

CHEMISTRY CHO3031Y1C

TOPIC RESOURCE INFORMATION

ACHIEVEMENT STANDARD 91389 (VERSION 2) CHEMISTRY 3.3

Demonstrate understanding of the chemical processes in the world around us

Level 3, Internal assessment

3 credits

C. FLUORIDATION OF WATER SUPPLIES

Achievement	Achievement with Merit	Achievement with Excellence
<p>The student submits a report that:</p> <ul style="list-style-type: none"> States the reasons why some cities fluoridate their water supplies. Describes the historical background to fluoridation of water. Describes the makeup of teeth. Describes how dental decay occurs. Explains pH and describes the effect of pH on teeth. Describes the solubility equilibria involved, including K_s values Describes issues arising due to fluoridation of water supplies. Is supported by the use of typical chemistry vocabulary, symbols, conventions and equations. Shows understanding of Level 3 chemistry. 	<p>The student submits a report that:</p> <ul style="list-style-type: none"> Explains the reasons why some cities fluoridate their water supplies. Describes the historical background to fluoridation of water. Describes the makeup of teeth. Explains how dental decay occurs. Explains pH and the effect of pH on teeth, including solubility equilibria. Explains the solubility equilibria involved, including K_s values. Explains issues arising due to fluoridation of water supplies. Has explanations integrate chemistry vocabulary, symbols, conventions and equations. Shows in-depth understanding of Level 3 chemistry. 	<p>The student submits a report that:</p> <ul style="list-style-type: none"> Comprehensively explains the reasons why some cities fluoridate their water supplies. Describes the historical background to fluoridation of water Describes the makeup of teeth. Comprehensively explains how dental decay occurs Comprehensively explains pH and the effect of pH on teeth, including solubility equilibria. Comprehensively explains the solubility equilibria involved, including K_s values. Comprehensively explains issues arising due to fluoridation of water supplies. Has consistent integration of chemistry vocabulary, symbols, conventions and equations. Shows comprehensive understanding of Level 3 chemistry.

ASSESSMENT TIPS

To achieve this standard, you need to present your report **in your own words** and **show your understanding of level 3 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!

Background

1. How did they discover the effect of fluoride on teeth?
2. How do teeth decay?
3. What is the optimal application of fluoride?
4. What is the difference between drinking fluoridated water and brushing one's teeth with fluoridated toothpaste?

Chemistry: How fluoridation works

1. Can I explain terms like 'pH', 'weak acid', 'equilibrium', 'hydroxyapatite', 'fluorapatite' and 'solubility equilibrium'?
2. Can I write equations and K_s expressions for the solubility of hydroxyapatite and fluorapatite?
3. Have I written my equations using correct chemical language (e.g. using subscripts and states)?
4. Can I use Le Chatelier's principle to explain the effect of pH on the solubility of teeth?
5. Can I use ionic product (I.P. or Q)?
6. Have I drawn my own molecules and not just copied and pasted pictures from the internet?

Advantages and disadvantages

1. Can I describe at least two positive and two negative issues associated with fluoridation?
2. Can I explain some of the interventions that are carried out to minimise harm?

TIP 2

When you read through the links or watch the videos given on *My Te Kura* or in the task, make notes using key words or phrases in your log book, CHO3031A. When you write your report, use these key words rather than the text given in the links.

TOPIC RESOURCES

FLUORIDATION OF WATER SUPPLIES

Your first source is the modules you should have completed – CHO3001, CHO3061, CHO3062.

EXTRA SOURCES FOR MORE DETAIL

GENERAL OVERVIEW

1. <https://youtu.be/XuMxAB9q92E> overview of fluoride
2. www.nidcr.nih.gov/oralhealth/topics/fluoride/thestoryoffluoridation.htm History of fluoridation
3. [www.sciencelearn.org.nz/interactive_timeline/5-muriel-bell-nutritionist fluoridation in New Zealand](http://www.sciencelearn.org.nz/interactive_timeline/5-muriel-bell-nutritionist-fluoridation-in-New-Zealand)
4. www.compoundchem.com/2014/07/22/fluoride/
5. https://en.wikipedia.org/wiki/Tooth_decay
6. https://en.wikipedia.org/wiki/Water_fluoridation
7. https://commons.wikimedia.org/wiki/File:The_fluorine_economy.svg where fluorine and fluoride is found and used.
8. <https://youtu.be/zGoBFU1q4go> Video on what causes cavities

CHEMISTRY OF FLUORIDATION (THIS SHOULD BE YOUR KEY FOCUS)

9. <http://sciencline.ucsb.edu/getkey.php?key=3252>
10. www.dentalcare.com/en-us/professional-education/ce-courses/ce410/fluoride-s-mechanism-of-action
11. www.sciencelearn.org.nz/resources/1796-bone-and-tooth-minerals useful chemistry overview (but equations have some errors)
12. www.nzqa.govt.nz/assets/scholarship/2014/93102-exm-2014.pdf Question 5. Gives detailed chemistry
13. www.nzqa.govt.nz/assets/scholarship/2014/93102-ass-2014.pdf Question 5. Gives answer to above question.
14. www.chem.wisc.edu/deptfiles/genchem/netorial/rottosen/tutorial/modules/acid-base/o4salts/salt4.htm Useful for effect of pH
15. www.cda-adc.ca/jcda/vol-69/issue-11/722.pdf More detailed report on dissolution
16. [https://americanfluoridationsociety.org/wp-content/uploads/2018/04/Jackson-lead-corrosive-wrcreport.pdf](http://americanfluoridationsociety.org/wp-content/uploads/2018/04/Jackson-lead-corrosive-wrcreport.pdf) Has detailed chemistry (beyond level 3 but examines the chemistry of some of the issues)
17. [https://nvlpubs.nist.gov/nistpubs/jres/72A/jresv72An6p773_A1b.pdf](http://nvlpubs.nist.gov/nistpubs/jres/72A/jresv72An6p773_A1b.pdf) Quite dense - so skim and scan only

ISSUES AROUND FLUORIDATION

18. www.sciencelearn.org.nz/resources/2643-hamilton-s-fluoride-debate
19. [https://factor.niehs.nih.gov/2017/10/papers/fluoride/index.htm](http://factor.niehs.nih.gov/2017/10/papers/fluoride/index.htm)
20. [https://en.wikipedia.org/wiki/Fluoride_toxicity](http://en.wikipedia.org/wiki/Fluoride_toxicity)
21. www.ncbi.nlm.nih.gov/pubmed/1617567

TOPIC RESOURCES

22. www.slweb.org/fluoridation.html lots of links both for and against fluoridation
23. <https://fluoridefree.org.nz>
24. <https://mrc.ukri.org/publications/browse/water-fluoridation-and-health/>

OTHER SOLUTIONS

25. www.theguardian.com/what-is-nano/small-world/nanotechnology-in-your-toothpaste
26. www.carefreedental.com/resources/17-nutrition/152-the-importance-of-ph-balance-in-the-mouth
27. www.oralhealthgroup.com/features/dental-remineralization-simplified/

Some links are also given in lesson 2.

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