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## Making Plastic

crude oil, polymer, polymerization, biodegradable

Chemical Reactions Unit

Can you tell me where plastic comes from? Sure, you know that it makes water bottles and holds the food you carry home from the store and keeps the ink inside your pen. You use plastic to comb your hair and type a word and play board games. But do you know where it comes from? It does not grow from a tree, like rubber. Caterpillars do not make it, like silk. And we do not go out and hunt plastic animals and then skin them for their plastic hides . . . No, we get plastics from deep under the Earth. But that is not where they began. And it isn't where they finish.

So. Let's go deep under the Earth. There we will find a buried lake. It might be yellow. It might be black. It might be runny. It might be solid. One thing's for sure: it stinks. What is this black stuff? Why, this is our plastic before it's plastic. It's also an energy source. This pool is what the bodies of many plants and animals that died millions of years ago turned into. Their bodies broke down and a lot of heat and pressure under the Earth's surface turned them into this sludge. Believe it or not, we can use this dead body stuff in all sorts of ways. **Crude oil** is a fossil fuel that comes from deep in the Earth. We take this stuff and divide it up into many different things that we use for energy. The part that we want is the color of honey and you will find it inside car engines, helping them run.

So, moving cars makes sense. But plastic? Let's take a look at a plastic bag. Note the difference between this and the oil? Of course you do. When we pick the plastic bag up, it does not drip apart and run off our fingers. A **polymer** is a molecule that is made of repeating parts all connected to each other. Think of it like taking a bunch of straws and connecting each one to the end of the others to make one super long straw. Clearly, the oil's parts are not connected. If you tried to hold your groceries in the oil . . . you would have very soggy groceries.

So how do we make the jump from soggy groceries to something that can carry our groceries home? It is not easy. You cannot just freeze the crude oil. You cannot pour it into a bag-shaped mold and hope it stays that way. And you cannot ask it nicely to carry your groceries home for you. (Trust me, I tried.)

**Polymerization** is one way to turn a liquid into a solid by connecting smaller molecules together to make big molecules. Is that hard to understand? Lucky for you, you never have to do this if you do not want to. You can just go get a plastic bag from the store.

YES! We did it. We made a plastic bag out of oil! Now we can make a water bottle, a computer, and all kinds of cool things! Should we be happy? . . . Not yet. See, there's a problem with making plastics.

What happens to it when we throw it away? When something that was once living is thrown away it will go back into the environment. Apples will turn brown and be broken down by tiny cells in the dirt. A dead rat will be eaten by maggots. Mushrooms will grow on a dead tree to break it down. Look what happens when we leave this plastic bag out in the forest . . . nothing. **Biodegradable** means that something can be broken apart by living things and be reused again by other living things. Turning oil into a plastic gives us many great things, but there is a price. Connecting all of those smaller parts into chains means they will not break apart very easily again. Plastic will take hundreds to thousands of years to break down! I hope you really like the bag we made . . .

The stuff that makes up our plastic bag has come a long way. It started as life on Earth, as plants and animals. When they died, their bodies mixed together and over time with and under a lot of pressing and heat became a pool of oil under the Earth. We pulled that up and stuck different parts together to make chains of something solid. This gives us plastic, which we use for . . . well, almost everything. There is a price though. Because plastic is not biodegradable, it does not go away for a very long time. Plastic is neat . . . but I prefer a forest floor covered with plants.

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