

Learning about



AIR QUALITY

SCIENCE TEACHERS GUIDE

A guide to using the site within CfE

www.LearnAboutAir.com

Air Quality Learning Package

Teacher's Notes

Welcome to this interactive learning module on air quality. The module will help your pupils learn more about the air that we breathe and its importance in our lives. The air that we breathe is something that we all take for granted as we can't see it. However air is very important to us, poor air quality can makes us feel unwell so we should take care of it.

By working their way through this module the pupils will find out:

- what the air used to be like compared to how it is now
- the main pollutants affecting air quality
- how we measure the quality of the air
- how it compares to other parts of Scotland and the world
- the impacts of poor air quality
- what we can do to ensure we have, and continue to have good quality air.

The materials on this website can be used in a variety of different ways. This document lays out one way in which these materials can be used on a lesson by lesson basis. Notes, extension exercises and homework's can however be used differently (e.g. as class activities) depending on the class using it. The order of activities and length of time taken to teach each section is flexible.

Class Presentation

The site is designed to be used by pupils with access to computers, as such it may not be ideal for use by a teacher using a Projector or SMART Board. With that in mind we have provided "PowerPoint" style Slideshow Presentations in the **Resources** section of the site. These are full screen slides which contain abridged content from the site & all the videos & illustrations.

These can be combined with PDFs of the Pupils Notes which can be printed where access to computers is limited.

Feedback

If you wish to provide us with any feedback about the site or these notes, please do so at this page on the site: [Feedback](#)

Science: Section 1

Fuels

Experiences and Outcomes

- Third – by investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems. [SCN 3-04b](#)
- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)
- Fourth – through investigation, I can explain the formation and use of fossil fuels and contribute to discussions on the responsible use and conservation of finite resources. [SCN 4-04b](#)
- Third – I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. [SCN 3-05b](#)
- Fourth – I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives. [SCN 4-17a](#)
- Third – I have helped to design and carry out practical activities to develop my understanding of chemical reactions involving the Earth's materials. I can explain how we apply knowledge of these reactions in practical ways. [SCN 3-19b](#)

Teacher Instructions

1. Pupils read first 2 paragraphs on fuels
2. Teacher Demo the methane tin experiment (or pupils watch video if demo unavailable)
3. Pupils read note on fossil fuels
4. Pupils complete extension worksheet for section 1 (Forming Fossil fuels – How Coal was Formed)
5. Pupils read note on renewable fuels
6. Teacher Demo the whoosh bottle (or pupils watch video if demo unavailable)
7. Pupils complete homework 1
8. Optional extension research exercise about different types of renewable and non-renewable fuels could be completed for homework or as a research project in class

Science: Section 2

Fractional Distillation of Crude Oil

Experiences and Outcomes

- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)
- Fourth – through investigation, I can explain the formation and use of fossil fuels and contribute to discussions on the responsible use and conservation of finite resources. [SCN 4-04b](#)
- Fourth – I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives. [SCN 4-17a](#)
- Third – I have helped to design and carry out practical activities to develop my understanding of chemical reactions involving the Earth's materials. I can explain how we apply knowledge of these reactions in practical ways. [SCN 3-19b](#)

Teacher Instructions

1. Pupils read first section up to the distillation experiment
2. Teacher Demo the distillation experiment (or pupils watch video if demo unavailable)
3. Pupils complete extension worksheet for section 2 (Fractional Distillation) looking into the uses and properties of the different fractions.
4. Pupils read note on Properties of fractions
5. An experiment can be performed by pupils at this point to test the viscosity of various liquids using a burette and a timer.
6. Pupils complete homework 2

Science: Section 3

Combustion of Fossil Fuels

Experiences and Outcomes

- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)
- Third – I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. [SCN 3-05b](#)
- Fourth – I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives. [SCN 4-17a](#)
- Third – I have helped to design and carry out practical activities to develop my understanding of chemical reactions involving the Earth's materials. I can explain how we apply knowledge of these reactions in practical ways. [SCN 3-19b](#)
- Fourth – I can monitor the environment by collecting and analysing samples. I can interpret the results to inform others about levels of pollution and express a considered opinion on how science can help to protect our environment. [SCN 4-18b](#)
- Fourth – I can collect and analyse experimental data on chemical reactions that result in an obvious change in energy. I can apply my findings to explain the significance of the energy changes associated with chemical reactions. [SCN 4-19a](#)

Teacher Instructions

1. Pupils read first section up to the combustion of fossil fuels experiment
2. Teacher Demo the combustion experiment (or pupils watch video if demo unavailable)
3. Pupils should be instructed to construct a table of observations that can be made as the reaction proceeds and record colour changes including the soot produced that collects on the funnel.
4. Pupils read note on Other Products of Combustion
5. Teacher Demo the Sparking of Air and/or Burning Sulphur experiment (or pupils watch video if demo unavailable)
6. Pupils complete homework 3

Science: Section 4

Air Pollution and Health

Experiences and Outcomes

- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)
- Third – I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. [SCN 3-05b](#)
- Fourth – I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives. [SCN 4-17a](#)
- Third – I have helped to design and carry out practical activities to develop my understanding of chemical reactions involving the Earth's materials. I can explain how we apply knowledge of these reactions in practical ways. [SCN 3-19b](#)
- Fourth – I can monitor the environment by collecting and analysing samples. I can interpret the results to inform others about levels of pollution and express a considered opinion on how science can help to protect our environment. [SCN 4-18b](#)
- Fourth – I can collect and analyse experimental data on chemical reactions that result in an obvious change in energy. I can apply my findings to explain the significance of the energy changes associated with chemical reactions. [SCN 4-19a](#)

Teacher Instructions

1. Pupils read first section and watch video on Air Pollution and Health
2. Pupils use interactive graphic to learn more about Pollutants
3. Pupils read the rest of the section
4. Pupils complete homework 4
5. Optional extension research exercise about Air Pollution could be completed for homework or as a research project in class

Science: Section 5

Pollution and the Environment

Experiences and Outcomes

- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)
- Third – I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. [SCN 3-05b](#)
- Fourth – I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives. [SCN 4-17a](#)
- Third – I have helped to design and carry out practical activities to develop my understanding of chemical reactions involving the Earth's materials. I can explain how we apply knowledge of these reactions in practical ways. [SCN 3-19b](#)
- Fourth – I can monitor the environment by collecting and analysing samples. I can interpret the results to inform others about levels of pollution and express a considered opinion on how science can help to protect our environment. [SCN 4-18b](#)
- Fourth – I can collect and analyse experimental data on chemical reactions that result in an obvious change in energy. I can apply my findings to explain the significance of the energy changes associated with chemical reactions. [SCN 4-19a](#)

Teacher Instructions

1. Pupils read section on acid rain
2. Teacher Demo the acid rain experiment (or pupils watch video if demo unavailable)
3. Pupils read sections on Nutrient Enrichment and Greenhouse effect
4. Pupils complete homework 5
5. Pupils can use extension sheets for section 5 to find out more information about the different types of pollutants

Science: Section 6

What can we do about it?

Experiences and Outcomes

- Third – by investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems. [SCN 3-04b](#)
- Fourth – by contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. [SCN 4-04a](#)

Teacher Instructions

1. Pupils read section on what can be done
2. Pupils watch solutions video
3. Pupils can design a poster/leaflet to for different people (children, drivers, homeowners, industrial workers etc.) telling them what they can do to help.