

Learning, teaching and assessment resources and strategies for Chemistry

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Science Education Section, EDB

Teaching strategies / learning activities

- Practical activities / experimental demonstrations
- Flipped learning
- Peer discussion (with the use of clickers)
- e-Learning tools (computer simulations, Google Form, multimedia production tools, etc.)

Chemistry demonstrations

- spectacular, stimulating and motivating
- facilitate interpretation of observations and experimental data
- facilitate application of knowledge/understanding to solve problems

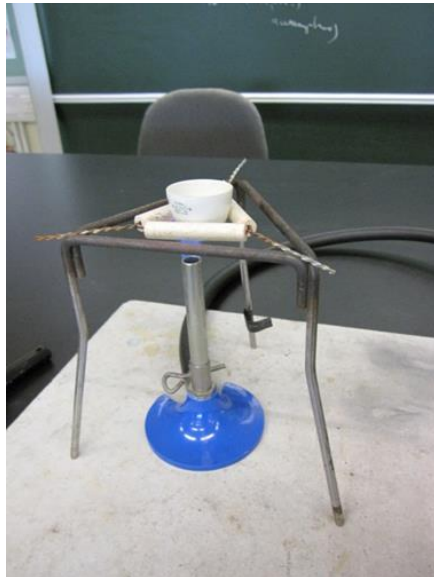
Reaction between Zn(s) and CuO(s)



<https://youtu.be/9qfluTAIsPU>

Practical activities

- Pre-lab assignments, post-lab data analyses and discussion
- Taking video/photo of students' practical work for discussion, revision, evaluation, assessment...



Decomposition of baking soda

Possible chemical equations

sodium hydrogencarbonate (s) →
sodium hydroxide (s) + carbon dioxide (g)

sodium hydrogencarbonate (s) →
sodium oxide (s) + carbon dioxide (g) + water (g)

sodium hydrogencarbonate (s) →
sodium carbonate (s) + carbon dioxide (g) + water (g)

Evaporation and intermolecular attractions



Pre-lab exercise

1. Complete the following table.

Substance	Formula	Structural Formulae	Molecular Mass	Existence of Hydrogen Bond (Yes or No)
Ethanol	$\text{C}_2\text{H}_5\text{OH}$			
Propan-1-ol	$\text{C}_3\text{H}_7\text{OH}$			
Butan-1-ol	$\text{C}_4\text{H}_9\text{OH}$			
Pentane	C_5H_{12}			
Hexane	C_6H_{14}			

2. (a) Predict which of the alcohols above will give the greatest temperature change in evaporation.

(b) Predict which of the alkanes above will give the greatest temperature change in evaporation.

Substance	Temperature decrease ($^{\circ}\text{C}$)
Ethanol	9.1
Propan-1-ol	6.4
Butan-1-ol	3.3
Pentane	16.2
Hexane	13.9

Flipped learning approach

	Non-flipped approach	Flipped approach
Before class		Teachers instruction in terms of videos Assignments
During class	Teacher instruction Classwork Peer discussion	Follow-up instruction Classwork / Assignments Peer discussion
After class	Assignments	

Chemical Naming

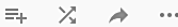
2. **Metal** which can be in different charges

- Cation is always named first and the anion second.
- Cation: the name of the element.
Include a Roman numeral to indicate the charge on the cation.
- Anion: taking the first part of the element name and adding the letters "ide".
- Combine the names of the ions.

The rules of n... [PLAY ALL](#) are listed below, which are... [View more](#)

Chemistry teaching videos - Chinese narrative and English subtitle

13 videos • 213 views • Last updated on Feb 26, 2018




This is a collection of instructional video clips ranging from concepts and skills related to "formula and chemical equation", reactions of metals, as well as redox reactions in chemical cells. The clips are suitable for the use of secondary four chemistry students.

這是一系列學習短片，涵蓋與「方程式和反應式」、金屬的反應，以及化學電池中的氧化還原反應相關的概念和技能。這些短片適合中學四年級修讀化學科的學生使用。


All the video clips are presented in Cantonese with English captions.

