



Artificial Turf: Chemical Analysis

Findings of the chemical analysis conducted by Yale University on the crumb rubber tire infill used in synthetic turf and the rubber tire mulch used as surfacing material in toddler playgrounds.

The shredded rubber tire playground mulch samples tested were provided by the manufacturer and were purchased in new bags of rubber mulch for use in gardens and playgrounds. The rubber tire infill for synthetic turf fields was obtained as new infill material from installers of synthetic turf fields. There were 5 samples of infill from 5 different installers of fields and 9 different samples of rubber mulch taken from 9 different unopened bags of playground mulch.

RESULTS

EHHI's study done at Yale University found 96 chemicals in the synthetic turf and rubber tire mulch used as surfacing in toddler playgrounds. Of the 96 chemicals detected – a little under a half have had never had toxicity assessments for their health effects. Of the rest, 20% are probable carcinogens.

12 CARCINOGENS

2-mercaptobenzothiazole

Carcinogen, toxic to aquatic life

9,10-dimethylanthracene

Carcinogen, respiratory irritant and can cause asthma

Bis(2-ethylhexyl) phthalate

Carcinogen, may cause damage to fetuses

Fluoranthene

Carcinogen, one of the US EPA's 16 priority pollutants, a PAH

Heptadecane

Carcinogen

Phenol, 4-(1,1,3,3-tetramethylbutyl)-

Carcinogen

Phenanthrene

Carcinogen, a PAH

Phthalimide

Carcinogen, skin, eye and lung irritant. A fungicide.

Pyrene, 1-methyl-

Carcinogen

Tetratriacontane

Carcinogen, eye and skin irritant. Can cause systemic damage to central nervous system.

Pyrene

Carcinogen, toxic to liver and kidneys, a PAH

Carbon Black

Carcinogen

Carbon Black makes up to 20% to 30 % of every tire. It is used as a reinforcing filler. Carbon Black is listed as a carcinogen by the International Agency for Research on Cancer (IARC).

Carbon Black, as such, was not analyzed by the Yale Study because Carbon Black is made up of a number of chemicals – some of which were found in the Yale study. Carbon Black is not one chemical – it is made up of many chemicals – often of petroleum products.

Furthermore, carbon black has no fixed composition, even of the many compounds it contains. Carbon black from different sources will have differing compositions. In our method, carbon black will register as a series of substances extracted from it. There is no carbon black molecule, it's **a mixture**.

20 IRRITANTS

1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-
Irritant – causes skin and eye irritation, toxic to aquatic life

1,4-Benzenediamine, N-(1-methylethyl)-N'-phenyl-
Irritant – causes skin and eye irritation, toxic to aquatic life

2(3H)-Benzothiazolone

Irritant – causes skin and lung irritation

2-Dodecen-1-yl(-)succinic anhydride

Irritant – causes eye, skin and lung irritation

3,5-di-tert-Butyl-4-hydroxybenzaldehyde

Irritant – causes eye, skin and lung irritation

Anthracene

Irritant – causes skin, eye and respiratory irritation. Breathing it can irritate the nose, throat and lungs causing coughing and wheezing.

Benzenamine, 4-octyl-N-(4-octylphenyl)-

Irritant – causes eye and skin irritation

Benzenesulfonanilide

Considered hazardous, very little testing has been done on it.

Benzothiazole, 2-(methylthio)-

Irritant – causes skin and eye irritation

Dehydroabietic acid

Toxic to aquatic organisms

Docosane

Irritant – causes skin irritation

Hexadecanoic acid, butyl ester

Irritant – causes eye, skin and lung irritation. Can cause reproductive effects.

Methyl stearate

Irritant – causes eye, skin and lung irritation

Octadecane

Irritant – causes skin, eye and lung irritation

Octadecanoic acid also known as Stearic acid

Irritant – causes skin, eye and respiratory irritation

Oleic Acid

Irritant – causes skin and eye irritation

Phenol, 2,2'-methylenebis[6-(1,1-dimethylethyl)-4-ethyl-

Irritant – causes skin, eye and respiratory irritation

Tetradecanoic acid

Toxic to aquatic organisms. Skin and eye irritant

Anthracene, 2-methyl-

Acute aquatic toxicity, Not much data available – what there is shows it to be an eye, skin and lung irritant

Anthracene, 9-methyl-

Acute aquatic toxicity, serious eye irritant