

# Biomonitoring California Designated Chemicals June 2014

The designated chemicals for the California Environmental Contaminant Biomonitoring Program<sup>a</sup> (also known as Biomonitoring California) are provided in this list. Designated chemicals consist of those substances that are included in the Centers for Disease Control and Prevention's (CDC's) biomonitoring studies<sup>b</sup> and additional chemicals that are recommended by the Scientific Guidance Panel (SGP) for Biomonitoring California. Designated chemicals are the pool of chemicals from which the SGP can recommend priority chemicals for biomonitoring.

Targets for measurement in biomonitoring studies could include the parent chemical, metabolites and other chemical products formed in the body or the environment (e.g., hemoglobin adduct; environmental degradation product). The approach for biomonitoring a chemical may change as methods development proceeds. For some of the parent chemicals listed below, metabolites or other targets for measurement are shown indented underneath. Chemicals are grouped into categories (like "metals" and "pesticides"); some are included in more than one category. The Program determines the chemicals that are actually biomonitored and the appropriate targets for measurement. To jump to each footnote referenced in the list below, click on the relevant number.

## Acrylamide

Acrylamide hemoglobin adducts  
Glycidamide hemoglobin adducts

## Antimicrobials used in Food Production <sup>1</sup>

## Brominated and Chlorinated Organic Compounds used as Flame Retardants <sup>1</sup>

Allyl 2,4,6-tribromophenyl ether (ATE)  
2,2-Bis(bromomethyl)-1,3-propanediol  
2,2-Bis(chloromethyl)trimethylene bis[bis(2-chloroethyl)phosphate]  
Bis(2-ethyl-1-hexyl)tetrabromophthalate (TBPH)  
Bis(hexachlorocyclopentadieno)cyclooctane (Dechlorane Plus)  
1,2-Bis(2,4,6-tribromophenoxy)ethane (BTBPE)  
2-Bromoallyl 2,4,6-tribromophenyl ether (BATE)  
Chlorendic acid  
Decabromodiphenylethane (DBDPE)  
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane (TBECH)  
2,4-Dibromophenol  
2,3-Dibromopropyl-2,4,6-tribromophenyl ether (DPTE)  
2-Ethyl-1-hexyl-2,3,4,5-tetrabromobenzoate (TBB)  
*N,N*-Ethylenebis(tetrabromophthalimide)  
Hexabromobenzene (HBB)  
2,2',4,4',5,5'-Hexabromobiphenyl (BB 153)  
Hexabromocyclododecane (HBCD)  
Hexachlorocyclopentadienyl-dibromocyclooctane

Isobutoxypentabromocyclododecanes (iBPBCDs)  
Octabromotrimethylphenylindane (OBIND)  
Pentabromoethylbenzene (PBEB)  
Pentabromophenol (PBP)  
Pentabromotoluene (PBT)  
Short-chain chlorinated paraffins  
Tetrabromobisphenol A (TBBPA)  
Tetrabromobisphenol A bis(2,3-dibromopropyl) ether  
Tetrabromobisphenol A bis(2-hydroxyethyl) ether (TBBPA-DBPE)  
Tetrabromophthalic anhydride  
2,3,5,6-Tetrabromo-*p*-xylene  
2,4,6-Tribromophenol  
Tris(2-chloroethyl)phosphate (TCEP)  
Tris(1-chloro-2-propyl)phosphate (TCPP)  
Tris(2,3-dibromopropyl) isocyanurate  
Tris(2,3-dibromopropyl)phosphate (TDBPP)  
Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)  
Tris(2,3-dichloro-1-propyl)phosphate

## Polybrominated diphenyl ethers (PBDEs)

2,2',4-Tribromodiphenyl ether (BDE 17)  
2,4,4'-Tribromodiphenyl ether (BDE 28)  
2,2',4,4'-Tetrabromodiphenyl ether (BDE 47)  
2,3',4,4'-Tetrabromodiphenyl ether (BDE 66)  
2,2',3,4,4'-Pentabromodiphenyl ether (BDE 85)  
2,2',4,4',5-Pentabromodiphenyl ether (BDE 99)  
2,2',4,4',6-Pentabromodiphenyl ether (BDE 100)  
2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE 153)  
2,2',4,4',5,6'-Hexabromodiphenyl ether (BDE 154)  
2,2',3,4,4',5',6-Heptabromodiphenyl ether (BDE 183)

- Codified at Health and Safety Code section 105440 et seq.
- Known collectively as the National Reports on Human Exposure to Environmental Chemicals program.

