**Production of Materials Teaching Guide.**

**Duration:**

10 weeks.

**Program:**

1. Electrochemistry

- Assessment Task 1, Practical task (10%)

1. Ethene
2. Polymers
3. Ethanol
4. Nuclear Chemistry

-Assessment Task 2, Topic test (5%)

**Assessment:**

1. Practical task: Construct a Galvanic Cell. (10%)
2. Topic test: 15 Multiple choice, 5 short answer questions. (5%)

**Safety:**

Students will be made aware that MSDS sheets are available in the labs and will be consulted before each practical activity. Any task specific safety issues will also be explicitly treated before each practical activity. Furtherinformation for safety can be found in the website resource list.

**Resources**

**Textbooks**:

Chemistry Contexts II (Irwin, Farrelly, Vitlin, & Garnett, 2006).

Classic Chemistry Experiments (Hutchings, 2000).

**Safety Information Websites**:

* Practical guidance on risk management in the laboratory.

<http://www.hse.gov.uk/education/labguide.htm>

* University of Melbourne School of Chemistry chemical safety site

<http://safety.chemistry.unimelb.edu.au/Chemsafety.php>

* Chemical safety in schools

<http://www.curriculumsupport.education.nsw.gov.au/primary/scitech/safety/index.htm>

* MSDS Australia

<http://www.msds.com.au/>

**Other Websites**:

* Caltex oil refinery

<http://www.caltex.com.au/about_facts.asp>

* Australian Institute of Petroleum

<http://www.aip.com.au/industry/fact_refine.htm>

* HSC Online

<http://www.hsc.csu.edu.au/chemistry/core/identification/chem921/chem921net.html>

* National Geographic

<http://www.nationalgeographic.com/index.html>

* Chemical of the week

<http://scifun.chem.wisc.edu/CHEMWEEK/chemweek.html?>

* Nuclear Chemistry

<http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch23/history.php>

* The Living Textbook of Nuclear Chemistry

<http://livingtextbook.oregonstate.edu/>

* Experiments in Electrochemistry

<http://www.funsci.com/fun3_en/electro/electro.htm>

* All about Electrochemistry

<http://www.chem1.com/acad/webtext/elchem/>

* Biopolymers

<http://www.biopolymer.net/>

* American Coalition for Ethanol

<http://www.ethanol.org/>

* How stuff works

<http://www.howstuffworks.com/>

* Radioactivity and radioisotopes

<http://www.ndtd.org/EducationResources/HighSchool/Radiography/radioactivity.htm>

* CLI resources for production of materials

<http://www.lmpc.edu.au/c_linkList.php?KLA=Science&LEVEL=Stage%206%20Chemistry&CFRAME=Production%20of%20materials>

* University of Sydney Uniserve science

<http://science.uniserve.edu.au/school/curric/stage6/chem/material.html>

* OTEN online

<http://www.lmpc.edu.au/smallFrameset.php?KLA=Science&LEVEL=Stage%206%20Chemistry>

* The discovery of radioactivity : The Dawn of the Nuclear Age

<http://www.accessexcellence.org/AE/AEC/CC/radioactivity.html>

* Radioisotopes in medicine

<http://www.uic.com.au/nip26.htm>

* information about various polymers  
  <http://www.psrc.usm.edu/macrog/floor2.htm>
* How polymers are made

<http://www.psrc.usm.edu/macrog/floor4.htm>

* The Uses We Make of Polymers

<http://www.psrc.usm.edu/macrog/floor1.htm>

* All About Polythene

<http://www.psrc.usm.edu/macrog/pe.htm>

* All About Most of the Polymers in the Syllabus

<http://www.psrc.usm.edu/macrog/vinyl.htm>

* All about biomass

<http://www.repp.org/articles/static/1/988040477_6.html>

**Glossaries**

Students should be encouraged to keep a glossary of terms in their workbooks. Definitions for words in this topic, along with other senior chemistry topics, can be found in the CLI glossary of terms for senior chemistry at:

<http://www.lmpc.edu.au/resources/science/glossaryChemistry/default.html>

**Syllabus verbs** need explicit treatment and students should be given a list similar to the one that follows:

**Glossary of Verbs**

* Account: Account for: state reasons for, report on. Give an account of: narrate a series of events or transactions
* Analyse: Identify components and the relationship between them; draw out and relate implications
* Apply: Use, utilise, employ in a particular situation
* Appreciate: Make a judgement about the value of
* Assess: Make a judgment of value, quality, outcomes, results or size
* Calculate: Ascertain/determine from given facts, figures or information
* Clarify: Make clear or plain
* Classify: Arrange or include in classes/categories
* Compare: Show how things are similar or different
* Construct: Make; build; put together items or arguments
* Contrast: Show how things are different or opposite
* Critically (analyse/ evaluate): Add a degree or level of accuracy depth, knowledge and understanding, logic, questioning, reflection and quality to (analysis/evaluation)
* Deduce: Draw conclusions
* Define: State meaning and identify essential qualities
* Demonstrate: Show by example
* Describe: Provide characteristics and features
* Discuss: Identify issues and provide points for and/or against
* Distinguish: Recognise or note/indicate as being distinct or different from; to note differences between
* Evaluate: Make a judgement based on criteria; determine the value of
* Examine: Inquire into
* Explain: Relate cause and effect; make the relationships between things evident; provide why and/or how
* Extract: Choose relevant and/or appropriate details
* Extrapolate: Infer from what is known
* Identify: Recognise and name
* Interpret: Draw meaning from
* Investigate: Plan, inquire into and draw conclusions about
* Justify: Support an argument or conclusion
* Outline: Sketch in general terms; indicate the main features of
* Predict: Suggest what may happen based on available information
* Propose: Put forward (for example a point of view, idea, argument, suggestion) for consideration or action
* Recall: Present remembered ideas, facts or experiences
* Recommend: Provide reasons in favour
* Recount: Retell a series of events
* Summarise: Express, concisely, the relevant details
* Synthesise: Putting together various elements to make a whole

**Writing scientifically** is also important in this stage of learning and students should be given opportunities to practice writing in the following text types typically found in science:

* Reports
* Explanations
* Discussions
* Procedures
* Exposition
* Recounts

**Sampled Lesson Strategies:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Lesson** | **Content** | **Teaching strategy** | **Would suit this type of learner…** | **QT focus** | | |
| **I.Q.** | **Q.L.E.** | **Sig.** |
| **1** | Metal displacement reactions:  Direct instruction is used to introduce the topic. Small group work to perform the experiment. | Direct instruction  Small group work | Logical/mathematical  Visual  Kinaesthetic  Interpersonal | DK  PK  M  SC | EQC  ENG  SS  SSR | BK  KI  INC |
| **4&5** | Application and Investigation of different power cells:  Students use the library or internet to find information and present to each other | Student Research  Co-operative learning | Verbal/Linguistic  Interpersonal | DK  DU  PK  HOT  M  SC | ENG  HE  SSR  SD | BK  KI  INC  CON  NAR |
| **12** | Identify important commercial monomers.  Students can design their own HSC style questions of work covered so far and assess each other. | Problem solving  Co-operative learning | Verbal/Linguistic  Interpersonal  Visual-Spatial | DK  PK  HOT  M | EQC  ENG  HE  SD | INC  CON |
| **20&22** | Discuss the importance of ethanol as a renewable fuel.  Students research the pros and cons and debate the issue in class. | Student Research  Case study  Discussion | Verbal/Linguistic  Interpersonal  Visual-Spatial  Intrapersonal | DK  DU  HOT  M  SC | EQC  ENG  HE  SS  SD | BK  CK  KI  INC  CON |
| **29** | Identify a radioisotope used in industry or medicine.  Students discuss the impacts of the nuclear industry on society. | Discussion | Verbal/Linguistic  Interpersonal  Intrapersonal | DK  DU  PK  HOT  M  SC | ENG  SS  SD | BK  CK  KI INC CON NAR |

Notes.

These sampled lessons are indicators of the range of strategies that can be employed in this topic. It is not exhaustive, and may not be suitable in all situations. Class size, composition and dynamics are factors that may determine the particular strategy chosen. These examples demonstrate the need for learners to be exposed to a variety of styles and strategies to motivate and extend the student beyond the comfort zones of teacher directed learning.

**References**

BOS, (2002). *Chemistry: Stage 6 syllabus.* Sydney: Board of Studies NSW.

Hutchings, K. (2000). *Classic chemistry experiments*. London: The Royal Chemistry Society.

Irwin, D., Farrelly, R., Vitlin, D., & Garnett, P. (2006). *Chemistry contexts 2 HSC* (2nd ed.). Melbourne: Pearson Education Australia.