EXTRACTIONS

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COFFEE FILTERS OUT TOXIC METALS

Looking for a safe drink? Try coffee. A research team of Australian, Chilean, and US scientists have found that filter coffee makers can remove from 78 to 90 percent of dissolved heavy metals such as lead and copper. The deeper the bed of coffee grounds in the coffee maker, the more time the water is in contact with the grounds, and the more effective the removal of heavy metals.

The scientists think the reason coffee is so effective is that the grounds contain uncharged or negatively charged molecules, whereas the dissolved heavy metals are positively charged. This causes the heavy metals to bind strongly to the coffee grounds.

Both copper and lead have long-term toxic effects on humans. Lead is strongly linked to intellectual impairment, especially in the young.

The scientists are extending their research to other toxic heavy metals such as mercury, cadmium, and zinc, which may also be removed in the process. Tea-bags and tea leaves may work in a similar way, but not as well as coffee.

These findings could mean that daily human exposures to heavy metals in many cities around the world have been overestimated, and could change current public health risk assessment models.

[From <http://ens.lycos.com/ens/feb2000/2000L-02-02-02.html>]

BACKYARD BURNING A HAZARD

Burning trash in backyard barrels is "one of the worse sources of dioxins and furans in America," says a report from the US Environmental Protection Agency and the New York State Department of Health.

Mainly a rural practice, such barrel-burning creates more polychlorinated compounds because of the lower incineration temperatures and poor combustion conditions compared to municipal incinerators. One barrel can put as many pollutants into the air as a well-controlled municipal waste incinerator serving tens of thousands of households.

Including barrel burning in the estimates of dioxin emissions may help resolve a long-standing discrepancy between the estimates and the higher measured deposition rates. The study's results may also give ammunition to regulators for widening areas now covered by trash-burning bans.

[From <http://ens.lycos.com/ens/jan2000/2000L-01-04-06.html>]

ROAD SALT GOES DEEP DOWN

Canada uses almost 5000 kilotonnes of salt and calcium chloride to de-ice our highways each year. In the spring, salt-laden runoff from melting snow can contaminate nearby lakes, streams, and ponds. While much is known about the adverse effects of salt contamination on fish, a new study by scientists at Environment Canada's National Water Research Institute in Burlington, Ontario, looked at the effects on the bottom layer of aquatic ecosystems.

Their results showed that when salt-laden water enters a lake or pond, it sinks to the bottom and prevents the normal water-mixing process, thereby depriving bottom-dwelling organisms of oxygen. The water in the pores of the sediments also contains high levels of salt, which, in turn, increases the concentration of heavy metals. Toxicity tests on a shrimp-like invertebrate (*Hyalella azteca*) show that the porewater itself is highly toxic and suggest that the toxicity is from heavy metals, such as cadmium, rather than high levels of chloride.

The results of this and further studies will help determine whether road salts should be considered toxic substances under the *Canadian Environmental Protection Act.*

Environment Canada is already working with Transport Canada to reduce the use of de-icing chemicals. Using automatic weather stations with specialized sensors embedded in the road surface to measure temperature, wetness, and residual chemicals, meteorologists can predict pavement temperatures, thus enabling road crews to better plan their winter maintenance.

[From *Science and the Environment*, November/December 1999, <http://www.ec.gc.ca/science/sandenov99/article2_e.html>]

DYNAMIC UNDERGROUND STRIPPING

A new environmental technology called dynamic underground stripping can remove up to 2000 times more contaminants from the ground than conventional pump-and-treat methods.

Using dynamic underground stripping, developed by Lawrence Livermore National Laboratory, Southern California Edison is cleaning up the groundwater at a site used for 60 years to treat power poles with preservatives such as creosote and pentachlorophenol. Since the clean-up started in June 1997, engineers have removed 902 000 pounds of contaminants.

The technology uses steam heat and pressure to drive contaminants toward extraction wells. It also uses heat and forced air to chemically break down contaminants in place, converting them to less harmful compounds. Sensors measuring underground temperatures and electrical resistance provide data to create computer generated, three-dimensional images that the specialists on the surface can use to control the process in real time.

Some experts believe that this new technology could be used to economically destroy pollutants found at one-fourth of the 1300 US Superfund sites.

[From Env. Sci. & Eng., January 2000]

NATURAL GAS—CLEANER THAN CLEAN

A study last fall by California's South Coast Air Quality Management District attributed 70 percent of the total cancer risk in the Los Angeles region to diesel particulates. That prompted national associations of air quality control officers to extend the study to other cities, which concluded that, over a lifetime of exposure to diesel fumes, more than 125 000 people in the US will develop cancer, especially those in urban areas.

New diesel transit buses still emit 80 times the nitrogen oxides and 60 times the particulate matter emitted by today's gasoline powered vehicles. Diesel engines also produce particulates less than 2.5 microns in diameter which significantly increase the risk of a number of diseases, such as asthma and other lung diseases.

Natural gas vehicles may be a solution. A study funded by the Gas Research Institute found strong evidence that substituting natural gas for diesel, even newer 'clean diesel' fuels, in heavy trucks and buses could significantly reduce the health risks from diesel exhaust.

[From <http://ens.lycos.com/ens/dec99/1999L-12-21-09.html>, <http://ens.lycos.com/ens/mar2000/2000L-03-15-07.html>]

MILK-BASED GARDEN SPRAY

Milk may be good for you to drink, but it may also be good for your garden. Several organic farmers near San Paulo, Brazil have successfully controlled mildew on cucumber by spraying once a week with a five-percent milk solution. The Brazilian scientists who discovered the milk's effect aren't yet sure why it works. It may be that the potassium phosphate in the milk boosts the plant's immune system, or that some other factor in the milk is a natural fungicide.

[From *New Scientist*, October 16, 1999]

FISH CLEAN UP SEWAGE

While most sewage treatment plants remove solids and organic matter, few remove dissolved phosphorous and nitrogen from detergents and fertilizer. Too much of these nutrients getting into fresh water can trigger explosive growths of algae. When the algae decompose, the oxygen in the water is used up, damaging other aquatic life.

Ray Drenner, a biologist at Texas Christian University, has developed a post-treatment process in which periphyton algae consume these nutrients in outflow tanks fitted with vertical plastic screens. African algae-eating fish then graze the algae from the screens, their wastes sinking to the bottom of the tank for routine collection.

[From <http://ens.lycos.com/ens/feb2000/2000L-02-23-09.html>]

MICROBE EATS SULPHIDES

While looking into the problem of acid mine drainage, researchers from the University of Wisconsin, Madison, discovered a primitive microbe in an old mine that metabolizes metal sulphides. In the presence of air and water, the microbe transforms sulphides into sulphuric acid, a pollutant that drains into nearby streams and groundwater. Some of the water was so acidic that the pH scale had to be extended to include negative pH values. The researchers believe that, while the microbes are eating sulphides all over the Earth's crust, mining, by exposing the metal sulphides to air and water, create ideal conditions for the microbes to prosper.

[From <http://ens.lycos.com/ens/mar2000/2000L-03-22-06.html>]

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