What is the big deal with carbon?

Why are they called fossil fuels?

They're called *fossil fuels* because the fuel in your gas tank comes from the chemical remains of prehistoric plants and animals!

All living things on Earth contain carbon. Even you contain carbon. Lots of it. If you weigh 100 pounds, 18 pounds of you is pure carbon! And plants are almost half carbon!

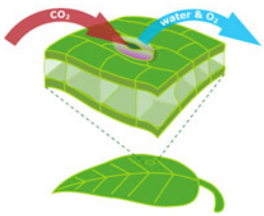
You are 18 percent carbon. Plants are 45 percent carbon.

With so much carbon, why isn't everything black and sooty? How can dogs be white and trees green? Because carbon, an element, combines easily with other elements to form new materials. The new stuff, called compounds, are quite different from pure carbon.

An atom is the tiniest possible particle of any element, like carbon or oxygen. A carbon atom combines easily with two oxygen atoms to make the compound carbon dioxide.

"C" stands for carbon, "O" stands for oxygen, so carbon dioxide is often called "C-O-2, and written "CO_2." CO_2 is a gas. It is invisible. CO_2 is really important.

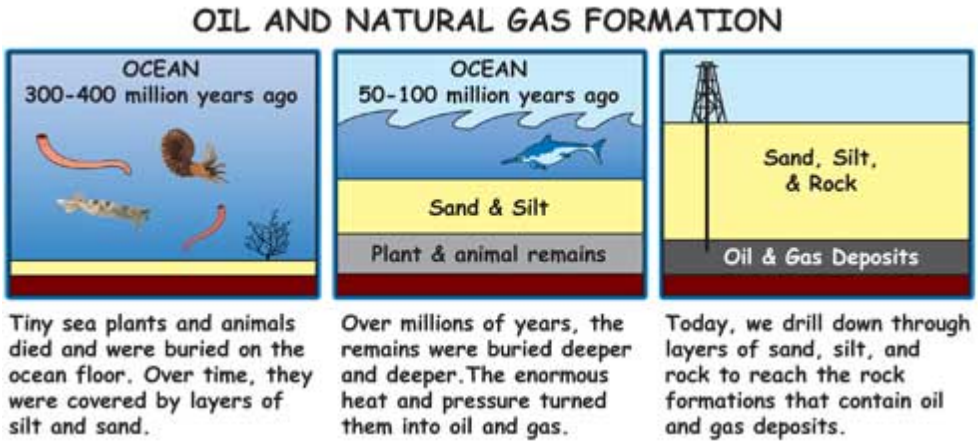
How does carbon get into living things?



Carbon dioxide in, water and oxygen out.

Plants take in CO_2. They keep the carbon and give away the oxygen. Animals breathe in the oxygen and breathe out carbon dioxide.

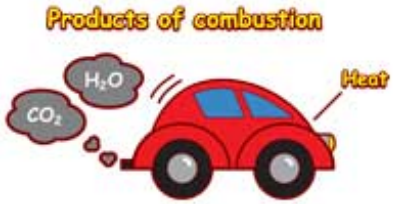
Plants and animals depend on each other. It works out well. For hundreds of millions of years, plants and animals have lived and died. Their remains have gotten buried deep beneath Earth's surface. So for hundreds of millions of years, this material has been getting squished and cooked by lots of pressure and heat.



For hundreds of millions of years, dead plants and animals were buried under water and dirt. Heat and pressure turned the dead plants and animals into oil, coal, and natural gas.

So what happens to all this dead plant and animal stuff? It turns into what we call fossil fuels: oil, coal, and natural gas. This is the stuff we now use to energize our world. We burn these carbon-rich materials in cars, trucks, planes, trains, power plants, heaters, speed boats, barbecues, and many other things that require energy.

How does the carbon get out of living things?



When fossil fuels burn, we mostly get three things: heat, water, and CO_2. We also get some solid forms of carbon, like soot and grease.

So that's where all the old carbon goes. All that carbon stored in all those plants and animals over hundreds of millions of years is getting pumped back into the atmosphere over just one or two hundred years.

Did you know that burning 6.3 pounds of gasoline produces 20 pounds of carbon dioxide?

Here's how!

A gallon of gas = 20 pounds of CO_2!

