

Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

Most plastics are made from natural gas and crude oil.



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Carbon Cards—Ocean Sciences Sequence 2.1–2.2, 2.6

Shells

CaCO_3 **Calcium Carbonate**

Many shelled organisms make their shells by taking CO_2 and calcium out of the water. Many shells are tiny and are made by plankton.



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Chalk

CaCO_3 **Calcium Carbonate**

Chalk forms when tiny shells from plankton fall to the ocean floor and build up over time.



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Crude Oil

C_6H_6 **Benzene**
(one of crude oil's many components)

Crude oil forms under the ocean when soft parts of dead marine organisms get buried with ocean sediments. Over millions of years, pressure and heat changes them into crude oil. Crude oil is a dark liquid, a mixture of different hydrocarbons and other ingredients. Oil is drilled from under the ground or beneath the ocean floor. It is a fossil fuel and it is used to make plastics and/or to burn for heat or power.



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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

Coal forms on land when dead plants get buried with dirt and/or water, and there is no oxygen. Over millions of years, pressure changes them into coal. People dig into Earth to get coal. Coal is a fossil fuel and is burned to produce heat or power.



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Limestone

CaCO_3 **Calcium Carbonate**

Over millions of years, limestone forms from the shells of dead organisms (including plankton) that pile up at the bottom of the ocean in areas where it's not too deep.



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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of phytoplankton's many components)

- Phytoplankton are tiny organisms that live in water and photosynthesize. They take in CO_2 , making $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) and release O_2 .
- Some phytoplankton make tiny calcium carbonate (CaCO_3) shells.
- There are more phytoplankton than almost any other living thing in the ocean. (There are more viruses.)



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Marble

CaCO_3 **Calcium Carbonate**

Heat and pressure from inner Earth may turn limestone into marble.



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Gasoline

C_6H_{18} **Octane**
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Zooplankton



Cement



Ocean Sediments



Plants



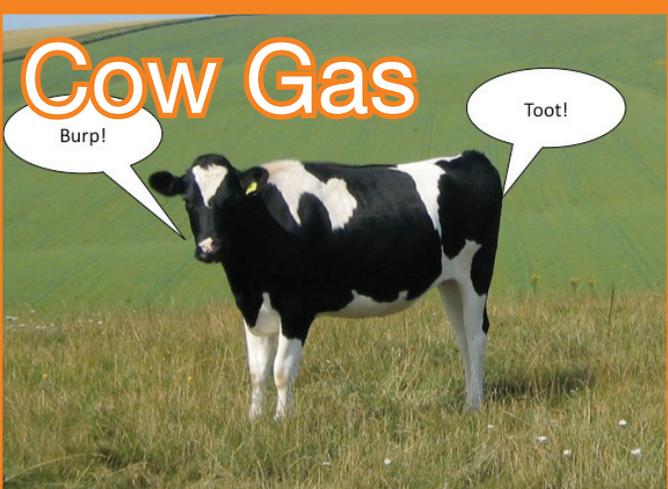
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

When ocean organisms with shells die, their tiny shells fall to the bottom of the ocean. Over millions of years, these sediments build up and may turn into chalk, limestone, or crude oil, depending on surrounding conditions. Sediments can also be made of rocks, soil, and clay.



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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of zooplankton's many components)

- Many zooplankton are tiny animals that live in the ocean, rivers, and lakes. Some, such as jellyfish, are much larger.
- Some zooplankton make tiny calcium carbonate (CaCO_3) shells.
- Most zooplankton feed on phytoplankton.
- Zooplankton are weak swimmers and drift with the currents.



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Diamond

C **Carbon**

Diamonds are pure carbon, and they are the hardest natural material known. They form from carbon minerals at high pressure and high temperatures deep in Earth.



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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
- When plants die, bacteria and fungi decompose them, releasing nutrients into the soil. If plants are buried under soil and/or water, and there is no oxygen, in millions of years, pressure may change them into coal.



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Air

CO_2 **Carbon Dioxide**
(one of air's many components)

Air is a mixture of gases that surrounds Earth in a layer called the *atmosphere*. Air is made of 78.09% N_2 (nitrogen), 20.95% O_2 (oxygen), 0.93% Ar (argon), 0.039% CO_2 (carbon dioxide), ~1% H_2O (water), and small amounts of other gases, including CH_4 (methane).



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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt

NaCl

Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

The ocean absorbs CO₂ from the atmosphere. Some of the CO₂ reacts with ocean water to form an acid (H₂CO₃), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Phytoplankton

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Zooplankton



Cement



Ocean Sediments



Plants



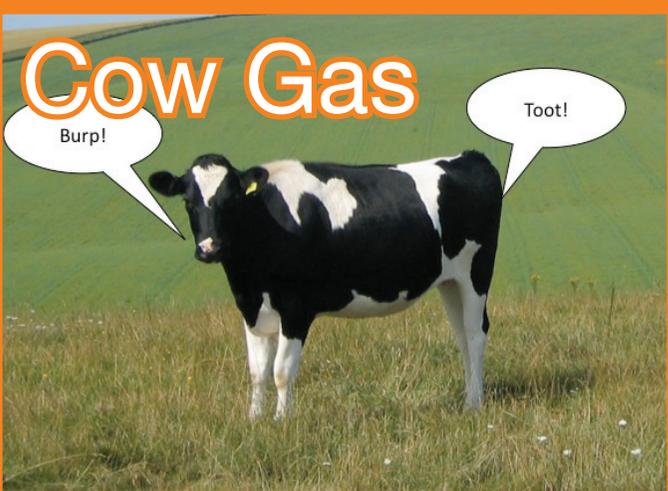
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