2,2',3,3',4,4',5,6'-Octabromodiphenyl ether (BDE 196)  
2,2',3,3',4,4',6,6'-Octabromodiphenyl ether (BDE 197)  
2,2',3,3',4,5',6,6'-Octabromodiphenyl ether (BDE 201)  
2,2',3,3',5,5',6,6'-Octabromodiphenyl ether (BDE 202)  
2,2',3,4,4',5,5',6-Octabromodiphenyl ether (BDE 203)  
2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether (BDE 206)  
2,2',3,3',4,4',5,6,6'-Nonabromodiphenyl ether (BDE 207)  
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether (BDE 208)  
2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (BDE 209)

#### **Hydroxy-PBDEs (Metabolites of PBDEs)**

4'-Hydroxy-BDE 17  
4-Hydroxy-BDE 42  
3-Hydroxy-BDE 47  
5-Hydroxy-BDE 47  
6-Hydroxy-BDE 47  
4'-Hydroxy-BDE 49  
2'-Hydroxy-BDE 68  
4-Hydroxy-BDE 90  
5'-Hydroxy-BDE 99  
6'-Hydroxy-BDE 99  
3-Hydroxy-BDE 100  
5'-Hydroxy-BDE 100  
4'-Hydroxy-BDE 101  
4'-Hydroxy-BDE 103

#### **Cyclosiloxanes** <sup>1</sup>

Decamethylcyclopentasiloxane (D5)  
Dodecamethylcyclohexasiloxane (D6)  
Octamethylcyclotetrasiloxane (D4)

#### **Diesel Exhaust** <sup>2</sup>

#### **Diglycidyl Ethers of *p,p'*-Bisphenols** <sup>1</sup>

Bisphenol A diglycidyl ether (BADGE)  
Bisphenol F diglycidyl ether (BFDGE)

#### **Disinfection By-Products (Trihalomethanes)** <sup>3</sup>

Bromodichloromethane  
Dibromochloromethane  
Tribromomethane (Bromoform)  
Trichloromethane (Chloroform)

#### **Environmental Phenols** <sup>3</sup>

Benzophenone-3  
4-*t*-Octylphenol  
*o*-Phenylphenol

#### ***p,p'*-Bisphenols** <sup>1</sup>

Bisphenol A  
Bisphenol AF (BPAF)  
Bisphenol B (BPB)  
Bisphenol F (BPF)  
Bisphenol S (BPS)  
4,4'-Sulfonylbis[2-(2-propen-1-yl)phenol] (TGSA)

#### **Brominated phenols** <sup>4</sup>

2,4-Dibromophenol  
Pentabromophenol (PBP)  
Tetrabromobisphenol-A (TBBPA)  
2,4,6-Tribromophenol

#### **Chlorinated phenols** <sup>5</sup>

2,4-Dichlorophenol  
2,5-Dichlorophenol  
Pentachlorophenol  
2,4,5-Trichlorophenol  
2,4,6-Trichlorophenol  
Triclosan

#### **Parabens** <sup>3</sup>

Butylparaben <sup>6</sup>  
Ethylparaben  
Methylparaben  
*n*-Propylparaben

#### **Related chemicals**

Triclocarban <sup>7</sup>

#### **Metals** <sup>3</sup>

Antimony  
Arsenic  
Arsenic (V) acid  
Arsenobetaine  
Arsenocholine  
Arsenous (III) acid  
Dimethylarsinic acid  
Monomethylarsonic acid  
Trimethylarsine oxide  
Barium  
Beryllium  
Cadmium  
Cesium  
Chromium  
Cobalt  
Lead  
Manganese  
Mercury  
Molybdenum

