Year 11

Chemistry booklet

Topic 1 – Chemistry of the atmosphere

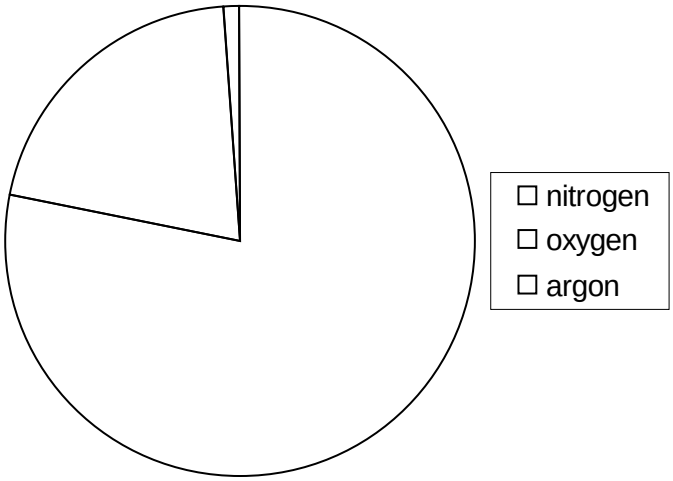
Name: _____

Chemistry of the atmosphere

Give a definition for each of these key words:

Atmosphere	
Greenhouse gas	
Greenhouse effect	
Global warming	
Carbon footprint	
Pollutant	
Fuel	
Carbon particulates	
Carbon monoxide	
Sulphur dioxide	
Nitrogen oxide	
Global dimming	

Composition of the Atmosphere



Gases in the Atmosphere

Naturally Occurring

Produced by Humans

Draw diagrams of the following molecules:

Nitrogen

Oxygen

Carbon dioxide

Water

Match the pollutant with its effect:

Carbon dioxide	Toxic to humans
Carbon monoxide	Global dimming and dirt
Carbon	Acid rain and respiratory problems
Sulfur dioxide	Acid rain and respiratory problems
Nitrogen oxide	Global warming

Our Early Earth

4500 million years ago our Earth was a hot fiery planet. As the Earth cooled a thin crust was formed through which bubbling lava gave off vast clouds of gas – a mixture of carbon dioxide, steam and ammonia. Hydrogen and helium were also formed and initially made up most of the air, but these gases escaped from the atmosphere, as they were so light. Some volcanoes were high enough for steam to cool and condense as water and fall as rain. Gradually pools of water collected on the surface, cooling the crust. As the crust cooled more water was able to form on the surface without immediately boiling off as steam. In this way the first seas and oceans were formed.

Rain began to wash carbon dioxide out of the air, which became dissolved in the oceans in the form of salts. These salts such as calcium carbonate did not evaporate but instead started to form rocks – limestone and chalk.

Once the oceans were established the earliest life forms appeared – a type of algae that consumed carbon dioxide and produced oxygen. The first oxygen formed was used up in chemical reactions such as oxidation of iron in rocks. Ammonia also reacted with oxygen to form the nitrogen that persists in the atmosphere today. Denitrifying bacteria also reacted with the ammonia to release more nitrogen gas.

The present composition of our atmosphere of 78% nitrogen, 21% oxygen and 0.04% carbon dioxide remains broadly constant although some people are expressing concern at the increasing level of carbon dioxide as a result of burning fossil fuels.

Task 1 - Read the passage above and highlight what you think are the 20 most important words.

Task 2 - Convert the text you have just read into a diagram or a cartoon strip, using your key words to help you.

How are atmospheric pollutants formed?

Chemical reactions happen when _____ is burnt in air. The air consists mainly of _____ and oxygen. The fuel is a mixture of _____which are compounds of carbon and hydrogen. The products of the combustion process are carbon dioxide, nitrogen, carbon _____, nitrogen _____, and _____. Most of the nitrogen passes through the engine without change.

In the petrol engine the liquid fuel vaporises. This is then mixed with air. The reaction between the fuel and oxygen is started by a _____ . This explosive reaction releases a lot of _____. The force of the explosion drives the moving parts of the engine. New chemicals are formed during this _____ process. This happens because the _____of the fuel and air are broken, and the free atoms join with other atoms to make new compounds. All the atoms at the start of the chemical reaction are still there after the process. However, many will have different partner atoms, as new compounds are formed.

Vehicles which are more than three years old in the uk require a _____test. During this test the quantities of pollutants from the _____ are measured. If the concentrations are too high, the car will _____the test. In order to reduce the amount of pollutants entering the air many cars use _____converters. The waste gases from the combustion process are made to pass through a honeycomb structure. This structure has a very large surface _____. A metal coating, such as platinum, acts as a _____, to speed up the reactions between the waste gases. This enables less harmful chemicals to be formed. This reduces the concentration of carbon _____ and nitrogen _____ entering the atmosphere. However, the amount of carbon _____ is increased.