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(one of many components)

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Air

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Sugars

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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



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Sodium Chloride

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Power Plants

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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

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Cement



Ocean Sediments



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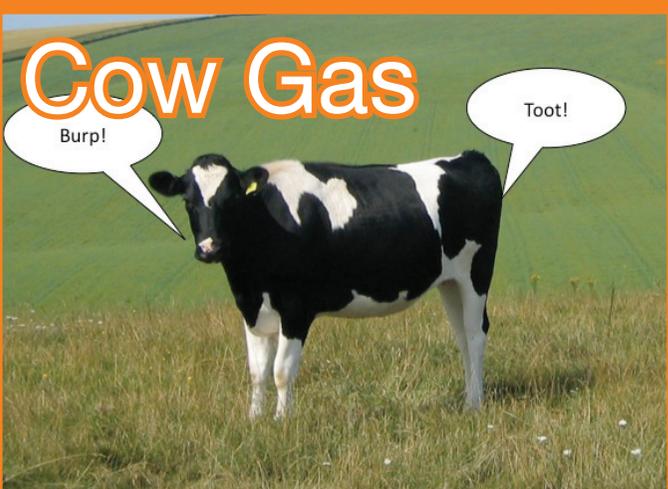
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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

Bacteria that live without oxygen in the guts of cows (and other animals) release CH_4 (methane) gas as they break down food. Cows release more methane through their burps than through flatulence.



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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt

NaCl

Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass

SiO₂

Silicon Dioxide

Clear glass for windows and drinking glasses is made by melting sand, and some sand is made of SiO₂. There are other ingredients used in different kinds of glass.



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Soil

SiO₂

Silicon Dioxide
(one of soil's many components)

Soil is a mixture of minerals, including sand (often SiO₂), water, air, and organisms, both living and dead. When there is plenty of oxygen around, bacteria and fungi decompose dead animals and plants, and that releases nutrients, including carbon, into the soil.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

The ocean absorbs CO₂ from the atmosphere. Some of the CO₂ reacts with ocean water to form an acid (H₂CO₃), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals

C₆H₁₂O₆

Sugar

(one of the many components of animals)

Ocean animals range in size from microscopic zooplankton to blue whales, the largest animal ever known to have lived on Earth. Ironically, the primary food source of blue whales is krill, a small shrimplike zooplankton.



