

Acid Rain

- ❖ State the adverse effect of these common pollutants on buildings and why these pollutants are of global concern
- ❖ Relate the effects of acid rain to sedimentary rocks.

We all know what acid rain is but where does it come from?

Pollutant	Formula	Acid Formed	Source
Sulfur dioxide	SO ₂	SULFURIC ACID	SULFUR IN FOSSIL FUELS, BEING BURNED
Nitrous oxides	NO _x	NITRIC ACID	CREATED IN CAR ENGINES
Carbon dioxide	CO ₂	CARBONIC ACID	COMBUSTION

Carbon Dioxide

Combustion of hydrocarbons creates carbon dioxide.

One of the most used fuels is petrol, one of the compounds in petrol is octane. C₈H₁₈

TASK: Write word, symbol and particle equations for this reaction.

Don't forget state symbols

Sulfur Dioxide

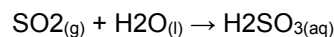
Sulfur (S) can be an impurity in fossil fuels.

When the fossil fuels are burned in power stations the sulfur reacts with oxygen to make Sulfur dioxide.

Sulfur(s) + Oxygen(g) → Sulfur Dioxide(g)

TASK: add symbol and particle equations for this reaction.

This sulfur dioxide then dissolves in droplets of rainwater to form sulfurous acid.



Oxides of Nitrogen

Nitrogen makes up 79% of the air. Oxygen is around 20%

In a car engine very hot **sparks** can cause this nitrogen to combust.

Nitrogen can make NO, NO₂ or NO₃, so we group them all together into 'oxides of nitrogen'

TASK: Can you write word equations for the combustion reactions that create these products.

Consequences of acid rain

Acid rain causes lakes to become acidic and many plants and animals die as a result.

Acid rain also kills trees, damages limestone buildings and ruins stone statues.

Links between acid rain and human health problems have also been suggested.

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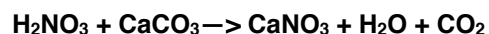
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Reactions of Acids Rain

Acid rain reacts with calcium carbonate in marble and limestone. Can you write the symbol and word equations for these reactions. One has been done for you.

Nitric acid + calcium carbonate → calcium nitrate + water + carbon dioxide



Is it balanced? What are the missing state symbols?

List 3 ways acid rain affects the environment

Reducing Acid Rain

Sulfur dioxide - Power stations have scrubbers attached to the chimneys to remove sulfur dioxide formed. These contain **calcium carbonate** - what type of reaction is this?

Reducing Acid Rain

Nitrous Oxides - Catalytic converters can be used in car exhausts that contain rare metals such as platinum or palladium as a catalyst that breaks down the oxides into nitrogen and oxygen.

What is the formula?- what type of reaction is this?

Reducing Acid Rain

Carbon dioxide - This is the hardest to reduce though we have tried methods such as carbon capture and storage. HWK TASK - Find out what this is and whether it is effective.

TED TALK

What do you think is the most effective way to reduce this?