

Nature's Chemistry 3

Pollution – What's the Alternative?



Name _____

Class _____

Teacher _____

Pollution – What’s the Alternative? – Lesson 1

Aim: What is Pollution?

When we burn most fuels, we release gases into the air such as carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NO_x). Many fuels also released tiny particles of solid carbon (graphite) which are sometimes known as “soot”. Highly poisonous carbon monoxide can also be produced. When carbon dioxide, sulphur dioxide and nitrogen oxides dissolve in water (such as clouds) they give acid solutions. This can then make lakes, seas and oceans acidic and can kill the plants and animals trying to live in them. It can also lead to rainwater becoming an acid and falling as acid rain.

1. What is a pollution?

Pollution is _____ when we burn most fuels. Carbon dioxide, _____ dioxide and nitrogen oxides are _____. Carbon _____ and soot can _____ be produced.

2. Which gasses dissolve in water to give acid rain?

Carbon dioxide, _____ dioxide and nitrogen oxides _____ in water to _____ acid rain.

3. What would you expect the pH of acid rain to be?

I would _____ the pH of _____ rain to be below _____.

Pollution – What’s the Alternative? – Lesson 2

Aim: What is “Global Warming”?

Despite what most people think, Global Warming has almost nothing to do with the ozone layer! There used to be a problem that gases called “CFCs” (used in fridges, aerosols and polystyrene cups) were attacking the ozone layer and making holes in it. This was allowing the harmful rays from the sun to pass through. Thankfully, CFCs have been banned and the ozone layer is now healing itself.

1. Why is the hole in the ozone layer no longer a problem?

The hole in the _____ layer was _____ by CFCs from _____, aerosols and polystyrene cups attacking it. CFCs have now been _____.

The average temperature on the earth is increasing. This is called “Global Warming” and is most likely due to the fact that when we burn fuels, we release carbon dioxide (CO₂) gas into the air. The carbon dioxide gas is better at holding heat than the air so more heat is trapped and the earth gets warmer. This is sometimes called the “Greenhouse Effect”.

2. What is “Global Warming”?

“Global _____” is the process where the average _____ of the earth increases.

3. Why is “Global Warming” happening?

“Global _____” is happening because we release greenhouse gasses such as _____ into the air. Carbon dioxide traps _____ and increases the average _____.

**4. Some people don't believe that Global Warming is happening.
What do you think?**

Pollution – What’s the Alternative? – Lesson 3

Aim: What is the story of an atom of carbon?

Most of the chemicals that make up living tissue contain carbon. When organisms die the carbon is recycled so that it can be used by future generations. This is called the “carbon cycle”.

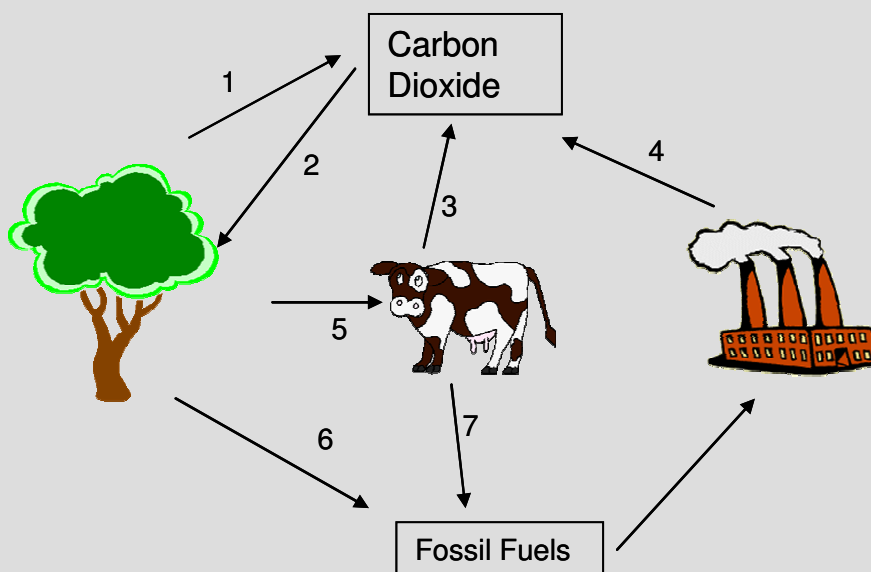
1. What happens to the carbon in the bodies of organisms when they die?

The carbon is _____ and used by _____ generations.

”

*The carbon in fossil fuels is **combusted** (burnt) to create carbon dioxide and this is released into the air. Carbon dioxide is also produced when animals **respire** to make energy and when plants are burnt. The carbon dioxide in the air can be taken in by plants and used again to make energy (photosynthesis). When these plants die, they and their carbon can be turned into fossil fuels over millions of years. The carbon in plants can also be eaten by animals!*

2. Label the arrows below to show the carbon cycle. Use the words “combustion” (x2), “respiration”, “photosynthesis”, “death” (x2) and “feeding”.



Pollution – What’s the Alternative? – Lesson 4

Aim: Why don’t we just use wind and solar power?

People like the idea of using wind and solar power to make all of our electricity. The trouble is, these methods can only produce some electricity some of the time. In Scotland, it is unlikely for the weather to be particularly sunny so solar panels seldom create a lot on electricity here. However, Scotland can be a very windy country so wind turbines should work well. The question is, even when wind turbines and solar panels make lots of energy, do they make enough for us to use all the electrical devices we want to use?

1. Would you use solar panels or wind turbines to make electricity in Scotland? Why?

I would use _____ to power my house in Scotland because _____

_____.

2. Would you use solar panels or wind turbines to make electricity in Florida? Why?

I would use _____ to power my house in Florida because _____

_____.

3. The wind turbine on Dr. Murray's roof can produce 250 kWh per day. His solar panel can produce 130 kWh per day. Dr. Murray uses 430 kWh of electricity per day. How many kWh per day is he going to have to buy from Scottish Power (other electricity suppliers are available)?

Total electricity used = _____ + _____ = _____ kWh

Left over electricity = _____ - _____ = _____ kWh

4. Scottish Power charges Dr. Murray 5p per kWh of electricity he uses. How much will he have to pay per day?

Cost = _____ x 5 = _____ p = £ _____

Pollution – What's the Alternative? – Lesson 5

Aim: Could we produce all of our diesel from plants?

1. Answer the questions using the information from the video?

a. What is biodiesel made from?

Vegetable _____ or animal _____

b. What does the waste oil contain that makes it unsuitable for use as biodeisel?

Water _____ food _____

c. What does the oil go through to strain out the food/debris?

A _____ sieve

d. What is the other source of oil?

_____ tallow

e. What do the producers refer to the raw material as?

f. What is the feedstock combined with

_____ tallow

g. What is applied to make the reaction happen?

Heat and _____.

h. What temperature is the oil heated to in the safety test?

_____ °C

i. What does bio-diesel emit less of?

Carbon _____ and _____

Pollution – What’s the Alternative? – Lesson 6

Aim: What is your carbon footprint?

1. Use the table below to write down the number of kilos (kg) of carbon dioxide and percentage of the total each part of your lifestyle produces.

Source	Mass of CO ₂ produced (kg)	% of total
Travelling to school		
Watching television		
Leaving TV on standby		
Using the computer		
Lights in the bedroom		
Showers		
Baths		
Home total		
Going on holiday		
Your total		