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Chalk



Shells



Plastics



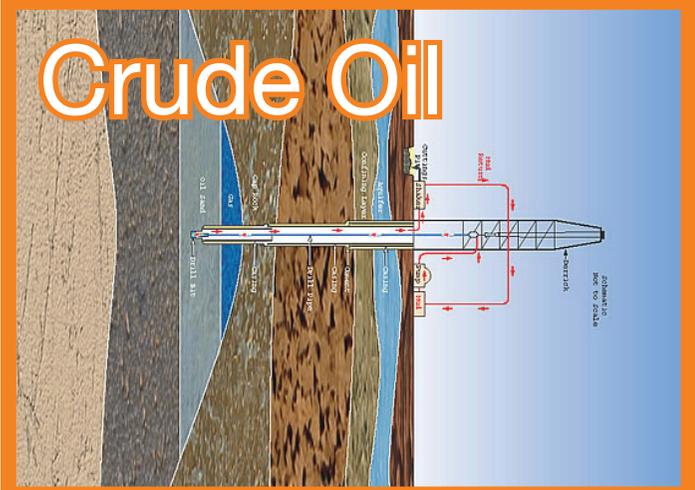
Limestone



Coal



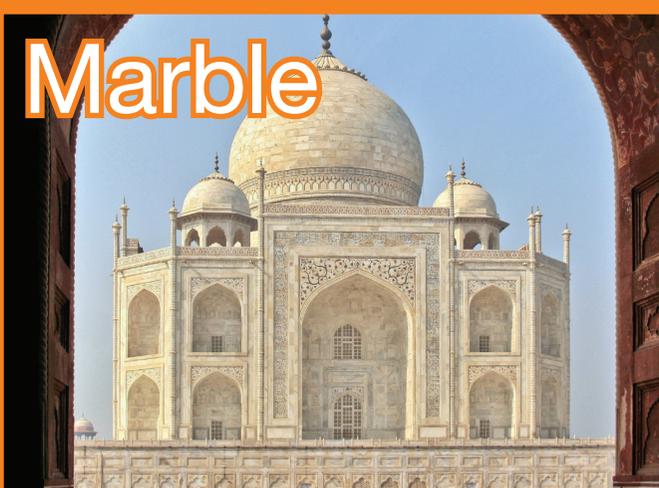
Crude Oil



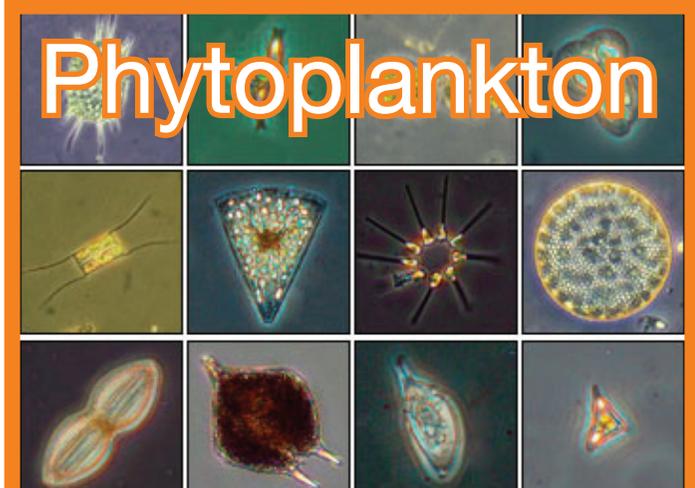
Gasoline



Marble



Phytoplankton



Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

Most plastics are made from natural gas and crude oil.



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Shells

CaCO_3 **Calcium Carbonate**

Many shelled organisms make their shells by taking CO_2 and calcium out of the water. Many shells are tiny and are made by plankton.



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Chalk

CaCO_3 **Calcium Carbonate**

Chalk forms when tiny shells from plankton fall to the ocean floor and build up over time.



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Crude Oil

C_6H_6 **Benzene**
(one of crude oil's many components)

Crude oil forms under the ocean when soft parts of dead marine organisms get buried with ocean sediments. Over millions of years, pressure and heat changes them into crude oil. Crude oil is a dark liquid, a mixture of different hydrocarbons and other ingredients. Oil is drilled from under the ground or beneath the ocean floor. It is a fossil fuel and it is used to make plastics and/or to burn for heat or power.



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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

Coal forms on land when dead plants get buried with dirt and/or water, and there is no oxygen. Over millions of years, pressure changes them into coal. People dig into Earth to get coal. Coal is a fossil fuel and is burned to produce heat or power.



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Limestone

CaCO_3 **Calcium Carbonate**

Over millions of years, limestone forms from the shells of dead organisms (including plankton) that pile up at the bottom of the ocean in areas where it's not too deep.



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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of phytoplankton's many components)

- Phytoplankton are tiny organisms that live in water and photosynthesize. They take in CO_2 , making $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) and release O_2 .
- Some phytoplankton make tiny calcium carbonate (CaCO_3) shells.
- There are more phytoplankton than almost any other living thing in the ocean. (There are more viruses.)



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Marble

CaCO_3 **Calcium Carbonate**

Heat and pressure from inner Earth may turn limestone into marble.



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Gasoline

C_6H_{18} **Octane**
(one of gasoline's many components)

Gasoline, a liquid burned in engines to generate power, is made from crude oil after it is processed at an oil refinery. Different types of gasoline are blended from various hydrocarbons and other additives.



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Zooplankton



Cement



Ocean Sediments



Plants



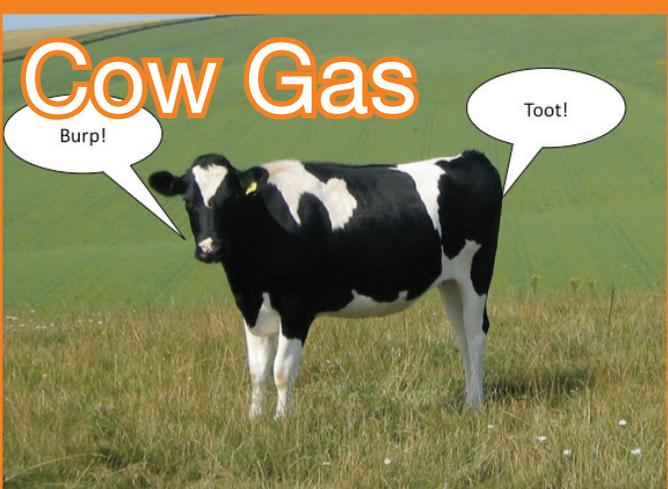
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

When ocean organisms with shells die, their tiny shells fall to the bottom of the ocean. Over millions of years, these sediments build up and may turn into chalk, limestone, or crude oil, depending on surrounding conditions. Sediments can also be made of rocks, soil, and clay.



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Cement

CaCO_3 **Calcium Carbonate**

Limestone is burned to make cement.



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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of zooplankton's many components)

- Many zooplankton are tiny animals that live in the ocean, rivers, and lakes. Some, such as jellyfish, are much larger.
- Some zooplankton make tiny calcium carbonate (CaCO_3) shells.
- Most zooplankton feed on phytoplankton.
- Zooplankton are weak swimmers and drift with the currents.



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Diamond

C **Carbon**

Diamonds are pure carbon, and they are the hardest natural material known. They form from carbon minerals at high pressure and high temperatures deep in Earth.



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Graphite

C **Carbon**

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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
- When plants die, bacteria and fungi decompose them, releasing nutrients into the soil. If plants are buried under soil and/or water, and there is no oxygen, in millions of years, pressure may change them into coal.



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Air

CO_2 **Carbon Dioxide**
(one of air's many components)

Air is a mixture of gases that surrounds Earth in a layer called the *atmosphere*. Air is made of 78.09% N_2 (nitrogen), 20.95% O_2 (oxygen), 0.93% Ar (argon), 0.039% CO_2 (carbon dioxide), ~1% H_2O (water), and small amounts of other gases, including CH_4 (methane).



