

簡介

運用資訊科技進行互動學習能配合課堂內外的學與教策略，可讓學生在互動的情況下，自行掌握學習內容和怎樣學習。適當地運用資訊科技的教學資源，既可加強學生對化學概念和過程的理解，亦能發展他們的資訊科技能力，對終身學習裨益良多。新修訂中六級化學課程提供了很多運用資訊科技的機會，有助促進學生學習。

- ◆ 立體電腦圖像〔例如以蛋白質數據庫（PDB）和虛擬現實模型語言（VRML）格式貯存的檔案〕有助學生觀察分子的形狀及其化學結構。通過旋轉圖像，可從不同角度觀看，就像觀看真實的模型一樣。
- ◆ 動畫能幫助學生掌握抽象的化學概念和過程，尤其在分子層面上，例如有機化學的各類概括機理。
- ◆ 利用電腦模擬可製作化學體系（例如在平衡狀態下的可逆反應）模型。學生可自行決定改變體系的一些變項以完成指定的任務。學生可在很短時間內進行多個模擬實驗，從而找出變項間之關係。有效的模擬能幫助學生觀察自然現象和掌握科學原理。
- ◆ 試算表可用來進行實驗數據分析和作圖，亦可用來製作化學體系模型，讓學生就其作出的推測加以探究。如此可將學生的知識推展至超越重複計算及以數據作圖的層次。
- ◆ 數據收集器和傳感器可用來收集化學實驗中的數據並作圖。數據包括溫度、pH、吸光度和氣壓等。數據收集器尤其適用於需時很長或很短的實驗，以及須同時收集多組數據的實驗。有了數據收集器的幫助，學生便有更多時間來分析、討論和評價實驗的結果。
- ◆ 數碼錄像能讓學生無須重複進行實驗，亦可重溫實驗現象和實驗技巧，而且還可用來演示不適宜在學校實驗室進行的危險或高難度實驗。
- ◆ 互聯網讓學生獲得課本以外的可靠新資訊，有助他們掌握概念、獲取知識、觀察和發掘學校以外的世界。
- ◆ 協作學習平台，例如 Knowledge Forum 和 CMapTools，為學生提供通過交換觀點和意見來建立知識的環境。
- ◆ 網上評估工具，例如 Hot Potatoes 製作的評估工具，可為學生提供即時回饋，有助學生及早釐清所學的概念。
- ◆ 網上學習資源和多媒體光碟可支援教師在課堂教授某些課題，亦可讓學生因應各自的進度進行學習。

活動 #1-6 提供了運用資訊科技進行互動學習化學的示例。下面是一些相關的網址，以供參考。

化學結構圖像

Alphabetical Listing of Molecules

 <http://www.wellesley.edu/Chemistry/Flick/molecules/newlist.html>

Explore the Fullerenes

 <http://buckminster.physics.sunysb.edu>

Image Gallery, the Smalley Group, Rice University

 http://smalley.rice.edu/smalley.cfm?doc_id=4866

Orbitron, University of Sheffield

 <http://www.shef.ac.uk/chemistry/orbitron>

Making Matter: the Atomic Structures of Materials

 <http://www.ill.fr/dif/3D-crystals/index.html>

Molecular geometry: VSEPR

 <http://www.shef.ac.uk/chemistry/vsepr/jmol/intro.html>

Molecular Modeling, Viewing and Drawing Programs

 <http://ep.llnl.gov/msds/dvc/viewrs.html>

Nanotechnology Now

 <http://www.nanotech-now.com/nanotube-buckyball-sites.htm>

Valence-Shell Electron-Pair Repulsion Model

 <http://www.chm.davidson.edu/vsepr/vsepr.html>

Visualization and Problem Solving for General Chemistry, Purdue University

 <http://www.chem.purdue.edu/gchelp/>

What Is VSEPR?

