

TECHNICAL BULLETIN

NUMBER 2018 - 011

Date: May 2018
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Subject: Comparison of peCOD and Dichromate COD for 34 Organic Species

The purpose of this technical bulletin is to provide the results of a systematic comparison of peCOD and Dichromate COD vs. Theoretical Oxygen Demand (ThOD) for a suite of 34 organic species. The gradient of the peCOD response function was determined w.r.t. Sorbitol: $y = 1x$. The gradient of the Dichromate response function was determined w.r.t. KHP: $y = 1x$. The results are provided below.

Organic Compound	Class of Compound	ThOD Content (mg COD/mg)	Gradient of peCOD Response Function	Gradient of Dichromate Response Function
Acetic Acid (ethanoic acid)	carboxylic acid, volatile fatty acid	1.066	0.921	1.002
Na-Acetate	Na-salt of carboxylic acid	0.780	0.559	0.610
Acetone (propanone)	ketone, solvent	2.204	0.954	1.078
Aniline (phenylamine)	aromatic, amine	2.405	1.061	1.172
Benzene	aromatic, solvent	3.073	0.840	0.620
Benzoic Acid	aromatic, carboxylic acid	1.965	1.071	1.025
Cadaverine (1,5-diaminopentane)	diamine, animal tissue putrefaction product, foul odour	2.192	0.987	1.088
p-Cresol	aromatic, phenolic	2.515	1.184	1.147
1,3-Diaminopropane	diamine	1.727	0.979	0.900
Diethylamine	secondary amine	2.625	0.880	0.312
Ethanol	alcohol, solvent	2.084	1.071	0.974
Formic Acid (methanoic acid)	carboxylic acid	0.348	1.117	1.031

Organic Compound	Class of Compound	ThOD Content (mg COD/mg)	Gradient of peCOD Response Function	Gradient of Dichromate Response Function
Na-Formate	Na-salt of carboxylic acid	0.235	1.060	1.023
Glucose	monosaccharide, a sugar	1.066	1.029	0.991
Glutamic Acid	amino acid	0.979	1.076	0.996
Glutaric Acid (pentanedioic acid)	dicarboxylic acid	1.211	1.108	1.013
Glycine	amino acid	0.639	1.119	1.021
Na-Hexanesulfonate (hydrate)	Na-salt of sulfonic acid	1.615	1.209	0.891
Isobutyric Acid	carboxylic acid, volatile fatty acid, foul odour	1.816	1.078	1.093
KHP	aromatic, K-salt of dicarboxylic acid	1.175	1.131	1.000
Lactose	disaccharide, "milk sugar"	1.102	1.022	0.961
Malonic Acid (propanedioic acid)	dicarboxylic acid	0.615	1.003	0.989
MEK (methyl ethyl ketone)	ketone, solvent	2.441	1.022	1.067
Methanol	alcohol, solvent	1.498	0.997	1.103
MTBE (methyl tert-butyl ether)	ether, solvent (in petrol), major soil contaminant	2.721	1.079	1.055
Nicotinic Acid	aromatic, carboxylic acid, "niacin", a pyridine derivative	1.433	0.916	0.143
Oxalic Acid (ethanedioic acid)	dicarboxylic acid	0.127	1.289	0.999
Propionic Acid (propanoic acid)	carboxylic acid, volatile fatty acid, foul odour	1.512	0.921	1.227
Putrescine (1,4-diaminobutane)	diamine, animal tissue putrefaction product, foul odour	1.997	1.041	1.020

Organic Compound	Class of Compound	ThOD Content (mg COD/mg)	Gradient of peCOD Response Function	Gradient of Dichromate Response Function
Salicylic Acid	aromatic, carboxylic acid, phenolic	1.622	1.015	1.038
Sorbitol	carbohydrate, sugar substitute	1.142	1.000	1.001
Succinic Acid (butanedioic acid)	dicarboxylic acid	0.948	1.076	1.042
Sucrose	disaccharide, "table sugar"	1.122	1.007	1.020
Valeric Acid (pentanoic acid)	carboxylic acid, volatile fatty acid, foul odour	2.037	1.201	1.392

Table 1. Column 1: the 34 organic compounds considered in this study; Column 2: class of compound; Column 3: the ThOD content of the compound, calculated according to stoichiometry; Column 4: the gradient, m , of the peCOD response function, measured COD vs. ThOD, for the organic compound; and Column 5: the gradient, m , of the Dichromate response function, measured COD vs. ThOD, for the organic compound.

A summary of the response gradient results is provided in Table 2 below, and raw data plots for the study are included in Figures 3 & 4.

Statistic	peCOD	Dichromate COD
Number of gradients in set, N	34	34
Mean gradient, m	1.030	0.972
Median gradient, m	1.035	1.020
Std Deviation of m values, (absolute)	± 0.127	± 0.234
Std Deviation of m values, (relative)	± 12.3	± 24.1

Table 2. Mean, Median, and Standard Deviation (1σ) values for the set of peCOD and the set of Dichromate COD response function gradients, m .