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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt



Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass



Silicon Dioxide

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Soil



Silicon Dioxide
(one of soil's many components)

Soil is a mixture of minerals, including sand (often SiO_2), water, air, and organisms, both living and dead. When there is plenty of oxygen around, bacteria and fungi decompose dead animals and plants, and that releases nutrients, including carbon, into the soil.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean



Carbon Dioxide

(absorbed into ocean water, some of which then forms H_2CO_3)

The ocean absorbs CO_2 from the atmosphere. Some of the CO_2 reacts with ocean water to form an acid (H_2CO_3), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals



Sugar

(one of the many components of animals)

Ocean animals range in size from microscopic zooplankton to blue whales, the largest animal ever known to have lived on Earth. Ironically, the primary food source of blue whales is krill, a small shrimplike zooplankton.



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Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

Most plastics are made from natural gas and crude oil.



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Shells

CaCO_3 **Calcium Carbonate**

Many shelled organisms make their shells by taking CO_2 and calcium out of the water. Many shells are tiny and are made by plankton.



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Chalk

CaCO_3 **Calcium Carbonate**

Chalk forms when tiny shells from plankton fall to the ocean floor and build up over time.



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Crude Oil

C_6H_6 **Benzene**
(one of crude oil's many components)

Crude oil forms under the ocean when soft parts of dead marine organisms get buried with ocean sediments. Over millions of years, pressure and heat changes them into crude oil. Crude oil is a dark liquid, a mixture of different hydrocarbons and other ingredients. Oil is drilled from under the ground or beneath the ocean floor. It is a fossil fuel and it is used to make plastics and/or to burn for heat or power.



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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

Coal forms on land when dead plants get buried with dirt and/or water, and there is no oxygen. Over millions of years, pressure changes them into coal. People dig into Earth to get coal. Coal is a fossil fuel and is burned to produce heat or power.



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Limestone

CaCO_3 **Calcium Carbonate**

Over millions of years, limestone forms from the shells of dead organisms (including plankton) that pile up at the bottom of the ocean in areas where it's not too deep.



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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of phytoplankton's many components)

- Phytoplankton are tiny organisms that live in water and photosynthesize. They take in CO_2 , making $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) and release O_2 .
- Some phytoplankton make tiny calcium carbonate (CaCO_3) shells.
- There are more phytoplankton than almost any other living thing in the ocean. (There are more viruses.)



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Marble

CaCO_3 **Calcium Carbonate**

Heat and pressure from inner Earth may turn limestone into marble.



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Gasoline

C_6H_{18} **Octane**
(one of gasoline's many components)

Gasoline, a liquid burned in engines to generate power, is made from crude oil after it is processed at an oil refinery. Different types of gasoline are blended from various hydrocarbons and other additives.



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Zooplankton



Cement



Ocean Sediments



Plants



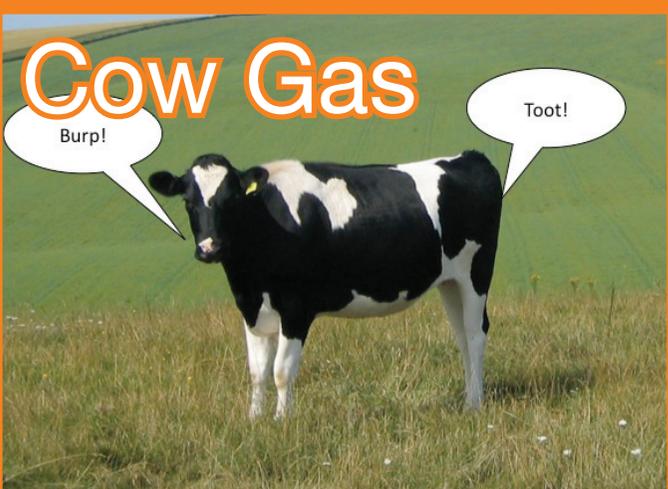
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

When ocean organisms with shells die, their tiny shells fall to the bottom of the ocean. Over millions of years, these sediments build up and may turn into chalk, limestone, or crude oil, depending on surrounding conditions. Sediments can also be made of rocks, soil, and clay.



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Cement

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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
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Diamond

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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
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Air

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Cow Gas

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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt

NaCl

Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass

SiO₂

Silicon Dioxide

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Power Plants

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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

The ocean absorbs CO₂ from the atmosphere. Some of the CO₂ reacts with ocean water to form an acid (H₂CO₃), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals

C₆H₁₂O₆

Sugar

(one of the many components of animals)

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Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

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Shells

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Chalk

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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

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Limestone

CaCO_3 **Calcium Carbonate**

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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
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Marble

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Gasoline

C_6H_{18} **Octane**
(one of gasoline's many components)

Gasoline, a liquid burned in engines to generate power, is made from crude oil after it is processed at an oil refinery. Different types of gasoline are blended from various hydrocarbons and other additives.