Platinum  
Thallium  
Tungsten  
Uranium

**Non-Halogenated Aromatic  
Phosphates <sup>1</sup>**

Bisphenol A bis(diphenyl phosphate)  
Butylated triphenyl phosphate  
*t*-Butylphenyl diphenyl phosphate  
2-Ethylhexyl diphenyl phosphate  
Isodecyl diphenyl phosphate  
Isopropyl phenyl diphenyl phosphate  
Isopropylated triphenyl phosphate  
Resorcinol bis(diphenyl phosphate)  
Tricresyl phosphate  
Triphenyl phosphate

**Perchlorate and Other Anions <sup>8</sup>**

Perchlorate

**Other Anions**

Nitrate  
Thiocyanate

**Perfluorochemicals <sup>3</sup>**

2-(*N*-Ethyl-perfluorooctane sulfonamido) acetic acid  
2-(*N*-Methyl-perfluorooctane sulfonamido) acetic acid  
Perfluorobutane sulfonic acid  
Perfluorodecanoic acid  
Perfluorododecanoic acid  
Perfluoroheptanoic acid  
Perfluorohexane sulfonic acid  
Perfluorononanoic acid  
Perfluorooctane sulfonamide  
Perfluorooctane sulfonic acid (PFOS)  
Perfluorooctanoic acid (PFOA)  
Perfluoroundecanoic acid

**Pesticides <sup>3,9</sup>**

**Carbamate Insecticides <sup>3</sup>**

Benfuracarb  
Carbofuranphenol  
Carbaryl  
1-Hydroxynaphthalene <sup>10</sup>  
2-Hydroxynaphthalene <sup>10</sup>  
Carbofuran  
Carbofuranphenol  
Carbosulfan  
Carbofuranphenol  
Furathiocarb  
Carbofuranphenol

Propoxur  
2-Isopropoxyphenol

**Fungicides <sup>3</sup>**

Captafol  
Tetrahydrophthalimide  
Captan  
Phthalimide  
Tetrahydrophthalimide  
Chlorothalonil  
Dichloran  
Folpet  
Phthalimide  
Iprodione  
Mancozeb  
Ethylene thiourea  
Maneb  
Ethylene thiourea  
Metalaxyl  
Metiram  
Ethylene thiourea  
Nabam  
Ethylene thiourea  
Pentachlorophenol  
*o*-Phenylphenol  
Propineb  
Propylene thiourea  
Thiram  
Ethylene thiourea  
Ziram  
Ethylene thiourea

**Herbicides - Substituted Ureas <sup>3</sup>**

Bensulfuron-methyl  
Chlorimuron-ethyl  
Chlorsulfuron  
Diuron  
Ethametsulfuron-methyl  
Foramsulfuron  
Halosulfuron  
Iodosulfuron  
Linuron  
Mesosulfuron-methyl  
Metsulfuron-methyl  
Nicosulfuron  
Oxasulfuron  
Primisulfuron-methyl  
Prosulfuron  
Rimsulfuron  
Sulfometuron-methyl  
Sulfosulfuron  
Thifensulfuron-methyl  
Triasulfuron  
Triflusulfuron-methyl  
Non-specific metabolites  
Dimethoxy pyrimidine  
Dimethyl pyrimidine  
Methyl methoxytriazine

**Organochlorine Pesticides** <sup>3</sup>

Aldrin  
     Dieldrin  
 Chlordane  
     *trans*-Nonachlor  
     Oxychlordane  
 Dichlorodiphenyltrichloroethane (DDT) (including  
     *p,p'*-DDT and *o,p'*-DDT)  
     *p,p'*-Dichlorodipenyldichloroethene (*p,p'*-DDE)  
 Dieldrin  
 Endosulfan  
     Endosulfan-ether  
     Endosulfan-lactone  
     Endosulfan-sulfate  
 Endrin  
 Heptachlor  
     Heptachlor epoxide  
 Hexachlorobenzene  
     Pentachlorophenol  
     2,4,5-Trichlorophenol  
     2,4,6-Trichlorophenol  
 Hexachlorocyclohexanes (HCH) (including *beta*-  
 HCH and *gamma*-HCH [lindane])  
     Pentachlorophenol  
     2,4,5-Trichlorophenol  
     2,4,6-Trichlorophenol  
 Methoxychlor  
     Dihydroxy methoxychlor  
     Monohydroxy methoxychlor  
 Mirex  
 2,4,5-Trichlorophenol  
 2,4,6-Trichlorophenol

