SVOA Compound List Grouped by Surrogates
SVOA 8270

Surrogate Definition: Surrogates are compounds similar in chemical composition to the analytes of interest and spiked into environmental samples prior to preparation and analysis. They are used to evaluate extraction efficiency and matrix interference on a sample-specific basis. In order for this to work, surrogates must behave in the same manner as the corresponding analytes. Unfortunately, in practice, this equivalency is typically difficult to demonstrate and is often more assumed than empirically derived.

Not all analytes types are represented by a SVOA surrogate. Surrogate recoveries will give you an overall indication of accuracy but are not analyte specific. The matrix spike recovery is the best indicator of how a specific analyte performs in your samples. Unfortunately matrix spikes are not performed on all samples. When determining how a surrogate recovery may affect specific analytes one should consider the following:

1. Check associated blank and BS/BSD data. These surrogates should be within control limits. If any of these surrogates are outside of control and the same surrogates are also outside of control limits in the associated samples then the problem is procedural and not the sample matrix. The batch should be reextracted.

2. All surrogates within control limits: Even though all surrogates worked within control limits, one cannot assume all analytes worked within control limits. Some analytes are nortoriously poor performers (PP). Review BS/BSD and MS/MSD data. Not all analyte types are represented by surrogates.

3. One acid and or base/neutral surrogate outside of control limits: This data is acceptable but shows there is a problem with a particular surrogate. Some things to consider:

a. Does the matrix or interference only affect the surrogate? (Rare)
b. Does the matrix or interference only affect analytes in the part of the chromatogram with the low surrogate? (See Project Narrative for details)
c. Is only a certain type of analyte affected by matrix or interference? Not every type of compound is represented with a surrogate. (Example: Benzidines (BZ) not represented)

4. Two or more acid and or two base/ neutral surrogates outside of control limits:
For RCP and MCP work, 2 acid or 2 base/neutral surrogate recoveries outside of control limits require reextraction and reanalysis, unless there is obvious interference from visual inspection of the chromatogram, to ensure that the problem was not a procedural error. Reanalysis alone only points to an instrument error. If reextraction and reanalysis produces the same results, then the matrix interference is confirmed and results are reported with surrogate recoveries outside of criteria.

There are 8 SVOA surrogates:
These four surrogates represent the acid compounds. (A)

2-Fluorophenol	**2-Chlorophenol-d4**
Phenol-d5	**2,4,6-Tribromophenol**

These four surrogates represent the base/neutral compounds. (B)

1,2 Dichlorobenzene-d4	**2-Fluorobiphenyl**
Nitrobenzene-d5	**Terphenyl-d14**

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The following tables are the breakdown of the SVOA compounds according to their corresponding surrogates. Typically the phenolic compounds are considered the acids and everything else the base/neutrals. Some compounds are qualified with "PP" to indicate they are poor performers. Due to their unique chemical characteristics, compounds with the "PP" qualifier may not perform like the surrogates.

Acid Compounds

Analyte	Retention Time	Type
2,4,6-Tribromophenol (SURR)	**12.87**	**Acid Surrogate**
2-Chlorophenol-d4(SURR)	**5.4**	**Acid Surrogate**
2-Fluorophenol (SURR)	**2.32**	**Acid Surrogate**
Phenol-d5 (SURR)	**5.2**	**Acid Surrogate**
Phenol	5.23	A
2,3,4,6-Tetrachlorophenol	12.01	A
2,4,5-Trichlorophenol	10.14	A
2,4,6-Trichlorophenol	10.07	A
2,4-Dichlorophenol	8.24	A
2,4-Dimethylphenol	8	A
2,4-Dinitrophenol	11.53	A PP
2-Chlorophenol	5.45	A
2-Methylphenol	6.86	A
2-Nitrophenol	7.84	A
3+4-Methylphenol	7.18	A
4,6-Dinitro-2-methylphenol	12.56	A PP
4-Chloro-3-methylphenol	9.42	A PP
4-Nitrophenol	11.77	A PP
Benzoic Acid	8.35	A PP
Benzyl Alcohol	6.55	A PP
Pentachlorophenol	13.93	A PP