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Carbon Cards—Ocean Sciences Sequence 2.1–2.2, 2.6

Zooplankton



Cement



Ocean Sediments



Plants



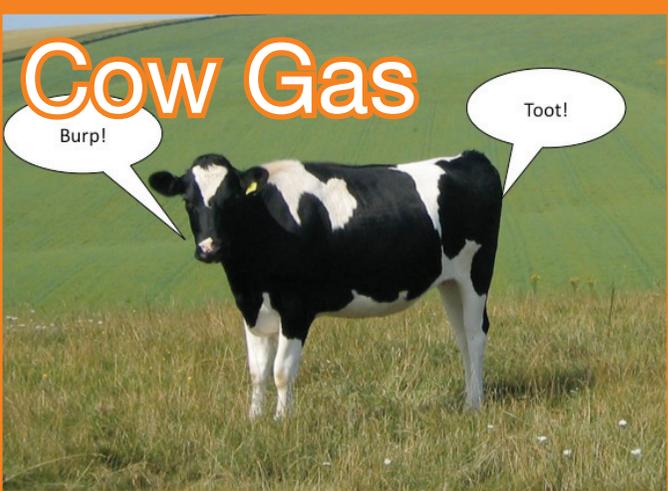
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

When ocean organisms with shells die, their tiny shells fall to the bottom of the ocean. Over millions of years, these sediments build up and may turn into chalk, limestone, or crude oil, depending on surrounding conditions. Sediments can also be made of rocks, soil, and clay.



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Cement

CaCO_3 **Calcium Carbonate**

Limestone is burned to make cement.



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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of zooplankton's many components)

- Many zooplankton are tiny animals that live in the ocean, rivers, and lakes. Some, such as jellyfish, are much larger.
- Some zooplankton make tiny calcium carbonate (CaCO_3) shells.
- Most zooplankton feed on phytoplankton.
- Zooplankton are weak swimmers and drift with the currents.



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Diamond

C **Carbon**

Diamonds are pure carbon, and they are the hardest natural material known. They form from carbon minerals at high pressure and high temperatures deep in Earth.



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Carbon Cards—Ocean Sciences Sequence 2.1–2.2, 2.6

Graphite

C **Carbon**

Graphite is pure carbon, and it is one of the softest natural materials known. It is used in pencils. Graphite forms from carbon minerals in Earth.



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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
- When plants die, bacteria and fungi decompose them, releasing nutrients into the soil. If plants are buried under soil and/or water, and there is no oxygen, in millions of years, pressure may change them into coal.



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Air

CO_2 **Carbon Dioxide**
(one of air's many components)

Air is a mixture of gases that surrounds Earth in a layer called the *atmosphere*. Air is made of 78.09% N_2 (nitrogen), 20.95% O_2 (oxygen), 0.93% Ar (argon), 0.039% CO_2 (carbon dioxide), ~1% H_2O (water), and small amounts of other gases, including CH_4 (methane).



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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

Bacteria that live without oxygen in the guts of cows (and other animals) release CH_4 (methane) gas as they break down food. Cows release more methane through their burps than through flatulence.



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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt

NaCl

Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass

SiO₂

Silicon Dioxide

Clear glass for windows and drinking glasses is made by melting sand, and some sand is made of SiO₂. There are other ingredients used in different kinds of glass.



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Soil

SiO₂

Silicon Dioxide
(one of soil's many components)

Soil is a mixture of minerals, including sand (often SiO₂), water, air, and organisms, both living and dead. When there is plenty of oxygen around, bacteria and fungi decompose dead animals and plants, and that releases nutrients, including carbon, into the soil.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

The ocean absorbs CO₂ from the atmosphere. Some of the CO₂ reacts with ocean water to form an acid (H₂CO₃), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals

C₆H₁₂O₆

Sugar

(one of the many components of animals)

Ocean animals range in size from microscopic zooplankton to blue whales, the largest animal ever known to have lived on Earth. Ironically, the primary food source of blue whales is krill, a small shrimplike zooplankton.



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Chalk



Shells



Plastics



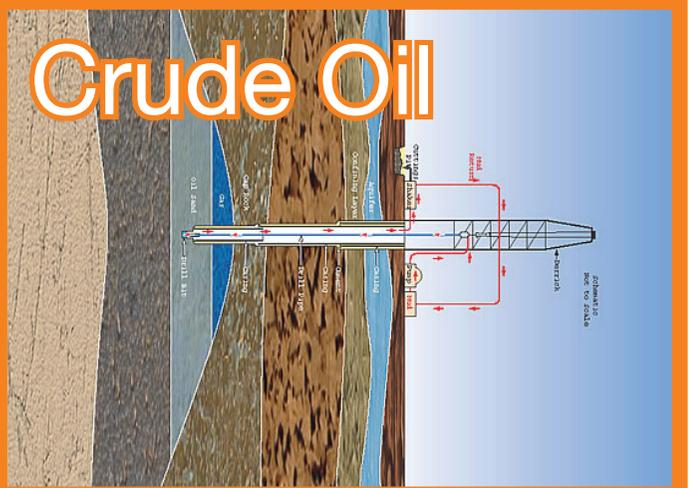
Limestone



Coal



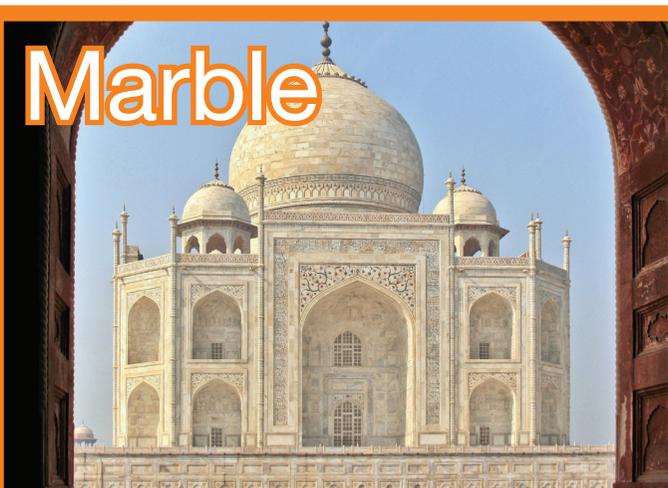
Crude Oil



Gasoline



Marble



Phytoplankton



Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

Most plastics are made from natural gas and crude oil.