所有短片均採用粵語和英文字幕。

 chemistry edb


SUBSCRIBE

1

17:13


01 Chemical formula and chemical name (Cantonese narrative and English subtitle)
chemistry edb

2

8:59


02 Criss cross rule (Cantonese narrative and English subtitle)
chemistry edb

3

9:45


03 Word equation (Cantonese narrative and English subtitle)
chemistry edb

4

13:48


04 Balancing equation (Cantonese narrative and English subtitle)
chemistry edb

5

4:47


04 Exercise – Balancing equation (Cantonese narrative and English subtitle)
chemistry edb

6

14:15


05 Reactivity of metals and displacement
chemistry edb

7


11:16

05 Exercise Reactivity of metals and displacement
chemistry edb

8


10:06

06 Ionic equation (Cantonese narrative and English subtitle)
chemistry edb

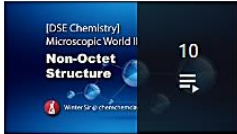


Winter Sir ChemChemDay
4.22K subscribers


HOMEVIDEOSPLAYLISTSCOMMUNITYCHANNELSABOUT




Created playlists




[DSE Chem] 自學影片 Microscopic World II
Non-Octet Structure
10
VIEW FULL PLAYLIST




[DSE Chem] 自學影片 Acids and Bases
Common acids and alkalis in daily life and in the laboratory
10
VIEW FULL PLAYLIST




[DSE Chemistry] 廣東話 Microscopic World I
Chemical Bondings
7
VIEW FULL PLAYLIST



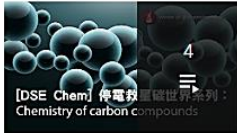
Past Paper 題解系列 Chemical Equilibrium
11
VIEW FULL PLAYLIST




[DSE Chem] 停電數量：速戰速決系列
Rate of Reaction
3
VIEW FULL PLAYLIST



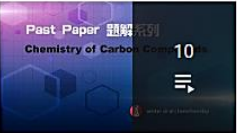
[DSE Chemistry] 停電數量、考前義章系列：Redox reaction,....
10
VIEW FULL PLAYLIST




[DSE Chem] 停電數量碳世界系列：Chemistry of carbon...
4
VIEW FULL PLAYLIST




[DSE Chem] Past Paper 題解系列：Metals
11
VIEW FULL PLAYLIST




Past Paper 題解系列 Chemistry of Carbon...
10
VIEW FULL PLAYLIST



[DSE Chem] 自學影片 Metals
17
VIEW FULL PLAYLIST



Past Paper 題解系列 Acids and Alkalis
15
VIEW FULL PLAYLIST

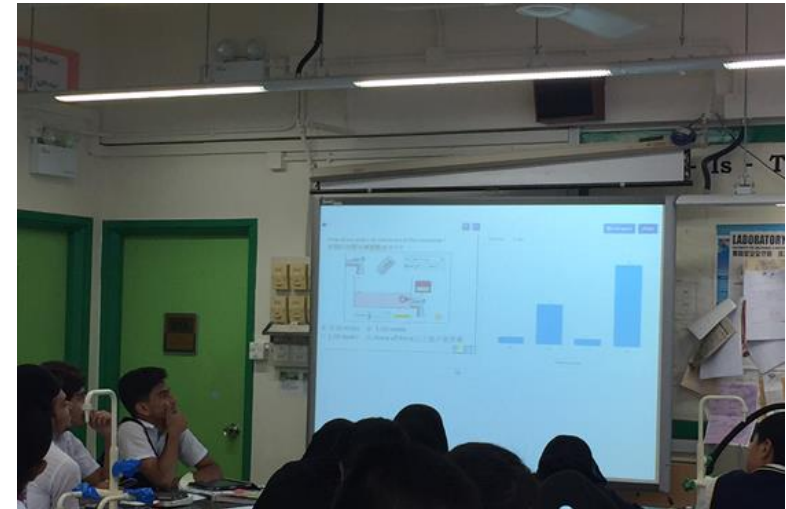
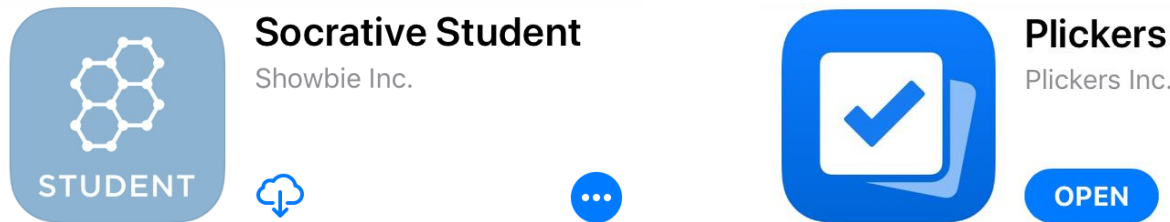


