

## Diatomaceous Earth

### (1) What is diatomaceous earth?

Diatomaceous earth (DE) is a type of rock composed of the silica-containing skeletons of fossilized diatoms (very small marine and freshwater organisms). Silica (silicon dioxide) is a mineral that occurs naturally in crystalline and amorphous (non-crystalline) forms. Diatom skeletons are composed mainly of amorphous silica, with small amounts of quartz and cristobalite. Quartz, cristobalite, and tridymite are three crystalline forms of silica, of which quartz is the most common. Cristobalite occurs naturally in volcanic rock, and is often found with quartz in the Pacific Northwest. It can also be formed by heating ("calcined") DE to a high temperature (1000-1100 °C). DE is mined for use in industrial filtration applications. Its oldest and best-known commercial use is as a very mild abrasive in metal polishes and in toothpaste. It is also used as an anti-caking additive in various food items. Large deposits occur in California, Nevada, Washington, and Oregon.

### (2) Is diatomaceous earth hazardous to my health?

DE in its natural state is composed largely of amorphous silica and there is no evidence that this form of silica is particularly toxic to humans. There is also no evidence to associate any form of natural DE with cancer in either experimental animals or humans. It does contain small amounts of crystalline silica, mainly cristobalite, which is the form of silica that can pose a health hazard.

### (3) Could inhaling diatomaceous earth be a health hazard? Who is likely to be most affected?

Inhaling naturally-occurring DE may cause temporary respiratory irritation while a person is breathing the DE. Any dust, whether it is DE dust, or everyday dust, could cause longer-term harm depending on how much of it is "respirable" (i.e., is of the right size to be taken into the lungs), how much of it is in the air (i.e., its air concentration), and how long a person is exposed to (breathes) it. In some cases, breathing dust may cause certain short-term health effects such as sneezing, coughing, difficulty breathing, eye/nose/throat irritation, and even bloody noses. These symptoms are temporary and should resolve on their own after a person stops breathing the dust. Also, for people with health problems (e.g., asthmatics, the elderly), those who breathe more (e.g., children) or breathe other chemicals (e.g.,

smokers), exposure to respirable dust at moderate to high concentrations could cause or worsen health problems.

### (4) What is it in diatomaceous earth that may cause a health hazard?

Respirable crystalline silica (mainly cristobalite) is the form of silica that can pose a health hazard. While the amount of crystalline silica in natural DE is too small (0.4 - 1.1%) to pose a health hazard, heating DE to high temperatures changes much of the harmless amorphous silica into the potentially harmful crystalline form. Processed (calcined) DE may contain from 20% to 60% crystalline silica.

### (5) Is processed diatomaceous earth potentially more hazardous to your health than naturally-occurring diatomaceous earth?

Yes, because processed (calcined) DE may contain far greater amounts of crystalline silica, the potentially harmful form of silica, than natural DE. Crystalline silica is likely to pose health hazard only if inhaled at high levels for a long time.

### (6) Information I have found on the internet says that silica can cause silicosis and even cancer. Is this true?

Yes, but only for crystalline silica and probably only under work-related conditions. Inhalation of crystalline silica under occupational conditions can produce a severe and disabling non-cancer disease of the lungs ("silicosis"). Silicosis can be either mild or severe, in direct proportion to the percentage and concentration of crystalline silica in the air and the duration of exposure. Silicosis is typically a work-related disease that develops over years of exposure to very high levels of crystalline silica-containing dust. Crystalline silica is presently considered a known human carcinogen only under occupational conditions. Health problems from crystalline silica are associated with exposure to very high levels for long periods (years), conditions that are unlikely to occur in non-industrial or residential situations.

### (7) How do we measure exposure?

The amount of dust (or of any chemical) in the air is usually expressed as a concentration, typically milligrams of dust per cubic meter of air, or  $\text{mg}/\text{m}^3$ . When measuring dust concentrations, respirable and total amounts are measured separately. Respirable particles



State of Oregon  
Department of  
Environmental  
Quality

**Air Quality Division**  
811 SW 6<sup>th</sup> Avenue  
Portland, OR 97204  
Phone: (503) 229-6251  
(800) 452-4011  
Fax: (503) 229-5850  
Contact: Bruce Hope  
[www.oregon.gov/DEQ/](http://www.oregon.gov/DEQ/)

includes only those small enough (about 2.5 microns in diameter [a human hair is 60-100 microns in diameter]) to enter deep into the human lung. Respirable particles are measured separately because it is the more hazardous form of dust. In Oregon, the amount of crystalline silica in an air sample is the sum of the quartz, cristobalite, and tridymite forms of silica in that sample.

**(8) What's the difference between occupational and residential exposure?**

Occupational or work-place exposure usually involves a large amount of time (up to 10 hours per day, 40 hours per week, for years) spent in an industrial setting where crystalline silica dust is generated at very high concentrations.

Residential exposures are what a person would likely get outside of work, typically either indoors or outdoors at home. These exposures are very unlikely to be as large, or last as long, as those in an industrial setting.

**(9) How do I know if I am being, or have been, exposed to crystalline silica?**

Unless your exposure is very high or prolonged, you probably wouldn't notice being exposed. It has been estimated that ambient ("natural") air usually contains low levels of respirable crystalline silica (mostly quartz, the most common crystalline form), so we are all being exposed a little most of the time. In the workplace, where exposures are higher and longer, symptoms of chronic silicosis may take 5-10 years to appear. Workers exposed to extremely high levels of crystalline silica dust (sandblasters, for example) may show symptoms of acute silicosis in only a few weeks if proper protective procedures are not followed. Any connection between exposure and cancer may also not be very obvious. It has been estimated that workplace exposure to crystalline silica dust may increase a worker's lifetime risk of cancer only 2% above background risk of 25-50%. The chance of this happening in a residential setting is very small.

**(10) Is diatomaceous earth harmful to water (rivers, lakes)? What about fish and other water-based life?**

No, neither DE nor crystalline silica is harmful to rivers, lakes, fish, or other aquatic life. In water, it is basically the same as plain sand. DE was actually created by living marine organisms

**(11) Is diatomaceous earth harmful to my pets and/or livestock?**

Inhaling naturally-occurring DE or crystalline silica at low levels should pose no more of a health hazard to pets or livestock than it would to their owners. Breathing dust is likely to be the same unpleasant nuisance for pets and livestock as it is for people. Natural DE is used as an insecticide, where it works in a purely physical manner and not through chemical toxicity (the abrasive diatom skeletons rub holes in an insect's soft parts, causing a loss of bodily fluids resulting in death; larger animals and people are immune to this effect).

**(12) Is diatomaceous earth harmful to plants?**

No. But it is probably not good to allow plants to become smothered in dust.

**(13) Can diatomaceous earth damage my property (vehicles, air conditioning, electronics, etc.)?**

Dust in general can be damaging to precision mechanical and electronic equipment. DE is a very mild abrasive (it's used in toothpaste) that could cause damage in precision equipment with moving parts. However, it might be hard to distinguish damage due to DE from that caused by dust in general.

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