

CHEMISTRY CHO2031Y1B

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

B. POLYMERS AND PTFE

Achievement	Achievement with Merit	Achievement with Excellence
<p>The student submits a report that:</p> <ul style="list-style-type: none"> Describes what polymers are and how they are formed. Describes how PTFE was discovered and some important steps that led to its development to its uses today. Describe key events in a timeline Shows understanding of Level 2 chemistry to explain how PTFE is made, including description of the addition polymerisation reaction and how catalyst affects energy. Lists properties of PTFE that makes it valuable. Shows understanding of Level 2 chemistry such as bonding and to explain these properties. Uses typical chemistry vocabulary, symbols, conventions and equations. 	<p>The student submits a report that:</p> <ul style="list-style-type: none"> Explains what polymers are and how they are formed. Describes in some detail how PTFE was discovered and important steps that led to its development to its uses today and relates these to a timeline. Shows in-depth understanding of Level 2 chemistry to explain how PTFE is made, including addition polymerisation steps and how catalyst affects energy. Lists properties of PTFE that makes it valuable. Shows in-depth understanding of Level 2 chemistry to explain these properties. Uses typical chemistry vocabulary, symbols, conventions and equations. 	<p>The student submits a report that:</p> <ul style="list-style-type: none"> Explains what polymers are and how they are formed. Explains in detail how PTFE was discovered and important steps that led to its development to its uses today and relates these to a timeline. Shows comprehensive understanding of Level 2 chemistry to explain how PTFE is made, including addition polymerisation steps and how catalyst affects energy. Lists properties of PTFE that makes it valuable. Shows comprehensive understanding of Level 2 chemistry to explain these properties. 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. Name two polymers that were discovered by accident.
2. What was Mr Plunkett trying to make when his experiment failed leading to his discovery of polytetrafluoroethene (PTFE)?
3. Why did Mr Plunkett investigate his failed experiment?
4. PTFE nearly was not developed as it was so expensive to make. What urgent application of PTFE resulted in it being developed further?
5. Why did it take so long for the discovery to be used in applications like non-stick frying pans?

Chemistry – How PTFE is made:

1. Can I explain terms like 'monomer', 'polymer', 'catalyst'?
2. Can I write equations for all the reactions?
3. Have I written my equations using correct chemical language (e.g. using subscripts)?
4. Can I draw the different steps in polymerisation? (CHO2052 is useful)

Properties of PTFE:

1. Can I describe 3 properties of PTFE that makes it so useful?
2. Can I describe at least one application of how we use PTFE for each of these properties?

Chemistry – Properties of PTFE:

1. Can I explain terms like 'covalent bonding', 'electronegativity, 'intermolecular forces'?
2. Can I explain at least two properties of PTFE in terms of the bonding within the molecules and/or between the molecules? (CHO2041, CHO2042 and CHO2043 are useful)

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

POLYMERS AND PTFE

Your first source is the modules you should have completed – CHO2001, CH2041, CH2042, CH2043, CHO2051, CHO2052.

EXTRA SOURCES FOR MORE DETAIL

PLASTICS

Overview of plastics:

<http://www.chem1.com/acad/webtext/states/polymers.html>

Focus on addition polymers and not condensation-elimination polymers.

Plastics and polymers general overview:

<http://www.nobelprize.org/educational/chemistry/plastics/readmore.html>

POLYTHENE

History of polythene:

<http://www.icis.com/resources/news/2008/05/12/9122447/polyethylene-discovered-by-accident-75-years-ago/>

The story of polythene:

<http://www.personal.rdg.ac.uk/~spsolley/pe.html> (Has some important points about development of technology)

Videos showing how polymerisation happens and properties of polymers:

1. <https://www.youtube.com/watch?v=sk6h40aArEo>
2. <https://www.youtube.com/watch?v=bGExqNckhAw>

PFTE

Overview:

<https://en.wikipedia.org/wiki/Polytetrafluoroethylene>

Discovery of PTFE:

https://en.wikipedia.org/wiki/Roy_J._Plunkett

Good overview of PTFE:

http://web.mit.edu/afs.new/athena/course/3/3.064/www/slides/teflon_history.pdf

Video on PTFE:

1. <https://www.youtube.com/watch?v=uXaP43Zbz7U>
2. <https://www.youtube.com/watch?v=4FsYvD27POA>
3. <https://www.youtube.com/watch?v=jxuaRCRKOWs>

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4. <https://www.youtube.com/watch?v=mMZ5toWFjcg>
5. <https://www.youtube.com/watch?v=5sKC9D9rhck>

Some chemical and physical properties of PTFE:

<http://textilelearner.blogspot.co.nz/2013/04/teflon-ptfe-polytetrafluoroethylene.html>

Video on Goretex:

<https://www.youtube.com/watch?v=a9Ee6XOLKSA>

Chemical properties of PTFE explained:

<http://www.chemguide.co.uk/qandc/ptfe.html>

What makes PTFE stick:

<http://www.scientificamerican.com/article/if-nothing-sticks-to-tefl/>

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