**Organophosphate Insecticides** <sup>3</sup>

Acephate  
     Methamidophos  
 Azinphos methyl  
     Dimethyldithiophosphate  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Chlorethoxyphos  
     Diethylphosphate  
     Diethylthiophosphate  
 Chlorpyrifos  
     Diethylphosphate  
     Diethylthiophosphate  
     3,5,6-Trichloro-2-pyridinol (TCPy)  
 Chlorpyrifos methyl  
     Dimethylphosphate  
     Dimethylthiophosphate  
     3,5,6-Trichloro-2-pyridinol (TCPy)  
 Coumaphos  
     3-Chloro-7-hydroxy-4-methyl-2H-chromen-2-  
     one/ol  
     Diethylphosphate  
     Diethylthiophosphate  
 Diazinon  
     Diethylphosphate

Diethylthiophosphate  
 2-Isopropyl-4-methyl-6-hydroxypyrimidine  
 Dichlorvos (DDVP)  
     Dimethylphosphate  
 Dicrotophos  
     Dimethylphosphate  
 Dimethoate  
     Dimethyldithiophosphate  
     Dimethylphosphate  
     Dimethylthiophosphate  
     Omethoate  
 Disulfoton  
     Diethyldithiophosphate  
     Diethylphosphate  
     Diethylthiophosphate  
 Ethion  
     Diethyldithiophosphate  
     Diethylphosphate  
     Diethylthiophosphate  
 Fenitrothion  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Fenthion  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Isazophos-methyl  
     5-Chloro-1,2-dihydro-1-isopropyl-[3H]-1,2,4-  
     triazol-3-one  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Malathion  
     Dimethyldithiophosphate  
     Dimethylphosphate  
     Dimethylthiophosphate  
     Malathion dicarboxylic acid  
 Methamidophos  
 Methidathion  
     Dimethyldithiophosphate  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Methyl parathion  
     Dimethylphosphate  
     Dimethylthiophosphate  
     *p*-Nitrophenol  
 Naled  
     Dimethylphosphate  
 Oxydemeton-methyl  
     Dimethylphosphate  
     Dimethylthiophosphate  
 Parathion (Ethyl parathion)  
     Diethylphosphate  
     Diethylthiophosphate  
     *p*-Nitrophenol  
 Phorate  
     Diethyldithiophosphate  
     Diethylphosphate  
     Diethylthiophosphate  
 Phosmet (Imidan)  
     Dimethyldithiophosphate

Dimethylphosphate  
Dimethylthiophosphate  
Pirimiphos-methyl  
2-(Diethylamino)-6-methylpyrimidin-4-ol/one  
Dimethylphosphate  
Dimethylthiophosphate  
Sulfotepp  
Diethylphosphate  
Diethylthiophosphate  
Temephos  
Dimethylphosphate  
Dimethylthiophosphate  
Terbufos  
Diethyldithiophosphate  
Diethylphosphate  
Diethylthiophosphate  
Tetrachlorvinphos  
Dimethylphosphate

**Pyrethroid Pesticides** <sup>1</sup>

Allethrin  
*cis/trans*-Dimethylvinylcyclopropane carboxylic diacid  
Bifenthrin  
Cyfluthrin  
*cis*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*cis*-DCCA)  
*trans*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*trans*-DCCA)  
4-Fluoro-3-phenoxybenzoic acid  
Cyhalothrin (including *lambda*- and *gamma*-)  
3-Phenoxybenzoic acid (3-PBA)  
Cypermethrin (including *cis*- and *trans*-)  
*cis*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*cis*-DCCA)  
*trans*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*trans*-DCCA)  
3-Phenoxybenzoic acid (3-PBA)  
Cyphenothrin  
Deltamethrin  
*cis*-3-(2,2-Dibromovinyl)-2,2-dimethylcyclopropane carboxylic acid  
3-Phenoxybenzoic acid (3-PBA)  
Esbiothrin  
Esfenvalerate  
Etofenprox  
Fenpropathrin  
3-Phenoxybenzoic acid (3-PBA)  
Fenvalerate  
Imiprothrin  
Metofluthrin  
Permethrin (including *cis*- and *trans*-)  
*cis*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*cis*-DCCA)