 <http://www.chem.purdue.edu/gchelp/vsepr/>

虛擬實境模型語言物體

 http://www.hkedcity.net/iclub_files/a/1/182/webpage/vr_3d/vrml/index.htm

互動式 3D 分子模擬網

 <http://home.kimo.com.tw/chemweb100/index.html>

化學科輔導團

 <http://venus.hpsh.tp.edu.tw/~chem/vsepr/orbital.html>

動畫

Animated Atoms, Tanner's General Chemistry

 <http://www.tannerm.com>

Chemistry Animations, University of Nebraska-Lincoln

 <http://chemmovies.unl.edu/ChemAnime/index.htm>

Chemistry Animations, Louisiana State University

 http://www.chem.lsu.edu/htdocs/people/jchogan/CHEM_1201/animation_links.html

Chiral Molecules, Nobel Prize Chemistry 2001

 <http://nobelprize.org/chemistry/educational/poster/2001/game.html>

Computer Animations and Simulations in General Chemistry

 <http://www.science.uwaterloo.ca/~cchieh/cact/trios/simulation.html>

Flash Animations, Raymond Chang

 <http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/flash.mhtml>

Infra-red Absorption Spectroscopy

 <http://www.shu.ac.uk/schools/sci/chem/tutorials/molspec/irspec1.htm>

Organic Online: Mechanism Movie, Chime Molecules

 <http://www.jbpub.com/organic-online/webhome.htm>

The Poon-Mundy Computer Demonstrations

 <http://www.colby.edu/chemistry/OCHEM/demoindex.html>

多媒體元件素材

 <http://www.yeschool.net/phd/file/RJSC/Menu.htm>

中國內地的化學教育資源

 <http://resources.ed.gov.hk/chemistry>

動感課堂

 <http://www.hongen.com/edu/dgkt/index.htm>

中學化學教學資源網站

 <http://www.yeschool.net/phd/file/RJSC/FLASH/>

模擬

ChemLand, University of Massachusetts

 <http://colossus.chem.umass.edu/bvining/downloads/chemland2>

Chemistry Experiment Simulations, Iowa State University

 <http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/animationsindex.htm>

Chemistry Experiments and Exercises, David N. Blauch, Davidson College

 <http://www.chm.davidson.edu/ChemistryApplets>

Electromagnetic Spectrum Calculator

 <http://lectureonline.cl.msu.edu/~mmp/applist/Spectrum/s.htm>

ICT resources to support Chemistry teaching for the 11-19 age range, Royal Society of Chemistry

 <http://www.chemit.co.uk/pageshow.aspx?PageID=43&selection=1>

Interactive Organic Reaction Mechanism, Oxford University

 <http://www.chem.ox.ac.uk/vrchemistry/iom>

Interactive Spreadsheet Demonstrations for Introductory, Inorganic, Analytical and Physical Chemistry

 <http://www.wellesley.edu/Chemistry/chem120/sheets.html>

Iodine Clock Reaction, Gary L. Bertrand, University of Missouri-Rolla

 <http://web.umr.edu/~gbert/IClock/IClock.html>

Journal of Chemical Education WebWare: Open Review Collection

 <http://www.jce.divched.org/JCEDLib/WebWare/collection/open/index.html>

Using Excel Spreadsheets to model Equilibria within A Level Chemistry

 <http://ferl.becta.org.uk/display.cfm?resID=2699>

Virtual chemistry lab for acid-base titration

 http://lrs.ed.uiuc.edu/students/mihyewon/chemlab_experiment.html

Maxwellian Velocity Distribution, University of Oregon

 <http://jersey.uoregon.edu/vlab/Balloon/index.html>

Web Experiments, Dr Nutt's CHE 115 Course, Davidson College

 http://www.chm.davidson.edu/ronutt/che115/che115_2.htm

互動週期表

Atomic and Emission Spectra of Elements, University of Oregon

 <http://jersey.uoregon.edu/vlab/elements/Elements.html>

Periodic Table, American Chemical Society

 http://www.chemistry.org/portal/a/c/s/1/acsdisplay.html?DOC=sitetools%5Cperiodic_table.html

Periodic Table with Electronic Configurations, ChemCollective

 <http://www.chemcollective.org/applets/pertable.php>

David's Whizzy Periodic Table

 <http://www.colorado.edu/physics/2000/applets/a2.html>

Internet Activity: The Periodic Table Comic Book

 http://www.phschool.com/atschool/chemistry/AW/Student_Area/AWCHEM_S C14_ACT_index.html

Visual Elements of Periodic Table, Royal Society of Chemistry

 http://www.chemsoc.org/viselements/pages/periodic_table.html

Pictorial Periodic Table

 <http://chemlab.pc.maricopa.edu/periodic/default.html>

Periodic Table

 <http://www.ch.cam.ac.uk/SGTL/elements/>

Spectra of Gas Discharges

 <http://perso.enstimac.fr/~latailla/java/spectre/>

WebElement Periodic Table

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

化學元素週期表

 http://www.phy.ntnu.edu.tw/demolab/JavaScript/s_pertab.html

錄像

Chemistry Film Studio

 <http://www.chem.ox.ac.uk/vrchemistry/FilmStudio/fshome.htm>

Delights of Chemistry, University of Leeds

 <http://www.chem.leeds.ac.uk/delights>

Experiments on the Web, Swiss Federal Institute of Technology Zurich

 <http://www.cci.ethz.ch/index.html>

Organic Chemistry Demonstration Experiments on Video Chemistry Visualized

 http://www.uni-regensburg.de/Fakultaeten/nat_Fak_IV/Organische_Chemie/Didaktik/Keusch/D-Video-e.htm

高中化學教學諮詢網

 <http://www.chemedu.ch.ntu.edu.tw/main.htm>

網上導修

Chemistry Homework Help, Oakland Community College

 http://www.occ.cc.mi.us/iic/iicah/ah_www_che.htm

Tutorial Materials and Resources by Professor Gary L. Bertrand

 <http://web.umr.edu/~gbert/links.html>

Organic Chemistry Online

 <http://www.chem.uic.edu/web1/OCOL-II/WIN/HOME.HTM>

Basic Organic Nomenclature, Okanagan University College

 <http://www.sci.ouc.bc.ca/chem/nomenclature/nom1.htm>

Chemguide

 <http://www.chemguide.co.uk>

學習加油站－高中化學教材資源中心－教材單元

 http://content1.edu.tw/query/resource.do?category=content.htm&position=/senior/chemistry/tp_sc/&position1=/senior/chemistry