

Biomonitoring California Designated Chemicals October 2014

The designated chemicals for the California Environmental Contaminant Biomonitoring Program^a (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^b 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
N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)-L-cysteine
N-Acetyl-S-(2-carbamoylethyl)-L-cysteine

Antimicrobials used in Food Production ¹

Brominated and Chlorinated Organic Compounds used as Flame Retardants ¹

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 (TBBPA-DBPE)
Tetrabromobisphenol A bis(2-hydroxyethyl) ether
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)

a. Codified at Health and Safety Code section 105440 et seq.

b. Known collectively as the National Reports on Human Exposure to Environmental Chemicals program.

2,2',3,4,4',5',6-Heptabromodiphenyl ether (BDE 183)
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 ¹

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

Diesel Exhaust ²

Diglycidyl Ethers of *p,p'*-Bisphenols ¹

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

Disinfection By-Products (Trihalomethanes) ³

Bromodichloromethane
Dibromochloromethane
Tribromomethane (Bromoform)
Trichloromethane (Chloroform)

Environmental Phenols ³

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

***p,p'*-Bisphenols** ¹

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 ⁴

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

Chlorinated phenols ⁵

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

Parabens ³

Butylparaben ⁶
Ethylparaben
Methylparaben
n-Propylparaben

Related chemicals

Triclocarban ⁷

Metals ³

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

Mercury
Ethyl mercury
Methyl mercury
Molybdenum
Platinum
Selenium
Strontium
Thallium
Tin
Tungsten
Uranium
Zinc

**Non-Halogenated Aromatic
Phosphates ¹**

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 ⁸

Perchlorate

Other Anions

Nitrate
Thiocyanate

Perfluorochemicals ³

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 ^{3,9}

Carbamate Insecticides ³

Benfuracarb
Carbofuranphenol

Carbaryl
1-Hydroxynaphthalene ¹⁰
2-Hydroxynaphthalene ¹⁰
Carbofuran
Carbofuranphenol
Carbosulfan
Carbofuranphenol
Furathiocarb
Carbofuranphenol
Propoxur
2-Isopropoxyphenol

Fungicides ³

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 ³

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 ³

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 ³

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 ¹

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 ³

Benzylbutyl phthalate (BzBP)
 Mono-benzyl phthalate (MBzP)
 Mono-*n*-butyl phthalate (MnBP)
 Di-*n*-butyl phthalate (DnBP)
 Mono-*n*-butyl phthalate (MnBP)
 Di-isobutyl phthalate (DIBP)
 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 (MCP)
 Mono-*n*-octyl phthalate (MnOP)

Phthalate Alternatives ³

1,2-Cyclohexane dicarboxylic acid, diisononyl ester (DINCH)
 Cyclohexane-1,2-dicarboxylic acid-mono (hydroxy-isononyl ester) (MHNCH)

Phytoestrogens ³

Daidzein
 O-Desmethylangolensin
 Equol
 Enterodiol
 Enterolactone
 Genistein

Polychlorinated Biphenyls (PCBs), Dioxin-Like ³

Coplanar PCBs ³

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 ³

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 ³

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 ^{1,3}

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 ³

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) ³

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 ¹

Melengestrol acetate
Trenbolone acetate
Zeranol

Synthetic Polycyclic Musks ¹

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)
Acetyethyltetramethyltetralin (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 ¹

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

Acrolein
N-Acetyl-S-(2-carboxyethyl)-L-cysteine
N-Acetyl-S-(3-hydroxypropyl)-L-cysteine
Acrylonitrile
N-Acetyl-S-(2-cyanoethyl)-L-cysteine
N-Acetyl-S-(2-hydroxyethyl)-L-cysteine
Benzene
N-Acetyl-S-(phenyl)-L-cysteine
t,t-Muconic acid
1-Bromopropane
N-Acetyl-S-(*n*-propyl)-L-cysteine

1,3-Butadiene
 N-Acetyl-S-(3,4-dihydroxybutyl)-L-cysteine
 N-Acetyl-S-(2-hydroxy-3-butenyl)-L-cysteine
 N-Acetyl-S-(4-hydroxy-2-butenyl)-L-cysteine
 N-Acetyl-S-(1-hydroxymethyl-2-propenyl)-L-cysteine
 Carbon disulfide
 2-Thioxothiazolidine-4-carboxylic acid
 Carbon tetrachloride
 Chlorobenzene
 Crotonaldehyde
 N-Acetyl-S-(3-hydroxypropyl-1-methyl)-L-cysteine
 Cyanide
 2-Aminothiazoline-4-carboxylic acid
 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
 N,N-Dimethylformamide
 N-Acetyl-S-(N-methylcarbamoyl)-L-cysteine
 2,5-Dimethylfuran
 Ethylbenzene
 Phenylglyoxylic acid
 Ethylene oxide
 N-Acetyl-S-(2-hydroxyethyl)-L-cysteine
 Hexachloroethane
 Methyl-*t*-butyl ether (MTBE)
 Nitrobenzene
 Propylene oxide
 N-Acetyl-S-(2-hydroxypropyl)-L-cysteine
 Styrene
 N-Acetyl-S-(1-phenyl-2-hydroxyethyl)-L-cysteine
 N-Acetyl-S-(2-phenyl-2-hydroxyethyl)-L-cysteine
 Mandelic acid
 Phenylglyoxylic acid
 1,1,2,2-Tetrachloroethane
 Tetrachloroethene (Perchloroethylene)
 N-Acetyl-S-(trichlorovinyl)-L-cysteine
 1,1,1-Trichloroethane
 1,1,2-Trichloroethane
 Trichloroethene (Trichloroethylene)
 N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine
 N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine
 Toluene
 N-Acetyl-S-(benzyl)-L-cysteine
 Vinyl chloride
 N-Acetyl-S-(2-hydroxyethyl)-L-cysteine

m-Xylene
 N-Acetyl-S-(dimethylphenyl)-L-cysteine
 3-Methylhippuric acid
o-Xylene
 N-Acetyl-S-(dimethylphenyl)-L-cysteine
 2-Methylhippuric acid
p-Xylene
 N-Acetyl-S-(dimethylphenyl)-L-cysteine
 4-Methylhippuric acid

Notes

- 1 All members of the chemical group 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 group 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.