*trans*-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (*trans*-DCCA)  
3-Phenoxybenzoic acid (3-PBA)  
Phenothrin (Sumithrin)  
Prallethrin  
Pyrethrin 1  
*cis/trans*-Dimethylvinylcyclopropane carboxylic diacid  
Resmethrin  
*cis/trans*-Dimethylvinylcyclopropane carboxylic diacid  
Tetramethrin  
Tralomethrin  
3-Phenoxybenzoic acid (3-PBA)

**Other Herbicides**

Acetochlor  
Acetochlor mercapturate  
Alachlor  
Alachlor mercapturate  
Atrazine  
Atrazine mercapturate  
Diaminochlorotriazine  
Desethylatrazine  
Desisopropylatrazine  
Hydroxyatrazine  
Dacthal  
2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters  
2,4-Dichlorophenoxyacetic acid  
2,4-Dichlorophenol  
Metolachlor  
Metolachlor mercapturate  
Pendimethalin  
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), salts and esters  
2,4,5-Trichlorophenoxyacetic acid  
Trifluralin

**Other Pesticides**

1,4-Dichlorobenzene (*p*-Dichlorobenzene)  
2,5-Dichlorophenol  
*N,N*-Diethyl-3-methylbenzamide (DEET)  
Fipronil  
Octhilinone

**Phthalates** <sup>3</sup>

Benzylbutyl phthalate (BzBP)  
Mono-benzyl phthalate (MBzP)  
Mono-*n*-butyl phthalate (MnBP)  
Dibutyl phthalate (DBP) <sup>11</sup>  
Mono-*n*-butyl phthalate (MnBP)  
Mono-isobutyl phthalate (MIBP)  
Dicyclohexyl phthalate (DCHP)  
Mono-cyclohexyl phthalate (MCHP)  
Diethyl phthalate (DEP)  
Mono-ethyl phthalate (MEP)

Di-2-ethylhexyl phthalate (DEHP)  
 Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)  
 Mono-2-ethylhexyl phthalate (MEHP)  
 Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)  
 Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)  
 Di-isodecyl phthalate (DIDP)  
 Mono-(carboxynonyl) phthalate (MCNP)  
 Di-isononyl phthalate (DINP)  
 Mono-(carboxyoctyl) phthalate (MCOP)  
 Mono-(hydroxyisononyl) phthalate  
 Mono-isononyl phthalate (MINP)  
 Mono-(oxoisononyl) phthalate  
 Dimethyl phthalate (DMP)  
 Mono-methyl phthalate (MMP)  
 Di-*n*-octyl phthalate (DnOP)  
 Mono-(3-carboxypropyl) phthalate (MCPP)  
 Mono-*n*-octyl phthalate (MnOP)

### Phytoestrogens <sup>3</sup>

Daidzein  
 O-Desmethylangolensin  
 Equol  
 Enterodiol  
 Enterolactone  
 Genistein

### Polychlorinated Biphenyls (PCBs), Dioxin-Like <sup>3</sup>

#### Coplanar PCBs <sup>3</sup>

3,4,4',5-Tetrachlorobiphenyl (PCB 81)  
 3,3',4,4',5-Pentachlorobiphenyl (PCB 126)  
 3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)

#### Mono-ortho-Substituted PCBs <sup>3</sup>

2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)  
 2,3',4,4',5-Pentachlorobiphenyl (PCB 118)  
 2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)  
 2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)  
 2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)  
 2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)

### Polychlorinated Biphenyls (PCBs), Non-Dioxin-Like <sup>3</sup>

2,2',5-Trichlorobiphenyl (PCB 18)  
 2,4,4'-Trichlorobiphenyl (PCB 28)  
 2,2',3,5'-Tetrachlorobiphenyl (PCB 44)  
 2,2',4,5'-Tetrachlorobiphenyl (PCB 49)  
 2,2',5,5'-Tetrachlorobiphenyl (PCB 52)  
 2,3',4,4'-Tetrachlorobiphenyl (PCB 66)  
 2,4,4',5-Tetrachlorobiphenyl (PCB 74)  
 2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)  
 2,2',4,4',5-Pentachlorobiphenyl (PCB 99)  
 2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)  
 2,3,3',4',6-Pentachlorobiphenyl (PCB 110)