Silicon
Chemistry of Carbon Compounds
16
VIEW FULL PLAYLIST

Instruction videos in Chemistry

Concept test & peer discussion with the use of clickers

- What is clickers / personal response system?
 - Allow students to give personal response anonymously in a class
 - Rapidly collect students' answers and provide immediate analysis and display of the students' feedback

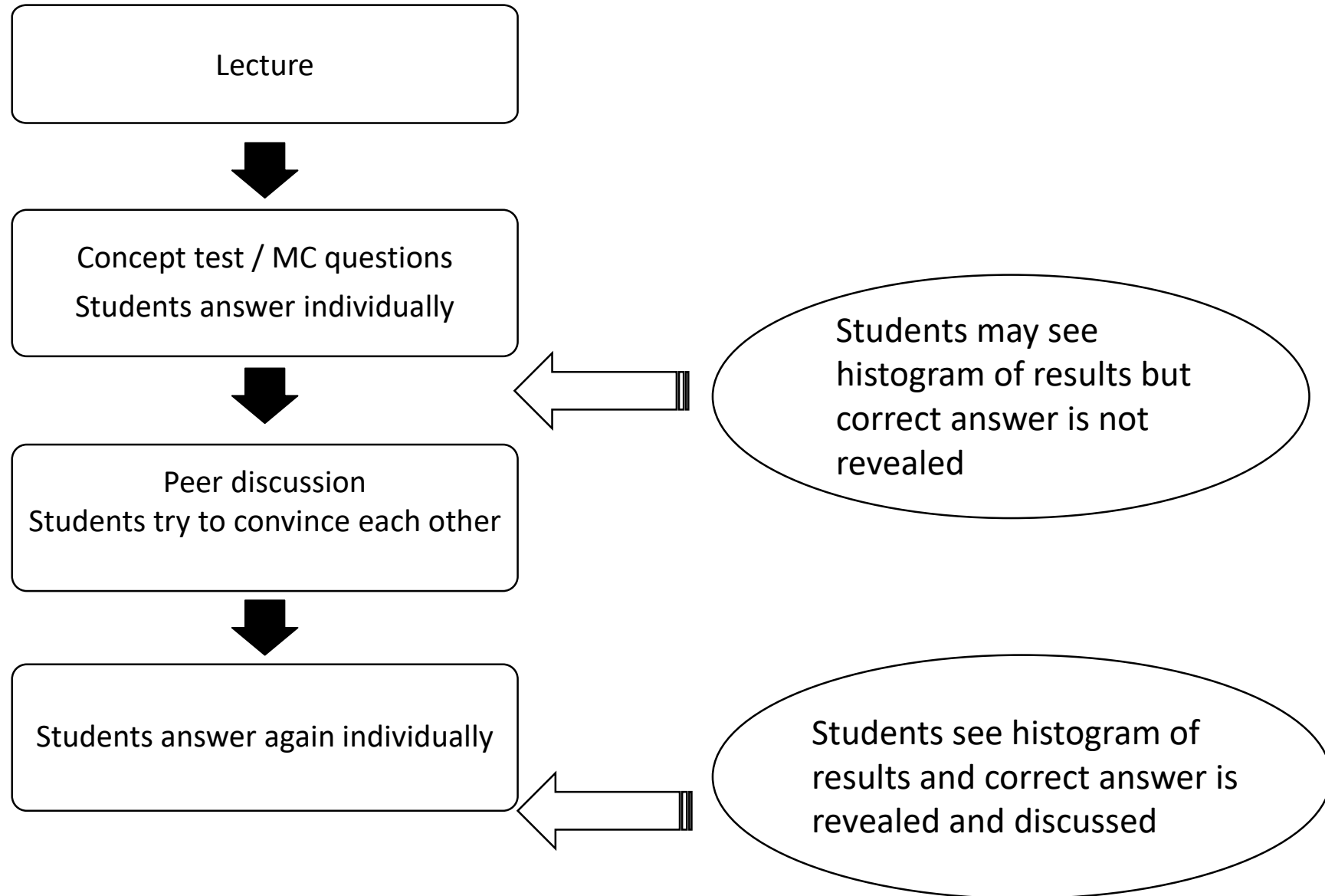


Concept test

0.01 mole of each of the following compounds is added to 1 dm³ of water. Which one will produce a solution with the highest pH value?