A = Acid Compounds - Represented by Acid Surrogates
PP = Poor Performers

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Analyte	Retention Time	Type
1,2 Dichlorobenzene-d4(SURR)	**6.48**	**B/N Surrogate**
2-Fluorobiphenyl (SURR)	**10.2**	**B/N Surrogate**
Nitrobenzene-d5 (SURR)	**7.29**	**B/N Surrogate**
Terphenyl-d14 (SURR)	**17.62**	**B/N Surrogate**
1,2,4,5-Tetrachlorobenzene	9.86	B
1,2,4-Trichlorobenzene	4.19	B
1,2-Dichlorobenzene	6.52	B
1,3-Dichlorobenzene	5.9	B
1,4-Dichlorobenzene	6.14	B
1,4-Dioxane	0.88	B PP
1-Methylnaphthalene	9.72	B
2,4-Dinitrotoluene	11.77	B
2,6-Dinitrotoluene	11.03	B
2-Chloronaphthalene	10.37	B
2-Methylnaphthalene	9.56	B
2-Nitroaniline	10.59	B PP
3-Nitroaniline	11.32	B PP
4-Bromophenyl-phenylether	13.38	B
4-Chloroaniline	8.58	B PP
4-Chloro-phenyl-phenyl ether	12.43	B
4-Nitroaniline	12.47	B PP
Acenaphthene	11.42	B
Acenaphthylene	11.1	B
Acetophenone	7.05	B
Aniline	5.12	B PP
Anthracene	14.39	B
Atrazine	13.77	B
Azobenzene	12.73	B
Benzo(a)anthracene	19.76	B
Benzo(a)pyrene	22.48	B
Benzo(b)fluoranthene	21.89	B
Benzo(g,h,i)perylene	24.82	B
Benzo(k)fluoranthene	21.94	B
Biphenyl	10.36	B
bis(2-Chloroethoxy)methane	8.13	B
bis(2-Chloroethyl)ether	5.38	B
bis(2-chloroisopropyl)ether	6.87	B
bis(2-Ethylhexyl)phthalate	19.99	B
Butylbenzylphthalate	18.72	B
Caprolactam	9.07	B
Carbazole	14.76	B
Chrysene	19.83	B

B = Base/Neutral Compounds - Represented by Base/Neutral Surrogates
PP = Poor Performers

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Analyte	Retention Time	Type
1,2 Dichlorobenzene-d4(SURR)	**6.48**	**B/N Surrogate**
2-Fluorobiphenyl (SURR)	**10.2**	**B/N Surrogate**
Nitrobenzene-d5 (SURR)	**7.29**	**B/N Surrogate**
Terphenyl-d14 (SURR)	**17.62**	**B/N Surrogate**
Dibenzo(a,h)anthracene	24.4	B
Dibenzofuran	11.75	B
Diethylphthalate	12.26	B
Dimethylphthalate	10.93	B
Di-n-butylphthalate	15.59	B
Di-n-octylphthalate	21.28	B
Fluoranthene	16.75	B
Fluorene	12.39	B
Hexachlorobenzene	13.49	B
Hexachlorobutadiene	8.69	B
Hexachlorocyclopentadiene	9.85	B PP
Hexachloroethane	7.16	B
Indeno(1,2,3-Cd)Pyrene	24.37	B
Isophorone	7.72	B
Naphthalene	8.44	B
Nitrobenzene	7.32	B
N-Nitrosodimethylamine	0.89	B PP
n-Nitroso-di-n-propylamine	7.1	B PP
n-Nitrosodiphenylamine	12.66	B PP
Pentachloronitrobenzene	13.92	B
Phenanthrene	14.28	B
Pyrene	17.21	B
Pyridine	0.92	B PP

B = Base/Neutral Compounds - Represented by Base/Neutral Surrogates
PP = Poor Performers

Benzidine Compounds

Analyte	Retention Time	Type
No Representative Surrogate		
3,3'-Dichlorobenzidine	19.77	BZ PP
Benzaldehyde	4.78	PP
Benzidine	17.1	BZ PP

BZ = Benzidine Compounds - Not Represented by any Surrogates
PP = Poor Performers