2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)  
 2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)  
 2,2',3,4',5,5'-Hexachlorobiphenyl (PCB 146)  
 2,2',3,4',5',6-Hexachlorobiphenyl (PCB 149)  
 2,2',3,5,5',6-Hexachlorobiphenyl (PCB 151)  
 2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)  
 2,3,3',4,4',6-Hexachlorobiphenyl (PCB 158)  
 2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)  
 2,2',3,3',4,5,5'-Heptachlorobiphenyl (PCB 172)  
 2,2',3,3',4,5',6'-Heptachlorobiphenyl (PCB 177)  
 2,2',3,3',5,5',6-Heptachlorobiphenyl (PCB 178)  
 2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)  
 2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB 183)  
 2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB 187)  
 2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB 194)  
 2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB 195)  
 2,2',3,3',4,4',5,6'-Octachlorobiphenyl (PCB 196)  
 2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB 199)  
 2,2',3,4,4',5,5',6-Octachlorobiphenyl (PCB 203)  
 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB 206)  
 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (PCB 209)

### Polychlorinated Biphenyls (PCBs)

#### Hydroxy-PCBs (Metabolites of PCBs)

4-Hydroxy-PCB 107  
 4-Hydroxy-PCB 120  
 4'-Hydroxy-PCB 130  
 3'-Hydroxy-PCB 138  
 4-Hydroxy-PCB 146  
 3-Hydroxy-PCB 153  
 4'-Hydroxy-PCB 172  
 3'-Hydroxy-PCB 180  
 4-Hydroxy-PCB 187  
 4'-Hydroxy-PCB 193

### Polychlorinated Dibenzo-*p*-dioxins <sup>3</sup>

1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin  
 1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin  
 1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin  
 1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin  
 1,2,3,4,6,7,8,9-Octachlorodibenzo-*p*-dioxin  
 1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin  
 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD)

### Polychlorinated Dibenzofurans <sup>3</sup>

1,2,3,4,6,7,8-Heptachlorodibenzofuran  
 1,2,3,4,7,8,9-Heptachlorodibenzofuran  
 1,2,3,4,7,8-Hexachlorodibenzofuran  
 1,2,3,6,7,8-Hexachlorodibenzofuran  
 1,2,3,7,8,9-Hexachlorodibenzofuran  
 2,3,4,6,7,8-Hexachlorodibenzofuran  
 1,2,3,4,6,7,8,9-Octachlorodibenzofuran  
 1,2,3,7,8-Pentachlorodibenzofuran  
 2,3,4,7,8-Pentachlorodibenzofuran  
 2,3,7,8-Tetrachlorodibenzofuran

### Polycyclic Aromatic Hydrocarbons (PAHs) <sup>3</sup>

Benz[a]anthracene  
 1-Hydroxybenz[a]anthracene  
 3-Hydroxybenz[a]anthracene  
 9-Hydroxybenz[a]anthracene  
 Benzo[a]pyrene  
 3-Hydroxybenzo[a]pyrene  
 Benzo[c]phenanthrene  
 1-Hydroxybenzo[c]phenanthrene  
 2-Hydroxybenzo[c]phenanthrene  
 3-Hydroxybenzo[c]phenanthrene  
 Chrysene  
 1-Hydroxychrysene  
 2-Hydroxychrysene  
 3-Hydroxychrysene  
 4-Hydroxychrysene  
 6-Hydroxychrysene  
 Fluoranthene  
 3-Hydroxyfluoranthene  
 Fluorene  
 2-Hydroxyfluorene  
 3-Hydroxyfluorene  
 9-Hydroxyfluorene  
 Naphthalene  
 1-Hydroxynaphthalene  
 2-Hydroxynaphthalene  
 Phenanthrene  
 1-Hydroxyphenanthrene  
 2-Hydroxyphenanthrene  
 3-Hydroxyphenanthrene  
 4-Hydroxyphenanthrene  
 9-Hydroxyphenanthrene  
 Pyrene  
 1-Hydroxypyrene

