

This document shows some of the scientific literature regarding crumb rubber. It has three sections divided by page breaks:

- **Chemical Components of Concern**
- **Release to Environment**
- **Risks to Organisms**

Chemical Components of Concern

[A new look at rubber recycling and recreational surfaces: The inorganic and OPE chemistry of vulcanised elastomers used in playgrounds and sports facilities](#) 2023

[Assessment of the bioaccessibility of PAHs and other hazardous compounds present in recycled tire rubber employed in synthetic football fields](#) 2023

[Global evaluation of the chemical hazard of recycled tire crumb rubber employed on worldwide synthetic turf football pitches](#) 2022

[Artificial turf and crumb rubber infill: An international policy review concerning the current state of regulations](#) 2022

[Hazardous compounds in recreational and urban recycled surfaces made from crumb rubber. Compliance with current regulation and future perspectives](#) 2021

[Recycling waste rubber tyres in construction materials and associated environmental considerations: A review](#) 2020

[ERASSTRI - European Risk Assessment Study on Synthetic Turf Rubber Infill – Part 1: Analysis of infill samples](#) 2020

[Artificial Turf Infill: A Comparative Assessment of Chemical Contents](#) 2020

[Chlorinated Paraffins in Car Tires Recycled to Rubber Granulates and Playground Tiles](#) 2019

[Evaluation of potential carcinogenicity of organic chemicals in synthetic turf crumb rubber](#) 2019

[July 2019 Report: Tire Crumb Rubber Characterization](#) 2019

[Polycyclic aromatic hydrocarbons in consumer goods made from recycled rubber material: A review](#) 2019-

[Physical and chemical characterization of representative samples of recycled rubber from end-of-life tires](#) 2017

[Determination of priority and other hazardous substances in football fields of synthetic turf by gas chromatography-mass spectrometry: A health and environmental concern](#) 2018

[Investigation of PAH and other hazardous contaminant occurrence in recycled tyre rubber surfaces. Case-study: restaurant playground in an indoor shopping centre.](#) 2014

[Hazardous organic chemicals in rubber recycled tire playgrounds and pavers](#) 2013

Release to Environment

[An overview of the key topics related to the study of tire particles and their chemical leachates: From problems to solutions](#) 2024

[Micron-size tire tread particles leach organic compounds at higher rates than centimeter-size particles: Compound identification and profile comparison](#) 2023

[Environmental Consequences of Rubber Crumb Application: Soil and Water Pollution](#) 2022

[Occurrences of Tire Rubber-Derived Contaminants in Cold-Climate Urban Runoff](#)

[Artificial Turf Study Leachate and Stormwater Characteristics](#) 2021

[Evaluation of chemicals of environmental concern in crumb rubber and water leachates from several types of synthetic turf football pitches](#) 2021

[Car Tire Crumb Rubber: Does Leaching Produce a Toxic Chemical Cocktail in Coastal Marine Systems?](#) 2020

[Tyre and road wear particles \(TRWP\) - A review of generation, properties, emissions, human health risk, ecotoxicity, and fate in the environment](#) 2020

[ERASSTRI - European Risk Assessment Study on Synthetic Turf Rubber Infill – Part 2: Migration and monitoring studies](#) 2020

[Release of particles, organic compounds, and metals from crumb rubber used in synthetic turf under chemical and physical stress](#) 2018

[Microplastics. Occurrence, Effects and Sources of Releases to the Environment in Denmark](#) 2015

[Leaching of DOC, DN, and inorganic constituents from scrap tires](#) 2015

[Automobile Tires—A potential source of highly carcinogenic dibenzopyrenes to the environment](#) 2012

[Zinc Leaching from Tire Crumb Rubber](#) 2012

[Characterization of substances released from crumb rubber material used on artificial turf fields](#) 2010

[Artificial Turf Study Leachate and Stormwater Characteristics](#) 2010

[Metals contained and leached from rubber granulates used in synthetic turf areas](#) 2009

[Occurrence and effects of tire wear particles in the environment – A critical review and an initial risk assessment](#) 2009

[Toxic components leaching from tire rubber](#) 2007

[Toxicity of tire debris leachates](#) 2005

[Fate and effect of zinc from tire debris in soil](#) 2002

Risks to Organisms

[Emerging Health Risks of Crumb Rubber: Inhalation of Environmentally Persistent Free Radicals via Saliva During Artificial Turf Activities](#) 2023

[Tire-Derived Transformation Product 6PPD-Quinone Induces Mortality and Transcriptionally Disrupts Vascular Permeability Pathways in Developing Coho Salmon](#) 2023

[Lethal effect of leachates from tyre wear particles on marine copepods](#) 2023

[Toxicity of tire particle leachates on early life stages of keystone sea urchin species](#) 2023

[Assessing children's potential exposures to harmful metals in tire crumb rubber by accelerated photodegradation weathering](#) 2023

[Presence of metals and metalloids in crumb rubber used as infill of worldwide synthetic turf pitches: Exposure and risk assessment](#) 2022

[Acute Toxicity Testing of the Tire Rubber-Derived Chemical 6PPD-quinone on Atlantic Salmon \(*Salmo salar*\) and Brown Trout \(*Salmo trutta*\)](#) 2022

[Acute Toxicity of the Tire Rubber-Derived Chemical 6PPD-quinone to Four Fishes of Commercial, Cultural, and Ecological Importance](#) 2022

[Toxicity and Effects of Tire Crumb Rubber in the Aquatic Environment](#) 2021

[Toxicological effects of micronized tire crumb rubber on mummichog \(*Fundulus heteroclitus*\) and fathead minnow \(*Pimephales promelas*\)](#) 2020

[Microplastic and tire wear particle occurrence in fishes from an urban estuary: Influence of feeding characteristics on exposure risk](#) 2020

[ERASSTRI - European risk assessment study on synthetic turf rubber infill - Part 3: Exposure and risk characterisation](#) 2020

[Ecotoxicology of micronized tire rubber: Past, present and future considerations](#) 2020

[Chemical composition and ecotoxicity of plastic and car tire rubber leachates to aquatic organisms](#) 2020

[Gut microbiota of aquatic organisms: A key endpoint for ecotoxicological studies](#) 2019

[Artificial turf infill associated with systematic toxicity in an amniote vertebrate](#) 2019

[Acute and long-term toxicity of micronized car tire wear particles to *Hyalella azteca*](#) 2019

[An evaluation of the Possible Health Risks of Recycled Rubber Granules Used as Infill in Synthetic Turf Sports fields. Helsinki: ECHA](#) 2018

[Ingestion and chronic effects of car tire tread particles on freshwater benthic macroinvertebrates](#) 2018

[New approach to the ecotoxicological risk assessment of artificial outdoor sporting grounds](#) 2013

[Acute aquatic toxicity of tire and road wear particles to alga, daphnid, and fish](#) 2011

[Toxicity assessment of sequential leachates of tire powder using a battery of toxicity tests and toxicity identification evaluations](#) 2009

[“Mapping, emissions and environmental and health assessment of chemical substances in artificial turf,” in Survey of Chemical Substances in Consumer Products, \(Taastrup: The Danish Technological Institute\)](#) 2008

[Acute toxicity of leachates of tire wear material to *Daphnia magna*—Variability and toxic components](#) 2006