1. SiO₂(s)
2. Na₂O(s)
3. Cl₂O(g)
4. SO₂(g)
5. KOH(s)

Pedagogy with the use of clickers



What factors are key to making clickers work

- Peer discussion – encourage students to verbalize their thinking, figure out what they understand and what they have questions about.
- Use questions sufficiently challenging with multiple plausible answers
- Teacher's explanation on the answers after second vote

Benefits of clicker usage

- Allow students to have formative assessments of their learning without penalty to their grade
- Clarify student misconceptions when discussing wrong choices selected by students
- Engage all students, including those with lower motivation and lower learning ability

When to use...

- Right after teaching
- Revision
- Post quiz / examination debriefing
- Checking prior understanding

Annotated assessment items

- Chemical structure and properties
- Organic chemistry
- Chemical reactions and energy
- Rate of reaction
- Chemical equilibrium

9. Which of the following statement(s) about the reaction of propene with bromine is/are correct?

- (i) The reaction does not occur in darkness.
- (ii) Both substitution and addition reactions occur.
- (iii) The color of the reaction mixture fades.

- (1) (i) only
- (2) (iii) only
- (3) (i) and (iii) only
- (4) (ii) and (iii) only**
- (5) (i), (ii) and (iii)

Annotation:

This question checks if the student could differentiate the addition reaction of alkene from the substitution reaction of alkane.

Option (i) is incorrect. Student probably mixes up the concept of addition and substitution. Propene, an alkene, is already reactive enough to undergo the reaction even in the darkness with bromine, therefore light is not required in this reaction and it does occur in darkness.

Option (ii) is correct. Some students do not realize that the fact that an alkene can react with bromine by both addition reaction and substitution reaction, whereas alkane can react with bromine only by substitution reaction.

Option (iii) is also correct as bromine will be consumed in the reaction. Therefore, choice (4) is the correct answer.

substitution



addition



Implementing e-Learning strategies to enhance Chemistry Learning, Teaching and Assessment

青年與資訊網絡科技意見調查：青年使用 智能手機情況

- 六成七（67.3%）受訪青年全日24小時長開智能手機
- 每日平均花3.5小時在使用手機上
- 接近一成（9.7%）青年無法容忍一天不使用智能手機
- 逾七成（71.3%）青年入睡前會使用智能手機
- 五成（49.9%）及逾四成（42.8%）於食飯時和如廁時仍然使用
- 半數（49.5%）認為不帶手機比不帶錢更乏安全感

(資料來源：香港青年協會青年研究中心(07/11/2013))

青年與資訊網絡科技意見調查：青年網上學習

- 每星期用 8.3 小時網上學習
- 近四成半學語文，其次是學術科目和生活興趣。
- 接近三成三 (32.6%) 青年透露，他們於網上學習時遇到最大的困難是容易分心，逾兩成 (20.6%) 則表示看不明網上資料。
- 過半數 (54.3%) 認為是方便搜集資料，其次是有助提升學習能力 (30.2%) 及學習不受時空限制 (29.6%)。

(資料來源：香港青年協會青年研究中心(02/10/2013))

青年與資訊網絡科技意見調查：青年電子閱讀

- 絕大部分均有運用數碼產品進行電子閱讀
- 智能手機最普遍 (75.2%)，其次分別是桌面電腦 (43.2%) 及平板電腦 (40.0%)
- 每人每日平均花 86 分鐘進行電子閱讀
- 七成 (70.6%) 受訪者認為可以擴闊閱讀範圍
- 六成 (62.2%) 認為增加了閱讀數量
- 受訪青年主要在閒暇休息 (40.0%)、乘車途中 (39.4%)，或睡前 (32.0%) 作電子閱讀

(資料來源：香港青年協會青年研究中心(17/7/2014))

Learning, Teaching and Assessment in Chemistry

The use of e-tools

- Google Form
- Edpuzzle
- PhET Simulation

Flipped Classroom in Chemistry Learning

1

Pre-lesson

- e-quizzes
- In-video Quizzes

“Google Form”
“Edpuzzle”

2

Set

- Reviewing e-quizzes

3

In-lesson

- Challenging tasks
- Simulation
- Expt.
- ...