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Shells

CaCO_3 **Calcium Carbonate**

Many shelled organisms make their shells by taking CO_2 and calcium out of the water. Many shells are tiny and are made by plankton.



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Chalk

CaCO_3 **Calcium Carbonate**

Chalk forms when tiny shells from plankton fall to the ocean floor and build up over time.



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Crude Oil

C_6H_6 **Benzene**
(one of crude oil's many components)

Crude oil forms under the ocean when soft parts of dead marine organisms get buried with ocean sediments. Over millions of years, pressure and heat changes them into crude oil. Crude oil is a dark liquid, a mixture of different hydrocarbons and other ingredients. Oil is drilled from under the ground or beneath the ocean floor. It is a fossil fuel and it is used to make plastics and/or to burn for heat or power.



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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

Coal forms on land when dead plants get buried with dirt and/or water, and there is no oxygen. Over millions of years, pressure changes them into coal. People dig into Earth to get coal. Coal is a fossil fuel and is burned to produce heat or power.



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Limestone

CaCO_3 **Calcium Carbonate**

Over millions of years, limestone forms from the shells of dead organisms (including plankton) that pile up at the bottom of the ocean in areas where it's not too deep.



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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of phytoplankton's many components)

- Phytoplankton are tiny organisms that live in water and photosynthesize. They take in CO_2 , making $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) and release O_2 .
- Some phytoplankton make tiny calcium carbonate (CaCO_3) shells.
- There are more phytoplankton than almost any other living thing in the ocean. (There are more viruses.)



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Marble

CaCO_3 **Calcium Carbonate**

Heat and pressure from inner Earth may turn limestone into marble.



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Gasoline

C_6H_{18} **Octane**
(one of gasoline's many components)

Gasoline, a liquid burned in engines to generate power, is made from crude oil after it is processed at an oil refinery. Different types of gasoline are blended from various hydrocarbons and other additives.



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Zooplankton



Cement



Ocean Sediments



Plants



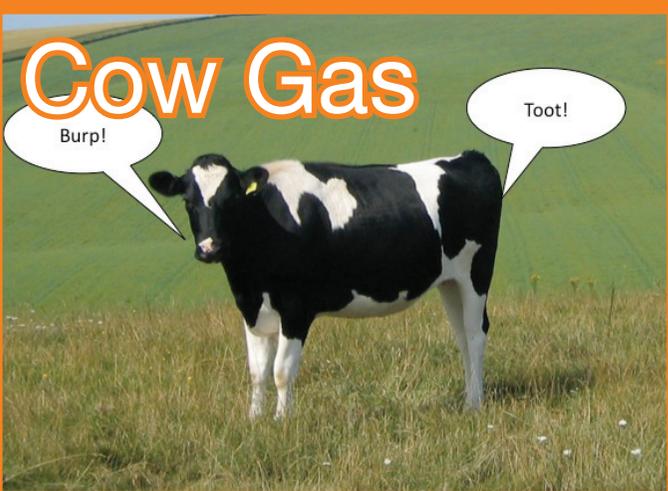
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

When ocean organisms with shells die, their tiny shells fall to the bottom of the ocean. Over millions of years, these sediments build up and may turn into chalk, limestone, or crude oil, depending on surrounding conditions. Sediments can also be made of rocks, soil, and clay.



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Cement

CaCO_3 **Calcium Carbonate**

Limestone is burned to make cement.



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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of zooplankton's many components)

- Many zooplankton are tiny animals that live in the ocean, rivers, and lakes. Some, such as jellyfish, are much larger.
- Some zooplankton make tiny calcium carbonate (CaCO_3) shells.
- Most zooplankton feed on phytoplankton.
- Zooplankton are weak swimmers and drift with the currents.



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Diamond

C **Carbon**

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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
- When plants die, bacteria and fungi decompose them, releasing nutrients into the soil. If plants are buried under soil and/or water, and there is no oxygen, in millions of years, pressure may change them into coal.



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Air

CO_2 **Carbon Dioxide**
(one of air's many components)

Air is a mixture of gases that surrounds Earth in a layer called the *atmosphere*. Air is made of 78.09% N_2 (nitrogen), 20.95% O_2 (oxygen), 0.93% Ar (argon), 0.039% CO_2 (carbon dioxide), ~1% H_2O (water), and small amounts of other gases, including CH_4 (methane).



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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

Bacteria that live without oxygen in the guts of cows (and other animals) release CH_4 (methane) gas as they break down food. Cows release more methane through their burps than through flatulence.



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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt

NaCl

Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass

SiO₂

Silicon Dioxide

Clear glass for windows and drinking glasses is made by melting sand, and some sand is made of SiO₂. There are other ingredients used in different kinds of glass.



