

Cement Makers Solve “Hard” Problems!

Test Your Parents and Friends

As you are going home from school today, look around you at the buildings and roadways. How many are made from concrete? If you started to make a list, the list would probably be very long! Have you ever thought about where all this concrete comes from? That is an interesting question. The answer is that concrete comes from cement! Most people think that concrete and cement are the same things. Ask your parents and friends about concrete. They probably don't know the difference between cement and concrete. But you can educate them. You can tell them that concrete is made from cement. Cement is a fine gray powder that you mix with water, sand, and gravel to form the rock-like mass that is called concrete. You can think of cement as the “glue” that holds the other ingredients together to make concrete. When it is wet, you can mold it. When it is dry, it hardens into a very strong substance called concrete!

Here is another interesting fact that most people do not know. The kind of cement that is used to make concrete is called Portland cement. It got the name Portland from the Isle of Portland where a British inventor worked on how to make it. But cement itself is very old. The Romans used material produced from volcanoes to make cement. That is why structures like the Parthenon have been around so long! But making cement without the help of nature's volcanoes can cause harm to our planet.

“Hard” Problems

Making cement requires high heat like a volcano! This high heat is made in a **kiln**. The kiln has to be heated to one-third of the temperature on the Sun's surface! As you can imagine, it takes

a lot of energy to get the kiln this hot. **Fossil fuels** like coal have been used to heat these kilns. As you know, the burning of fossil fuels makes **greenhouse gases** that are harmful to Earth. Fossil fuel burning also releases **particulates** into the air that can make breathing difficult for many people.

Taking the materials from the ground that are necessary to make cement can cause harm to the Earth, too. The other materials that are combined with cement to form concrete are often taken from riverbeds. This can cause harm to the rivers. Because of concern for our environment, different methods of making cement and concrete are being considered.

Winning an Environmental Award

Cement makers have been looking at ways they can reduce the amount of greenhouse gases they put into the air. Trying to heat their kilns with alternative fuels is one solution. They are also looking at safe ways they can burn waste material to make the kilns hot enough for cement making.

Being careful about mining and respecting nature's ecosystems are other ways the cement industry is trying to be more environmentally friendly. Manufacturers are looking at different materials to use in making cement and concrete. Using waste from the recycling of paper or **fly ash** from coal burning are two alternatives to taking natural materials from the Earth. Because of their efforts in reducing pollution, the cement industry (represented by The Portland Cement Alliance) recently won an award from the Environmental Protection Agency.

Pliny Fisk III is Concerned

Pliny Fisk III is a man who cares about the environment. He has a personal mission to find new ways to reuse waste as construction material. When he found out that the manufacture of cement produces 9 percent of **carbon dioxide** emissions globally, he wanted to find a new way to make cement. He wanted to stop the problems of carbon dioxide emissions. He

also wanted to help reduce the air pollution caused when particulates or waste material are put into the air by coal burning power plants. He decided to use these particulates from fossil fuel burning plants as the mixture to make concrete.

Finding a Way

Working in his earth lab on a farm outside of Austin, Texas, Mr. Fisk mixed the fly ash from a coal burning power plant with some spoonfuls of water. In fact, this experiment was stirred together in a teacup! He reported that the fly ash turned into a very hard substance in twenty minutes. So he decided to perform a more scientific test. The mixture was so strong that it broke his tester!

Finally, Mr. Fisk came up with a concrete like substance that is made up of 97 percent recycled material. This mixture is made from fly ash and bottom ash from coal burning power plants, borate, and a chemical from the chlorine family. Mr. Fisk would like to find a natural substitute for this chemical.

Mr. Fisk's Work Helps

The AshCrete invented by Pliny Fisk was used in his Advanced Green Builder Demonstration. The building is located on his property in Texas. It is made from locally available products and recycled waste material of various industries and agriculture. The foundation and frame of this building are made from AshCrete and other recycled materials. It shows that a family or business can have an environmentally friendly building in which to live or work.

Various government agencies took note of Mr. Fisk's work. He has shared AshCrete with many officials and has even served on a White House committee. Mr. Fisk is a man who is respected by many in government as he has the reputation of not only caring about the environment, but he also uses knowledge and technology to see that the Earth is protected in a responsible and meaningful manner.

You're An Expert!

1. Draw a cartoon showing the differences between concrete and cement. Make a graphic depiction of the harms that the manufacture of cement causes the environment.
2. Why do you think the removal of materials from a riverbed can cause harm to its ecosystem? Make a chart showing the ecosystem of a river.
3. Based on the information in the article, make an advertisement for AshCrete. Be sure to highlight three environmental reasons to use AshCrete.
4. Why do you think it is helpful to collect fly ash? Pretend you live near a coal burning power plant. Write a letter to the plant manager explaining the benefits of a partnership between the power plant and a company like AshCrete.
5. Think about Pliny Fisk. Why do you think he wants to find a substitute for the chemical he uses to make AshCrete? Write a paragraph explaining your thoughts. Be sure to start with a good topic sentence and end with a clincher sentence!

Taking Action.....

1. Find out about a power plant near you. What is the energy source of this plant? Are there any harmful effects to the environment because of its waste material? What is the power plant doing to reduce its waste?
2. Is there a plant that manufactures concrete near you? Call the plant manager and find out what materials and process they use.

3. Look in your city's phone book. Are there any builders who advertise that they use recycled material? Call them and find out what they use.