陽離子的定性分析 - Self-paced learning

<http://goo.gl/forms/OWZozyslAb>



Example:

Lesson Plan - Shapes of Molecules

Time (mins)	Lesson activity
1 Pre-lesson	<u>Google Form</u> Post 6 Qs related to chemical bonding and shape to Ss
2 10 mins <u>Set:</u>	<u>Google Form (Google analytics)</u> Discuss and explain the misconceptions
3 30 - 60 mins <u>In-lesson:</u>	<u>Lesson note + paper based in-class exercise</u> <u>Simulation</u> <ul style="list-style-type: none">• Shapes of molecules• Electronegativity in a molecule <u>Demonstration</u> <ul style="list-style-type: none">• Deflection of water jet under charged rod

①

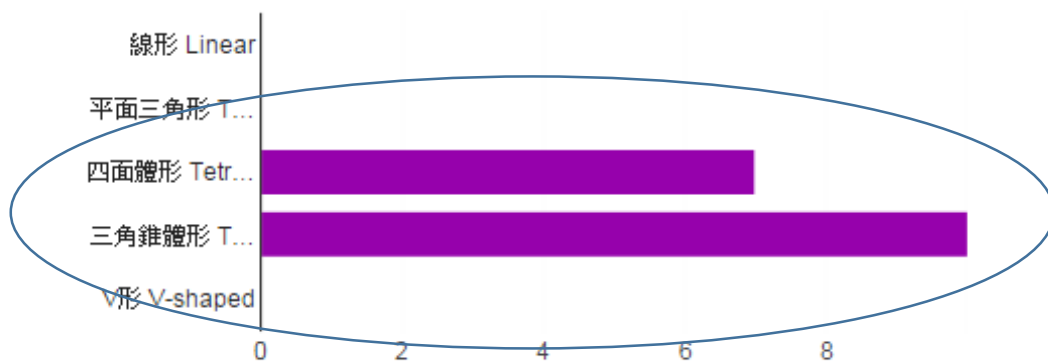
Google Form

化學鍵、吸引力和分子形狀

2

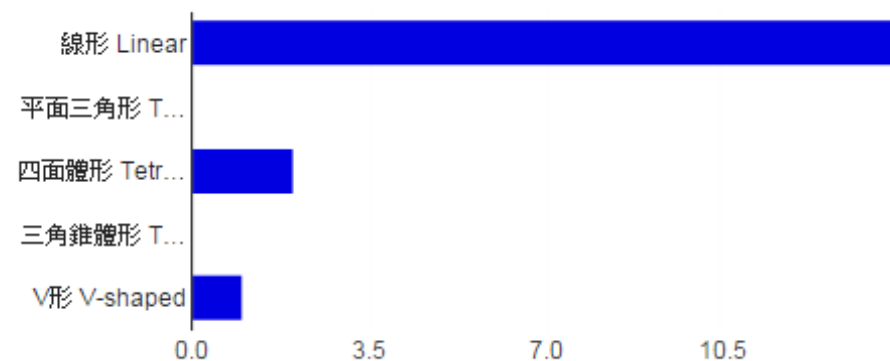
Google Analytics

POCl₃ [6. 配對：分子和分子形狀]



線形 Linear	0	0%
平面三角形 Trigonal Planar	0	0%
四面體形 Tetrahedral	7	41.2%
三角錐體形 Trigonal Pyramidal	10	58.8%
V形 V-shaped	0	0%

CS₂ [6. 配對：分子和分子形狀]



線形 Linear	14	82.4%
平面三角形 Trigonal Planar	0	0%
四面體形 Tetrahedral	2	11.8%
三角錐體形 Trigonal Pyramidal	0	0%
V形 V-shaped	1	5.9%



In lesson:

- PhET Simulation – “Shapes of molecules”
- Chemical Demonstration

3

Learning, Teaching and Assessment in Chemistry

The use of e-tools

- Google Form
- Edpuzzle
- PhET Simulation

1



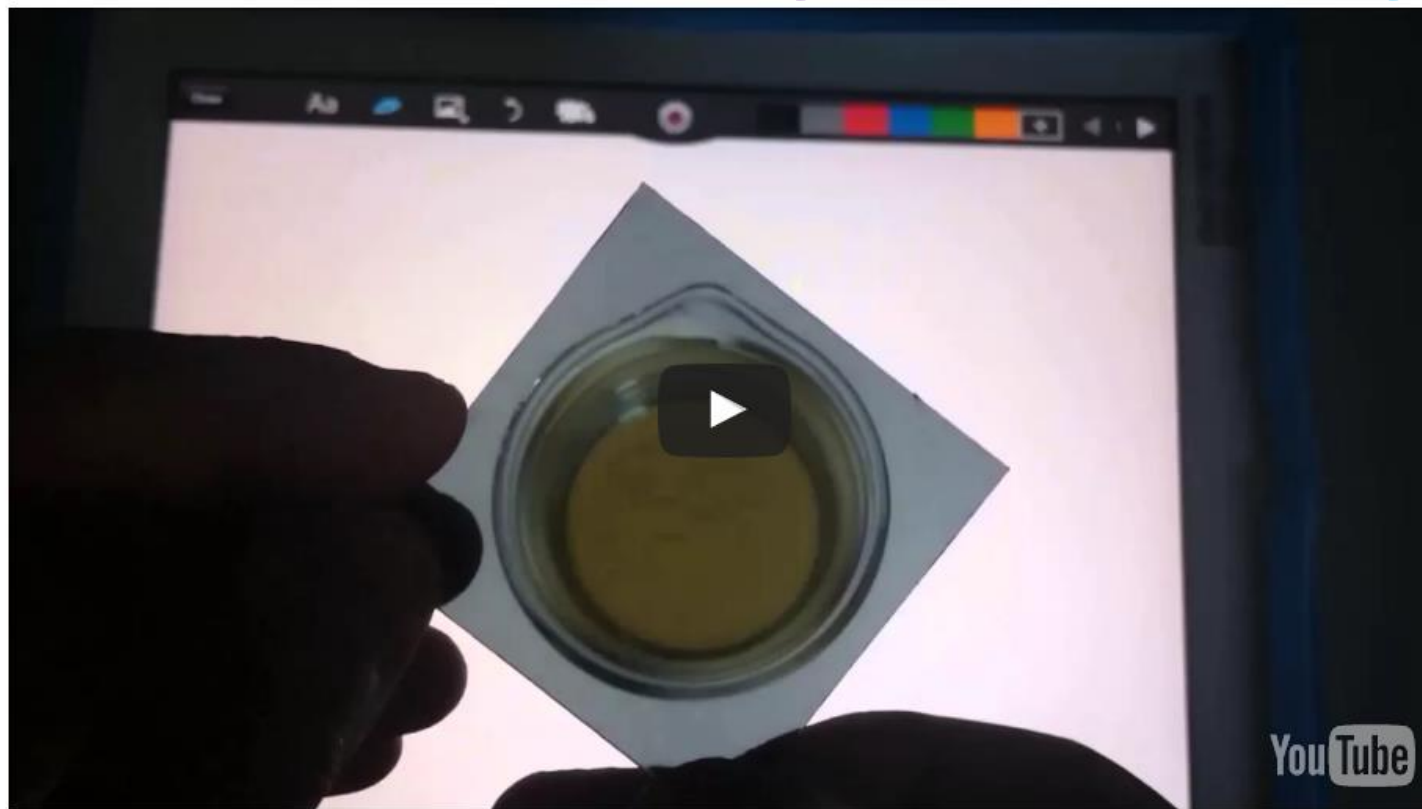
Voice-over



Audio note



In-video quiz



Why crop a video?
Explain only what you need.

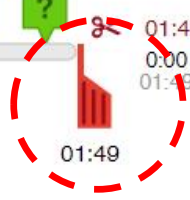
[Show me how](#)

Suitable for
experimental type
questions

(e.g. spotting
observable changes /
precautions in
experiments /
probing **WRONG**
practices in
experiments)

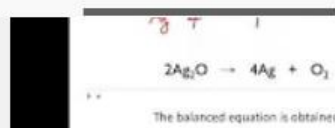


Video trimming



1

chem edb



3:44

04 Exercise – Balancing equation (English narrative and subtitle)

26 views • 3 months ago



We now have 4 Na atoms on the right, so we have to multiply the numbers of Na atoms on the left by 4.

9:44

04 Balancing equation (English narrative and subtitle)

49 views • 3 months ago

Written in word equations

7:54

03 Word equation (English narrative and subtitle)

40 views • 3 months ago

Then "2-" for Group VI ions and "1-" for Group VII ions.