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Soil

SiO₂

Silicon Dioxide
(one of soil's many components)

Soil is a mixture of minerals, including sand (often SiO₂), water, air, and organisms, both living and dead. When there is plenty of oxygen around, bacteria and fungi decompose dead animals and plants, and that releases nutrients, including carbon, into the soil.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean

CO₂

Carbon Dioxide

(absorbed into ocean water, some of which then forms H₂CO₃)

The ocean absorbs CO₂ from the atmosphere. Some of the CO₂ reacts with ocean water to form an acid (H₂CO₃), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals

C₆H₁₂O₆

Sugar

(one of the many components of animals)

Ocean animals range in size from microscopic zooplankton to blue whales, the largest animal ever known to have lived on Earth. Ironically, the primary food source of blue whales is krill, a small shrimplike zooplankton.



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Chalk



Shells



Plastics



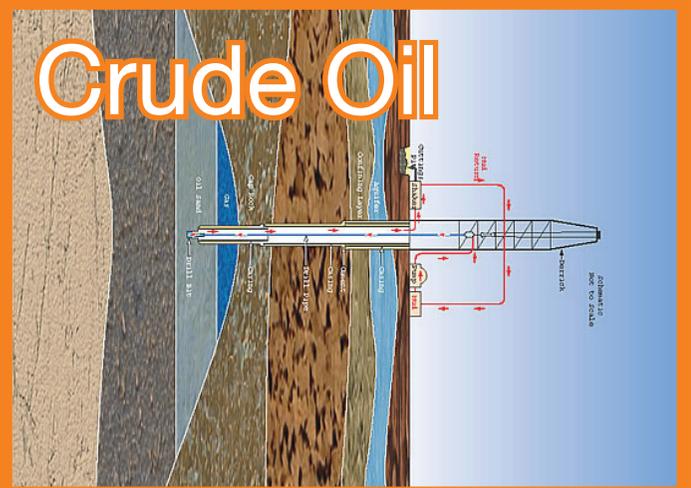
Limestone



Coal



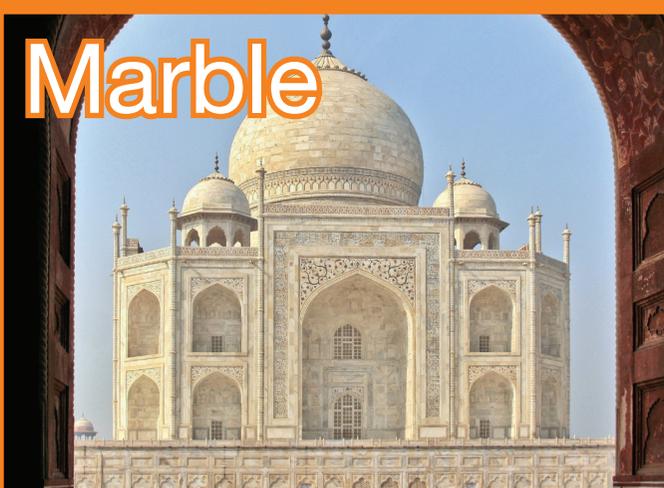
Crude Oil



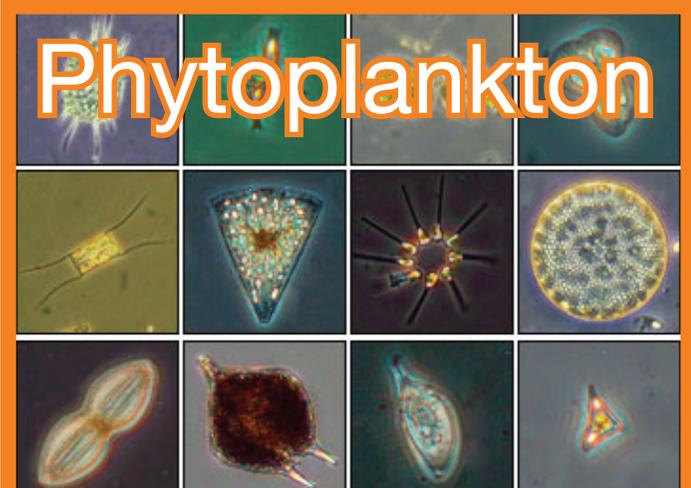
Gasoline



Marble



Phytoplankton



Plastics

$\text{CH}_2\text{:CHCl}$ **Polyvinyl Chloride (PVC)**
(one of the many kinds of plastic)

Most plastics are made from natural gas and crude oil.



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Shells

CaCO_3 **Calcium Carbonate**

Many shelled organisms make their shells by taking CO_2 and calcium out of the water. Many shells are tiny and are made by plankton.



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Chalk

CaCO_3 **Calcium Carbonate**

Chalk forms when tiny shells from plankton fall to the ocean floor and build up over time.



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Crude Oil

C_6H_6 **Benzene**
(one of crude oil's many components)

Crude oil forms under the ocean when soft parts of dead marine organisms get buried with ocean sediments. Over millions of years, pressure and heat changes them into crude oil. Crude oil is a dark liquid, a mixture of different hydrocarbons and other ingredients. Oil is drilled from under the ground or beneath the ocean floor. It is a fossil fuel and it is used to make plastics and/or to burn for heat or power.



