1×10^{-8} per ug/m^3
	Noncancer	Hepatic effects (hepatic vacuolation)	n/a	RfC	6×10^{-1} mg/m^3
Trichloroethylene	Cancer	Renal cell carcinoma, non-Hodgkin's lymphoma, and liver tumors	Carcinogenic to humans (2005 guidelines)	IUR	4.1×10^{-6} per ug/m^3

	Noncancer	Nervous, Ocular	n/a	RfC	$2x10^{-3}$ mg/m^3
2-Butanone (Methyl ethyl ketone)	Noncancer	Developmental toxicity (skeletal variations)	n/a	RfC	5 mg/m^3
Toluene	Noncancer	Neurological effects in occupationally-exposed workers	n/a	RfC	5 mg/m^3
Methyl methacrylate	Noncancer	Degeneration/ atrophy of olfactory epithelium (male rats)	n/a	RfC	$7x10^{-1}$ mg/m^3
1,1-Dichloroethylene	Noncancer	Liver toxicity (fatty change)	n/a	RfC	$2x10^{-1}$ mg/m^3
Carbon disulfide	Noncancer	Peripheral nervous system dysfunction	n/a	RfC	$7x10^{-1}$ mg/m^3
n-Hexane	Noncancer	Peripheral neuropathy (decreased MCV at 12 weeks)	n/a	RfC	$7x10^{-1}$ mg/m^3
1,2-Dichloropropane	Noncancer	Hyperplasia of the nasal mucosa	n/a	RfC	$4x10^{-3}$ mg/m^3
Methyl chloride	Noncancer	Cerebellar lesions	n/a	RfC	$9x10^{-2}$ mg/m^3
Naphthalene	Noncancer	Nasal effects: hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively	n/a	RfC	$3x10^{-3}$ mg/m^3
Vinyl acetate	Noncancer	Nasal epithelial lesions	n/a	RfC	$2x10^{-1}$ mg/m^3
Styrene	Noncancer	CNS effects	n/a	RfC	1 mg/m^3
o-Xylene	ND[8]				
Pentane	ND				
Propylene	ND				

Note: [1] Date sources are from EPA's Integrated Risk Information System (IRIS) (https://cfpub.epa.gov/ncea/iris/search/index.cfm)

[2] Probable human carcinogen - based on sufficient evidence of carcinogenicity in animals (1986 guidelines);

[3] Possible human carcinogen (1986 guidelines);

[4] Human carcinogen (1986 guidelines) Known/likely human carcinogen (1996 guidelines);

[5] Likely to be carcinogenic to humans (2005 guidelines);

[6] Inhalation Unit Risk, per ug/m^3;

[7] Reference Concentration, mg/m^3;

[8] ND, no data.

Table S2. The calibration equation, RSD, R^2 and method detection limits (MDL) of GC-MS for top 20 most abundant VOC species detected in this study

VOCs	Calibration equation	RSD (%)	R^2	MDL (ppb)
Ethanol	-	-	-	-
Propylene	y=940800x-7414	0.9999	0.9999	0.05
Acetone	-	-	-	0.05
2-Butanone	-	-	-	0.05
1,2-Dichloroethane	y=1.992x	3	0.9985	0.05
Toluene	y=1.236x	9.8	0.9965	0.05
Methyl methacrylate	y=0.1947x	20.6	0.9954	-
FREON11	-	-	-	0.3
Dichloromethane	y=0.6916x	4.5	0.9978	0.3
Carbon disulfide	y=1.788x	10.7	0.9945	0.05
n-Hexane	y=0.3130x	9.4	0.9973	0.05
1,2-Dichloropropane	y=0.1750x	10.1	0.9971	0.05
Methyl cyclopentane	y=0.1809x	12.7	0.9976	0.05
Ethyl acetate	y=0.3330x	4.9	0.9944	0.05
1,1,2-Trichloroethane	y=0.3736x	4.2	0.9949	0.05
FREON12	-	-	-	0.3
Methyl sulfide	-	-	-	-
Four chloroethane	y=0.7657x	7.9	0.9973	0.01
n-Butune	y=0.5416x	10.9	0.9967	0.3
Trichloromethane	y=0.5350x	3.2	0.9982	0.1