**Chapter** (approximate teaching hours) | **Topic** | **Linked learning opportunities and Ideas About Science** | **Higher tier only** | **2011 Resources**
--- | --- | --- | --- | ---
**C1 Air and water** (15) | **Earth’s atmosphere** | • How has the Earth’s atmosphere changed over time?  
• Particle model and the states of matter  
• Formation of Earth’s early atmosphere  
• Air pollutants  
• Oxidation and combustion reactions of fossil fuels  
• Chemical hazards  
• Balancing equations | • Measure temperature against time and plot cooling and heating curves  
• Use particle model to explain state changes  
• Distinguish data from explanatory ideas in accounting how the atmosphere was formed  
• Impacts of burning fossil fuels on air quality  
• Catalytic converters, low-sulfur petrol, and gas scrubbers as positive applications of science | • Limitations of the particle model | Chemistry Student Book pages  
18–21  
26–30  
34–39  
42  
138  
110, 111 | OxBox  
AC1.A.1 the story of our atmosphere  
AC1.1.1 Air demonstrations  
AC1.1.2 How much of the air is oxygen?  
IC1.1.4 Air quality  
AC1.2.1 candle demonstration  
AC1.2.2 Nitrogen and argon  
IS1.2.4 Natural additions to the atmosphere  
AC1.3.2 History of the atmosphere  
AC1.3.3 Oxygen debate  
IC1.3.4 Evolution of the atmosphere  
AC1.4.1 Making pollutants  
AC1.4.2 Air quality data on

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the internet
AC1.4.3 Air pollutants
AC1.5.2 Particulates from natural gas
AC1.5.3 Measuring dust in the air
IC1.5.4 Particulates in the atmosphere
AC1.6.1 Using your data on dust in air
Ac1.6.2 Using data
AC1.7.3 Once source of atmospheric pollutants
AC1.7.2 Power stations
AC1.7.4 Checking what comes out of a car engine
IC1.7.5 What goes in and what comes out of a car engine
AC1.8.1 Burning Carbon
AC1.8.2 Understanding Combustion Reactions
AC1.8.2 Understanding Combustion Reactions
AC1.8.2 Understanding Combustion Reactions
AC1.8.2 Understanding Combustion Reactions
IC1.8.5 Combustion reactions
IC1.8.6 Power station
AC1.4.3 Problems created by air pollutants
AC1.4.3 Problems created by air pollutants

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### Chemical reactions

- Endothermic and exothermic reactions
- Calculate energy changes
- Advantages and disadvantages of fuel cells
- Investigate different chemical reactions to find out if they are exothermic or endothermic
- Fuel cells as a positive application to mitigate effects of emissions
- Calculating bond energies

### Resources

- AC1.9.3 Investigating tests for water and carbon dioxide
- AC1.12.1 Improving the air quality
- IC1.9.4 Where do all the atoms go?
- AC1.12.1 Improving the air quality
- IC1.12.4 Reducing air pollution
- IC1.12.5 Catalytic converter

### Additional Content

- AC6.6.1 Energy changes in chemical reactions
- AC6.6.2 Exothermic and endothermic reactions
- AC6.6.3 An endothermic reaction
- IC6.6.4 Energy level diagrams
- AC73.1.1 Exothermic or endothermic?
- IC73.3.4 Activation energy
- AC73.1.2 Breaking and making chemical bonds

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| **Climate change** | • Evidence for climate change  
• Effects of climate change  
• Evaluate data | • Climate change models – physical models and computer models  
• Correlation and cause  
• Risks, costs, and benefits of fuel use and its sustainability and effects on climate  
• Targets for emissions and personal, social, and economic context | 42  
138  
140  
also Physics 54–63 | AP2.6.1 Modelling the Earth’s radiation  
AP2.6.2 The greenhouse effect  
AP2.6.3 If this is the answer, what was the question?  
IP2.6.4 Animation The greenhouse effect  
AP2.7.1 Plants use carbon dioxide  
AP2.7.2 Carbon-based life  
AP2.8.1 Global warming - a news report  
AP2.8.2 IPCC statements of risk  
AP2.8.3 Global warming - evidence past and present  
IP2.8.4 Presentation Chris Reid on ocean changes  
IP2.8.5 Presentation Climate change  
IP2.8.6 Presentation Climate modelling  
IP2.8.7 Presentation CO2 and my lifestyle |

| **Potable water** | • Methods for increasing availability of potable water | • Positive impact of technologies to increase the availability of potable | 88  
89  
140 |  
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<table>
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<th>• Filtration, chlorination, oxygenated bacteria, distillation, membrane filtration</th>
<th>water</th>
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</thead>
<tbody>
<tr>
<td>• Ethical issues and risk, cost, and benefit of access to treated water</td>
<td></td>
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<tr>
<td>• Identify unknown gases</td>
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