8:35

02 Criss cross rule (English narrative and subtitle)

50 views • 3 months ago

Chemical Naming

2. Metal which can be in different charges
 - > Cation is always named first and the anion second.
 - > Cation: the name of the element
 - > Include a Roman numeral to indicate the charge on the cation.
 - > Anion: taking the first part of the element name and adding the letters "ide".
 - > Combine the names of the ions.

The rules of naming such compounds are listed below which are similar as the above.

17:09

01 Chemical formula and chemical name (English narrative and subtitle)

110 views • 3 months ago

英



1:55

Reaction between zinc and copper(II) oxide

74 views • 3 months ago

How to use EdPuzzle

如何使用EdPuzzle

E. Kwong

9:01

How to Use EdPuzzle in Teaching

85 views • 3 months ago

How to use Flubaroo in Google Forms

如何在Google Forms 使用Flubaroo

E. Kwong

6:58

02 How to Use Flubaroo with Google Forms

49 views • 3 months ago

How to use Quizzes in Google Forms

如何在Google Forms 使用Quizzes

E. Kwong

6:55

03 Google Forms with Quizzes

38 views • 3 months ago

How to set questions in Google Forms

如何在Google Forms編輯題目

E. Kwong

13:27

01 Google Forms Set Questions

121 views • 3 months ago

Question 1

	W	X	Y	Z
W ²⁺ (aq)				
X ²⁺ (aq)				
Y ²⁺ (aq)				
Z ²⁺ (aq)				

As mentioned above, we are asked to find out the strongest reducing agent, the species that is oxidized most readily.

3:43

08 Exercise Simple redox reaction (Cantonese narrative and subtitle)

12 views • 3 months ago

Common Chemical Reactions of Metal

Written in word equations

9:45

03 Word equation (Cantonese narrative and English narrative and subtitle)

20 views • 3 months ago

Flipped Learning using simulations

3

Why use simulations in chemistry learning and teaching?

- To visualise molecular events in a reaction / chemical interactions
- To simulate the results of chemistry experiments (NOT to replace experiments)

E.g. PhET Simulations - “Reactions and rates”



