

NZQA Approved

Internal Assessment Resource

Chemistry Level 3

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| This resource supports assessment against:  Achievement Standard 91389  Demonstrate understanding of chemical processes in the world around us |
| Resource title: Gold mining and cyanide |
| 3 credits |
| This resource:   * Clarifies the requirements of the standard * Supports good assessment practice * Should be subjected to the school’s usual assessment quality assurance process * Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic |

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| Date version published by Ministry of Education | December 2012  To support internal assessment from 2013 |
| Quality assurance status | These materials have been quality assured by NZQA.  NZQA Approved number A-A-12-2012-91389-01-6038 |
| Authenticity of evidence | Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material.  Using this assessment resource without modification may mean that students’ work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

**Internal Assessment Resource**

Achievement Standard Chemistry 91389: Demonstrate understanding of chemical processes in the world around us

Resource reference: Chemistry 3.3A

Resource title: Gold mining and cyanide

Credits: 3

Teacher guidelines

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Chemistry 91389. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the Standard and assessing students against it.

Context/setting

This activity requires students to process and interpret information to write a report that demonstrates an understanding of: the processes involved in the extraction of gold from ore using cyanide; and the consequences of the chemical processes for the environment or people involved with the chemical processes.

Conditions

The students must be given sufficient time to show their understanding.

Students will need approximately five hours of in-class and out-of-class time to process the information and write their report.

This is an individual assessment.

Resource requirements

Internet access is needed for the links provided in Resource A. Additional web links or printed information can also be given to the students.

If Internet access is not available, provide printed copies of resource material.

Additional information

None.

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| Achievement | Achievement with Merit | Achievement with Excellence |
| Demonstrate understanding of chemical processes in the world around us. | Demonstrate in-depth understanding of chemical processes in the world around us. | Demonstrate comprehensive understanding of chemical processes in the world around us. |

Student instructions

Introduction

A company wishes to mine gold in a small community. The process the company plans to use to extract the gold involves using cyanide. This assessment activity requires you to prepare a report for the local council that outlines the chemical processes involved and the effect on the environment of this extraction method.

Teacher note: The context of extraction of gold using cyanide could be substituted by other contexts involving chemical processes as suggested in the Standard.

You will be assessed on the comprehensiveness of your report and on your evaluation of the impact of, and issues that have arisen from, chemical processes.

You have <<teacher to insert time and conditions here>> of in-class and out-of-class time to individually complete this task.

Task

Write a report that demonstrates an understanding of the chemical processes involved in the extraction of gold from ore using cyanide and the consequences of the chemical processes for the environment or people involved with the chemical processes.

See Resource A for links to information that you will need to process and interpret.

Teacher note: A selection of links/resources is provided in Resource A. You may need to provide additional resources for your students as appropriate.

You will be assessed on how well your report demonstrates your understanding of the chemical processes involved in the extraction of gold using cyanide and the environmental effects of these processes.

In your report:

* describe the chemical processes involved including appropriate chemistry vocabulary, symbols, conventions and equations to give an account of the chemical processes occurring
* elaborate on the steps involved in the chemical processes
* make and explain links between chemical processes and the consequences of the chemical processes for the environment or people
* compare and contrast the links between chemical processes and their consequences.

Resource A

Links and references to information about the extraction of gold from ore using cyanide:

International Cyanide Management Code for the gold mining industry. Cyanide Facts[www.cyanidecode.org/cyanidefacts.php](http://www.cyanidecode.org/cyanidefacts.php)

Martha Mine, Waihi, New Zealand

<http://www.marthamine.co.nz>

To access the links below that contain a PDF, you may need to paste the text into your search engine and select Quick View.

Cyanide Remediation: Current and Past Technologies

<http://www.engg.ksu.edu/hsrc/95Proceed/young.pdf>

Best Practice Environmental Management in Mining

[www.ret.gov.au/resources/Documents/LPSDP/BPEMCyanide.pdf](http://www.ret.gov.au/resources/Documents/LPSDP/BPEMCyanide.pdf)

Cyanide – The Facts

[www.geology.gov.yk.ca/pdf/MPERG\_2001\_2.pdf](http://www.geology.gov.yk.ca/pdf/MPERG_2001_2.pdf)

Assessment schedule: Chemistry 91389 Gold mining and cyanide

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student demonstrates understanding of the chemical processes of chemical processes in the world around us. They do this when they write a report that:   * identifies, describes, and gives an account of the chemical processes involved in the extraction of gold using cyanide * gives chemical equations for the reactions occurring in the cyanide extraction of gold * gives chemical equations for reactions used in reducing the environmental effects of the extraction processes   The student’s account is supported by the use of chemistry vocabulary, symbols, conventions, and equations.  *The examples above relate to only part of what is required, and are just indicative.* | The student demonstrates in-depth understanding of the chemical processes involved in the world around us. They do this when they write a report that:   * explains how the chemical properties of gold and cyanide allow gold to be extracted using these processes * makes and explains the link between the chemical processes and the consequences of the chemical processes for the environment or people   for example, cyanide enters the bird’s body through inhalation, ingestion, and absorption through eyes and skin   * explains how the chemical properties of cyanide allow for its degradation by a variety of methods * links their explanations to chemical equations for the processes occurring   The student’s explanations integrate chemistry vocabulary, symbols, conventions, and equations.  *The examples above relate to only part of what is required, and are just indicative.* | The student demonstrates comprehensive understanding of the chemical processes involved in the world around us. They do this when they write a report that:   * demonstrates consistent use of chemical equations and vocabulary to analyse the chemical processes involved in the extraction of gold using cyanide * elaborates on the consequences of the chemical processes for the environment or people involved in the extraction   for example, cyanide salts are readily soluble in water so when they are inhaled they easily dissolve in the bird’s mucous membrane, leading to respiratory arrest and death   * compares and contrasts the processes used to reduce consequences of the cyanide extraction processes for the environment or people   The student has consistently integrated chemistry vocabulary, symbols, conventions, and equations.  *The examples above relate to only part of what is required, and are just indicative.* |

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.