Te Kura
Te Aho o Te Kura Pounamu
THE CORRESPONDENCE SCHOOL

CHEMISTRY CHO2031Y1A
TOPIC RESOURCE INFORMATION

ACHIEVEMENT STANDARD 91163 (VERSION 2) CHEMISTRY 2.3
Demonstrate understanding of the chemistry used in the development of a current technology
Level 2, Internal assessment
3 credits

A. CATALYTIC CONVERTERS

Achievement	Achievement with Merit	Achievement with Excellence
The student submits a report that: • States the reason why catalytic converters were invented. • Gives a timeline linked to events that led to the development of the 3-way catalytic converter. • Describes the issues that helped or hindered the development of catalytic converters • Describes any changes made to catalytic converters. • Shows understanding of Level 2 chemistry to explain the shape and design of catalytic converters. • Shows understanding of Level 2 redox chemistry of how catalytic converters work. • Uses typical chemistry vocabulary, symbols, conventions and equations.	The student submits a report that: • Explains the reason why catalytic converters were invented. • Explains the issues that helped or hindered the development of catalytic converters and links these to a timeline. • Explains any changes made to catalytic converters. • Shows in-depth understanding of Level 2 chemistry to explain the shape and design of catalytic converters. • Shows in-depth understanding of Level 2 redox chemistry of how catalytic converters work. • Uses typical chemistry vocabulary, symbols, conventions and equations.	The student submits a report that: • Explains the reason why catalytic converters were invented. • Discusses the issues that helped or hindered the development of catalytic converters and links these to a timeline. • Discusses any changes made to catalytic converters. • Shows comprehensive understanding of Level 2 chemistry to explain the shape and design of catalytic converters. • Shows comprehensive understanding of Level 2 redox chemistry of how catalytic converters work. • Uses typical chemistry vocabulary, symbols, conventions and equations.

ASSESSMENT TIPS

In order to achieve this standard, you need to present your report in your own words and show your understanding of level 2 chemistry.

TIP 1

If you have difficulty in transforming the text given in the links into your own words, then it is useful to ask yourself questions, such as those listed below. You can get friend or family member to ask you the questions and then record your answers. Transcribe your answers and then weave them into your report.

Please note that these questions are only **some** of the questions you could ask yourself, so don't limit your report to these only!

History/development of technology

1. Why are catalytic converters necessary?
2. What problem prevented catalytic converters being used, and how was this problem solved?
3. What laws encouraged the development of catalytic converters in the USA?
4. What is the difference between the two-way and the three-way catalytic converter?
5. Why was the three-way catalytic converter developed?
6. Have there been any issues that have resulted from the use of catalytic converters?

Redox Chemistry:

1. Can I explain terms like 'catalyst', 'reduction' 'oxidation'?
2. Have I identified the catalyst for reduction and for oxidation?'
3. Have I used oxidation numbers to support my explanations?
4. Can I write equations for all the reactions?
5. Have I written my equations using correct chemical language (e.g. using subscripts)?
6. Can I identify what is being oxidised and what is being reduced? (CH2071 is useful)?

Shape of the catalytic converter

1. What factors affect the rate of reaction?
2. How are these factors incorporated into the design of the catalytic converter?
3. Why is a fast rate of reaction important?

TIP 2

When you read through the links or watch the videos given on OTLE or in the task, make notes using key words or phrases. When you write your report, use these key words rather than the text given in the links.

TOPIC RESOURCES
CATALYTIC CONVERTERS

Your first source is the modules you should have completed – CHO2001, CHO2071, CHO2061 (or Level 1 understanding of rates of reaction)

EXTRA SOURCES FOR MORE DETAIL

HISTORY

Timeline:
http://dev.nsta.org/evwebs/3368/History/History.htm

Possible future developments:
https://www.sciencelearn.org.nz/videos/930-catalytic-converters-and-platinum-nanoparticles

https://www.sciencelearn.org.nz/videos/935-designer-catalysts

https://www.sciencelearn.org.nz/resources/1644-new-nanoparticle-shapes

GOOD OVERVIEWS AND GENERAL CHEMISTRY

http://www.bbc.co.uk/education/guides/zqd2mp3/revision/6

http://www.drivingtesttips.biz/catalytic-converter.html

http://www.explainthatstuff.com/catalyticconverters.html

https://www.sciencelearn.org.nz/resources/1650-chemical-reactions-and-catalysts

HOW CATALYTIC CONVERTERS WORK

How car exhaust systems work:
https://www.youtube.com/watch?v=W6dIsC_eGBI

How catalytic converters work:
https://www.youtube.com/watch?v=DXchXMVteyk (ignore the first 30 s of advertisement)

Catalytic converters explained (good redox chemistry):
https://www.youtube.com/watch?v=HADOcrcMikA

Diagrammatic explanation:
https://www.sciencelearn.org.nz/images/2034-catalytic-converter-catalyst

Additional sources may be used and must be quoted (full web link) in the bibliography to verify the source.