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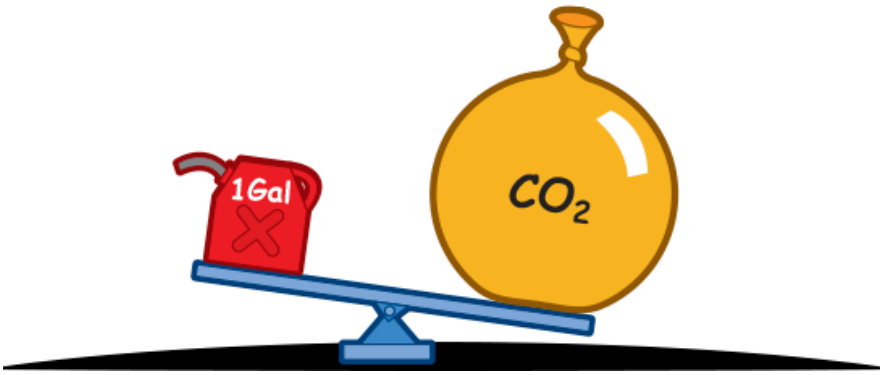
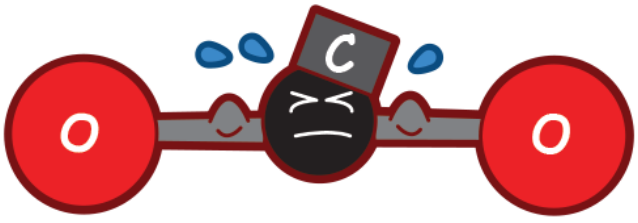


Huh!?

Most of the weight of carbon dioxide (CO_2) comes from the two oxygen atoms (the O_2). Gasoline molecules are made of carbon and hydrogen atoms all bound together. When gasoline burns, the carbon and the hydrogen in the gas molecules separate. Two hydrogen atoms combine with one oxygen atom to form H_2O, or water.

Each carbon atom in the gasoline combines with two oxygen atoms already in the air. This forms CO_2.



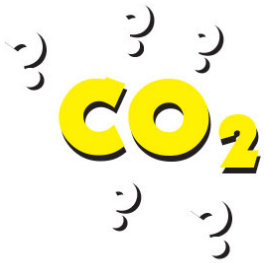
If you are curious about why the CO_2 is so much heavier than the gasoline—and you like math—read on.

A carbon atom has an atomic weight of 12. This means its nucleus (center) contains 6 protons and 6 neutrons, adding up to 12. One oxygen atom has an atomic weight of 16. So each molecule of CO_2 has an atomic weight of 44:

1 carbon
+ 1 oxygen
+ 1 oxygen
= carbon dioxide
12 + 16 + 16 = 44

So the total atomic weight of a molecule of CO_2 is 44, which is 3.7 times more than the carbon atom alone weighs (44 divided by 12).

Next, we need to know how much of the weight of the gasoline is just the carbon. Gasoline is about 87% carbon and 13% hydrogen by weight. So the carbon in a gallon of gasoline (weighing 6.3 pounds) weighs 5.5 pounds (.87 x 6.3 pounds = 5.5 pounds). So, multiply the weight of the carbon times 3.7, which equals 20 pounds of carbon dioxide!



Just something to think about when you fill the tank of the family car!

Is carbon in the air good, bad, or just ugly??

A greenhouse traps the Sun's energy inside and keeps the plants warm.

Here's the big, important thing about CO_2: It's a greenhouse gas. That means CO_2 in the atmosphere works to trap heat close to Earth. It helps Earth to hold on to some of the energy it gets from the Sun so the energy doesn't all leak back out into space.

If it weren't for this greenhouse effect, Earth's oceans would be frozen solid. Earth would not be the beautiful blue and green planet of life that it is.

If not for the greenhouse effect, Earth would be an ice ball.

So, CO_2 and other greenhouse gases are good—up to a point. But CO_2 is so good at holding in heat from the Sun, that even a small increase in CO_2 in the atmosphere can cause Earth to get even warmer.

Throughout Earth's history, whenever the amount of CO_2 in the atmosphere has gone up, the temperature of Earth has also gone up. And when the temperature goes up, the CO_2 in the atmosphere goes up even more.

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CLIMATE KIDS

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