### Synthetic Hormones used in Food Production <sup>1</sup>

Melengestrol acetate  
 Trenbolone acetate  
 Zeranol

### Synthetic Polycyclic Musks <sup>1</sup>

4-Acetyl-1,1-dimethyl-6-*tert*-butylindan (ADBI)  
 6-Acetyl-1,1,2,3,3,5-hexamethylindane (AHMI)  
 7-Acetyl-1,1,3,4,4,6-hexamethyl-tetrahydronaphthalene (AHTN)  
 5-Acetyl-1,1,2,6-tetramethyl-3-isopropylindan (ATII)  
 Acetyletyltetramethyltetralin (AETT)  
 6,7-Dihydro-1,1,2,3,3-pentamethyl-4[5H]indanone (DPMI)  
 1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl-cyclopenta[*g*]-2-benzopyran (HHCB)

### Tetramethyl Acetyloctahydronaphthalenes <sup>1</sup>

1-(1,2,3,4,6,7,8,8a-Octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)ethanone (alpha isomer)  
 1-(1,2,3,4,5,6,7,8-Octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)ethanone (beta isomer; OTNE)  
 1-(1,2,3,5,6,7,8,8a-Octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)ethanone (gamma isomer)  
 1-(1,2,3,4,5,6,7,8-Octahydro-2,3,5,5-tetramethyl-2-naphthalenyl)ethanone

### Tobacco Smoke

Nicotine  
 Cotinine  
 NNK (4-[Methylnitrosamino]-1-[3-pyridyl]-1-butanone)  
 NNAL (4-[Methylnitrosamino]-1-(3-pyridyl)-1-butanol)

### Volatile Organic Compounds <sup>3</sup>

Benzene  
 Carbon tetrachloride  
 Chlorobenzene  
 Dibromomethane  
 1,2-Dibromo-3-chloropropane (DBCP)  
 1,2-Dichlorobenzene (*o*-Dichlorobenzene)  
 1,3-Dichlorobenzene (*m*-Dichlorobenzene)  
 1,4-Dichlorobenzene (*p*-Dichlorobenzene)  
 1,1-Dichloroethane  
 1,2-Dichloroethane  
 1,1-Dichloroethene  
*cis*-1,2-Dichloroethene  
*trans*-1,2-Dichloroethene  
 Dichloromethane (Methylene chloride)  
 1,2-Dichloropropane  
 2,5-Dimethylfuran  
 Ethylbenzene  
 Hexachloroethane  
 Methyl-*t*-butyl ether (MTBE)  
 Nitrobenzene  
 Styrene  
 1,1,2,2-Tetrachloroethane  
 Tetrachloroethylene (Perchloroethylene)  
 1,1,1-Trichloroethane  
 1,1,2-Trichloroethane  
 Trichloroethylene  
 Toluene  
*m*-Xylene  
*o*-Xylene  
*p*-Xylene

**Notes**

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- 1 All members of the chemical class are designated chemicals, including, but not limited to, the chemicals shown.
- 2 Diesel exhaust is a complex mixture that contains many components, one or more of which may be useful as an indicator for biomonitoring.
- 3 All members of the chemical class are not designated chemicals; only the specific chemicals listed are designated chemicals.
- 4 These brominated phenols are part of the chemical group “brominated and chlorinated organic chemicals used as flame retardants”, which are listed as designated chemicals. The brominated phenols are also included in the category “environmental phenols” because the laboratory measures them with other environmental phenols.
- 5 These chlorinated phenols, with the exception of triclosan, are metabolites of certain pesticides that are listed as designated chemicals. These chlorinated phenols are also included in the category “environmental phenols” because the laboratory measures them with other environmental phenols.
- 6 Includes *n*-butylparaben and isobutylparaben.
- 7 Triclocarban is not a phenol but can be analytically measured with environmental phenols. When it is released into the environment, it is commonly found in the same environmental media as triclosan.
- 8 CDC measures nitrate and thiocyanate along with perchlorate, because all three anions can affect iodine uptake by the thyroid.
- 9 Fungicides, herbicides, and insecticides are grouped under the general heading of “Pesticides.”
- 10 1-Hydroxynaphthalene is the metabolite of both carbaryl and naphthalene. To determine the percent of 1-hydroxynaphthalene attributable to carbaryl alone, 2-hydroxynaphthalene (which is only a metabolite of naphthalene) must also be measured.
- 11 Includes di-*n*-butyl phthalate and di-isobutyl phthalate.