Death to diesel?

Teacher Guide

#### overview

It has recently come to light that major car manufacturers have fitted software to diesel cars to cheat exhaust emissions tests. In this activity students use their knowledge of chemical reactions to predict the products of combustion in a diesel engine. They then develop their communication skills through the production of a short video to persuade car buyers not to buy diesel cars.

#### LEARNING OBJECTIVEs

In this lesson students make a decision about whether a video produced by another group will persuade car buyers to boycott diesel cars.

* Reactions: predict the products of the combustion of a given reactant and show the reaction as a word equation
* Science in society: communication: use the four Cs of effective communication: making it clear, concrete, correct and coherent

#### Curriculum LINK

England National Curriculum KS3:

* Chemistry: Chemical reactions: Representing chemical reactions using formulae and using equations.

GCSE Combined Science subject content:

* Working Scientifically: Recognise the importance of ... communicating results to a range of audiences
* Chemistry: Chemical changes: Use the names and symbols of common elements and compounds and the principle of conservation of mass to write formulae and balanced chemical equations

#### TEACHING MATERIALS

* The presentation PowerPoint contains both the teaching presentation and the Student Sheets.
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* Visit the ENGAGE website [www.engagingscience.eu](http://www.engagingscience.eu) for more science-in-the-news activities.

#### Further MATERIALS required

* If you wish, use molecular modelling kits to reinforce learning about the reactions that occur in diesel engines
* Video-making equipment, such as mobile phones or tablets
* Scissors, glue, card and lollipop sticks to make characters to ‘act’ in a video

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| STAGE/PURPOSE RUNNING NOTES | |
| Engage  Car manufacturers have been cheating exhaust fume tests. What are the health impacts of emissions from diesel cars? | Display (2) to introduce the news story, and point out that the cars have cheat software that detects when the engine is being tested and then changes the engine’s performance to improve the test results.  Display (3) to outline the health impacts of emissions from diesel cars.  Display (4) to introduce the task for the lesson – persuading car buyers to boycott diesel cars.  Display the objectives (5). |
| Review  Students find out about the chemical reactions that make some of the substances emitted by diesel cars, and write chemical equations for these reactions. | Display (6) and get student pairs to suggest answers to the question on the slide. Draw attention to the tasks on the slide.  Display (7) (8) and (9) to explain how carbon dioxide, water and oxides of nitrogen (NOx) are produced in diesel engines. If you wish, use molecular models to reinforce learning. Students then complete the equations on SS1.  Answers:  decane + oxygen → carbon dioxide + water pentadecane + oxygen → carbon dioxide + water tridecane + oxygen → carbon dioxide + water hexadecane + oxygen → carbon dioxide + water nonadecane + oxygen → carbon dioxide + water  nitrogen + oxygen → nitrogen monoxide nitrogen + oxygen → nitrogen dioxide |
| Consider Students produce a vlog to persuade car buyers to boycott diesel cars. | Student groups then tackle the task on (10), using the further guidance on SS2 and SS3.  They can use the backgrounds on SS4a and characters from SS4b in their vlogs. They will need to select and cut out characters, stick them on card and then stick the cards onto lollipop sticks in order to use them to ‘act’ in their vlogs. |
| Decide  Students peer evaluate each others’ vlogs and decide whether they will persuade car buyers to boycott diesel cars. | Display (11). Each student group looks at a vlog made by another group and assesses it using the checklist for effective communication on SS2.  They then make – and justify – their decision: will the vlog persuade car buyers to boycott diesel? |