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Coal

$\text{C}_{135}\text{H}_{96}\text{O}_9\text{NS}$

Coal forms on land when dead plants get buried with dirt and/or water, and there is no oxygen. Over millions of years, pressure changes them into coal. People dig into Earth to get coal. Coal is a fossil fuel and is burned to produce heat or power.



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Limestone

CaCO_3 **Calcium Carbonate**

Over millions of years, limestone forms from the shells of dead organisms (including plankton) that pile up at the bottom of the ocean in areas where it's not too deep.



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Phytoplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
(one of phytoplankton's many components)

- Phytoplankton are tiny organisms that live in water and photosynthesize. They take in CO_2 , making $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) and release O_2 .
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Marble

CaCO_3 **Calcium Carbonate**

Heat and pressure from inner Earth may turn limestone into marble.



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Gasoline

C_6H_{18} **Octane**
(one of gasoline's many components)

Gasoline, a liquid burned in engines to generate power, is made from crude oil after it is processed at an oil refinery. Different types of gasoline are blended from various hydrocarbons and other additives.



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Zooplankton



Cement



Ocean Sediments



Plants



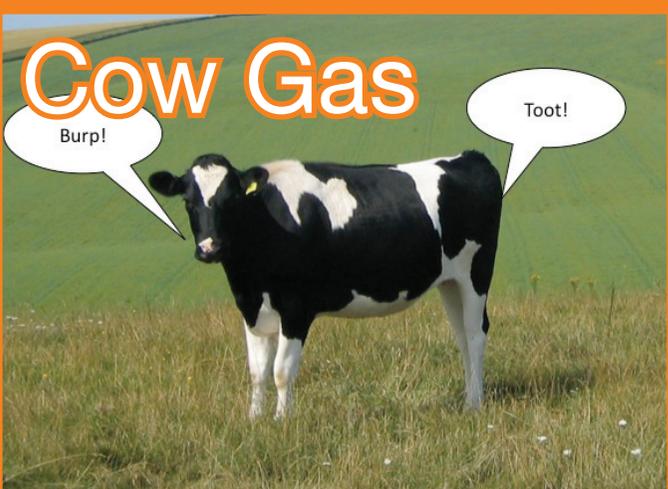
Graphite



Diamond



Cow Gas



Sugars



Air



Ocean Sediments

CaCO_3 **Calcium Carbonate**
(one of many components)

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Cement

CaCO_3 **Calcium Carbonate**

Limestone is burned to make cement.



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Zooplankton

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
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Plants

$\text{C}_6\text{H}_{12}\text{O}_6$ **Sugar**
 $\text{C}_6\text{H}_{10}\text{O}_5$ **Cellulose**

- Plants photosynthesize; they take in CO_2 , make $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar), and release O_2 . Then the plant changes some of the sugar into cellulose.
- When plants die, bacteria and fungi decompose them, releasing nutrients into the soil. If plants are buried under soil and/or water, and there is no oxygen, in millions of years, pressure may change them into coal.



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Air

CO_2 **Carbon Dioxide**
(one of air's many components)

Air is a mixture of gases that surrounds Earth in a layer called the *atmosphere*. Air is made of 78.09% N_2 (nitrogen), 20.95% O_2 (oxygen), 0.93% Ar (argon), 0.039% CO_2 (carbon dioxide), ~1% H_2O (water), and small amounts of other gases, including CH_4 (methane).



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Sugars

$\text{C}_{12}\text{H}_{22}\text{O}_{11}$ **Sucrose**
 $\text{C}_6\text{H}_{12}\text{O}_6$ **Glucose**

There are different types of sugar, including fructose, glucose, and sucrose. Plants, seaweed, and phytoplankton make $\text{C}_6\text{H}_{12}\text{O}_6$ when they photosynthesize.



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Cow Gas

CH_4 **Methane**

Bacteria that live without oxygen in the guts of cows (and other animals) release CH_4 (methane) gas as they break down food. Cows release more methane through their burps than through flatulence.



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Soil



Glass



Salt



Ocean Animals



The Ocean



Power Plants



Salt



Sodium Chloride

Salt crystals are obtained by evaporating ocean water or water from salty lakes.



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Glass



Silicon Dioxide

Clear glass for windows and drinking glasses is made by melting sand, and some sand is made of SiO_2 . There are other ingredients used in different kinds of glass.



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Soil



Silicon Dioxide
(one of soil's many components)

Soil is a mixture of minerals, including sand (often SiO_2), water, air, and organisms, both living and dead. When there is plenty of oxygen around, bacteria and fungi decompose dead animals and plants, and that releases nutrients, including carbon, into the soil.



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Power Plants

Many power plants burn fossil fuels, such as coal, to produce electricity that powers lights, heaters, and machines.



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The Ocean



Carbon Dioxide
(absorbed into ocean water, some of which then forms H_2CO_3)

The ocean absorbs CO_2 from the atmosphere. Some of the CO_2 reacts with ocean water to form an acid (H_2CO_3), which then mixes with ocean water. Because the ocean covers most of Earth's surface and is very deep, it holds a lot of carbon.



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Ocean Animals



Sugar
(one of the many components of animals)

Ocean animals range in size from microscopic zooplankton to blue whales, the largest animal ever known to have lived on Earth. Ironically, the primary food source of blue whales is krill, a small shrimplike zooplankton.



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