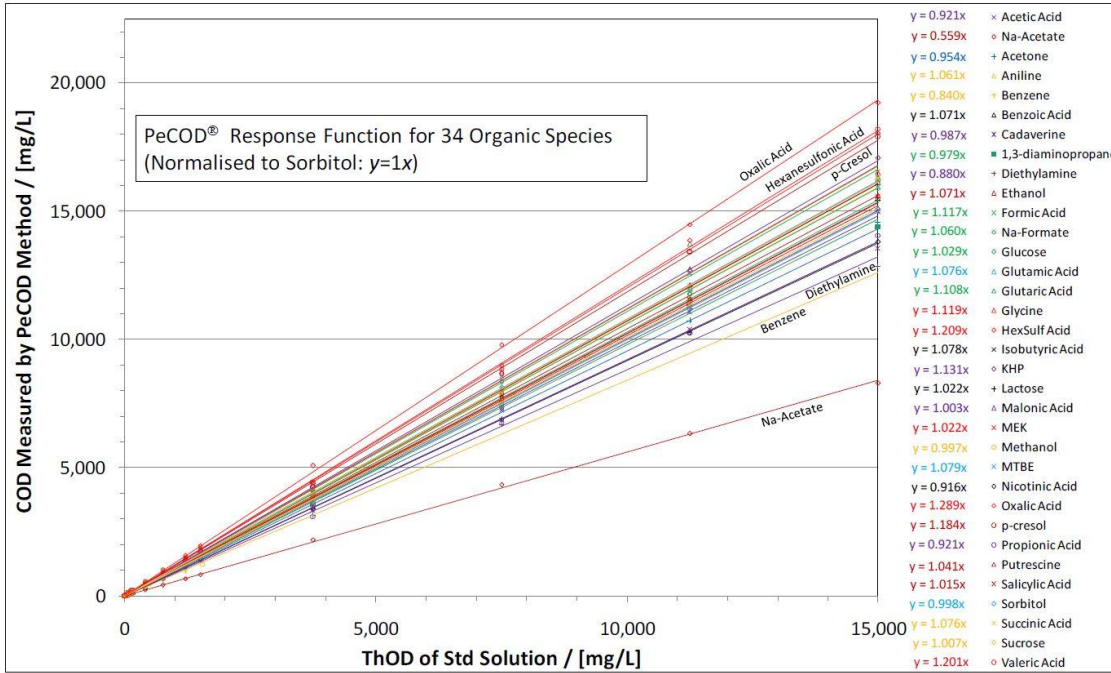


Figure 3. Plot of peCOD vs. ThOD for the set of 34 organic compounds. Experimental data points are shown as symbols. Lines of best fit having form $y=mx$, were determined by linear least squares regression.

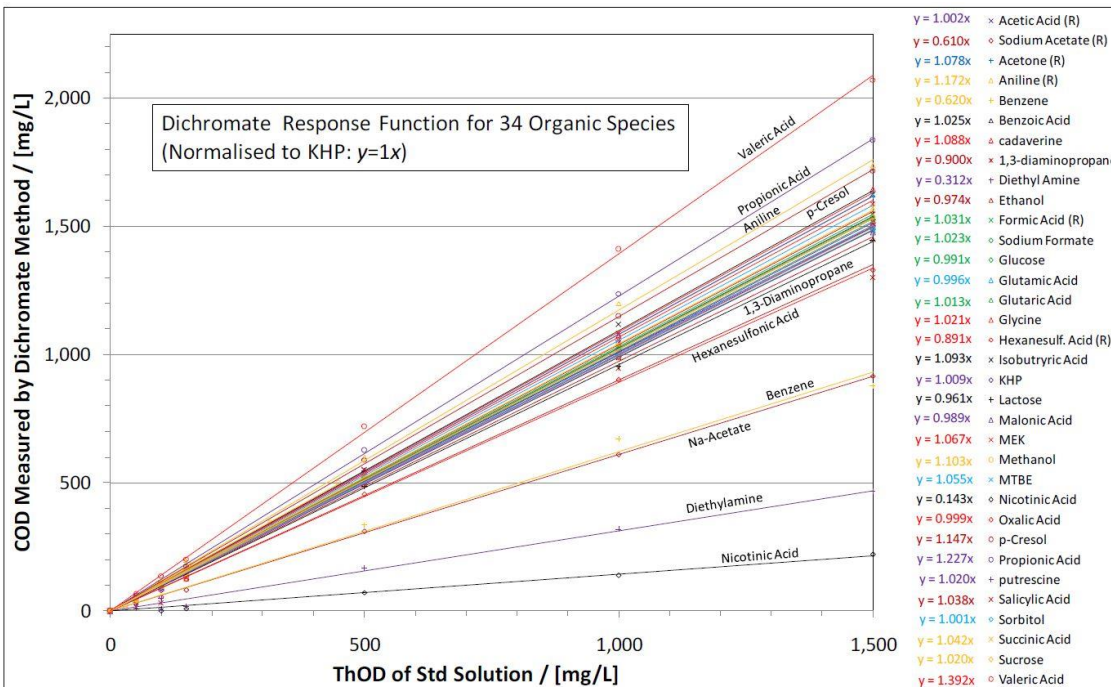


Figure 3. Plot of Dichromate COD vs. ThOD for the set of 34 organic compounds. Experimental data points are shown as symbols. Lines of best fit having form $y=mx$, were determined by linear least squares regression.