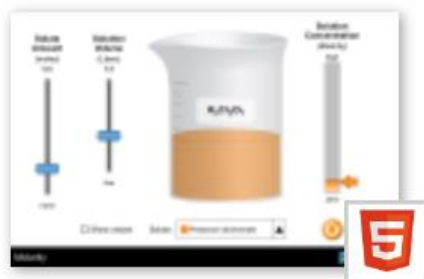
Lasers



Microwaves



Models of the
Hydrogen Atom



Molarity



Molecule Polarity



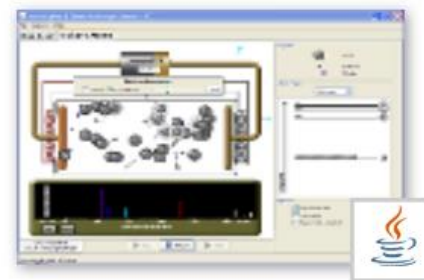
Molecules and Light



Molecule Shapes

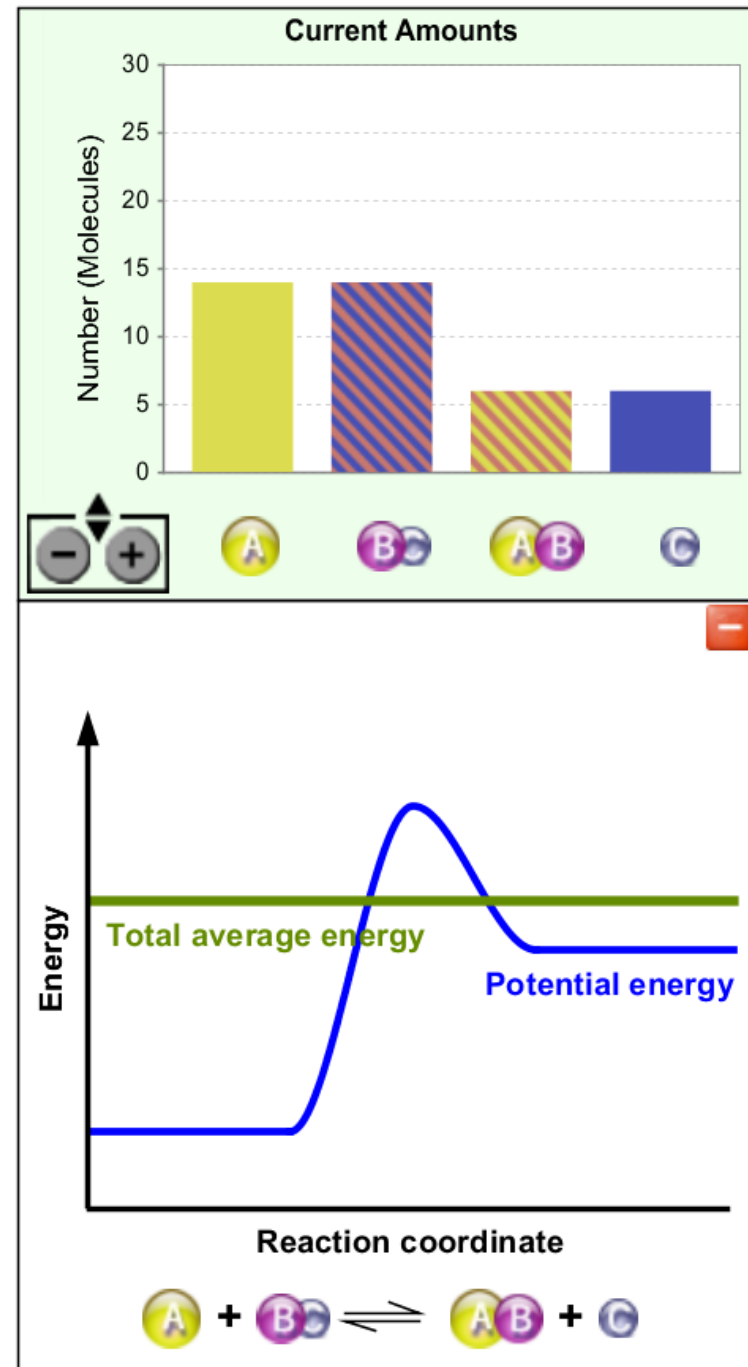


Molecule Shapes:
Basics



Neon Lights & Other
Discharge Lamps

The simulation interface includes a 3D visualization of a reaction mixture in a blue box. A thermometer on the right indicates the temperature, and a red piston is connected to the box via a black tube. Below the box, a green piston icon is linked to a "Temperature" control panel with a slider ranging from "Lower" to "Raise", currently set at "0". To the right of the temperature panel is a "Molecule ..." selection panel showing icons for A (yellow), B (purple), AB (yellow and purple), and C (blue). At the bottom, the chemical equation is displayed:

$$A + B \rightleftharpoons AB + C$$


Resources

- EDB Chemistry Website
- You-tube Channel (Chem EDB)
- Resources for Laboratory Safety and Management



chemistry edb

2940 位訂閱者

訂閱

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影片

播放清單

社群

頻道

簡介

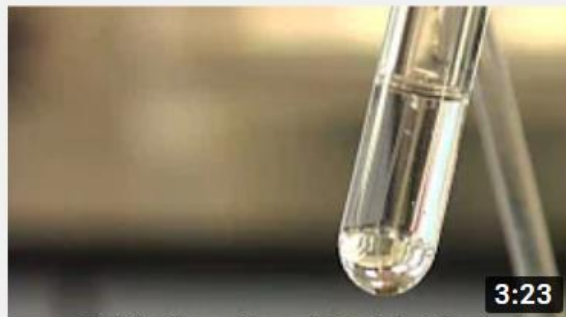


熱門上傳影片



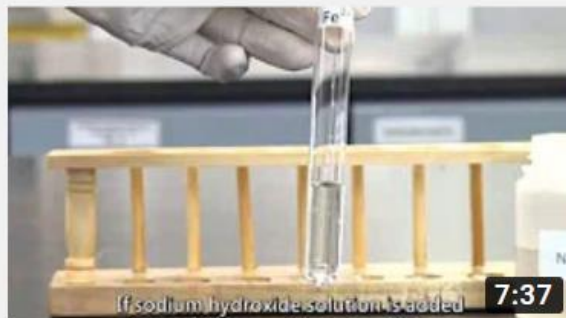
全部播放

英



Using Tollens' Reagent to Test for Aldehydes (Silver Mirror Test)

觀看次數：16萬次 · 5 年前



Qualitative Analysis of Cations

觀看次數：11萬次 · 5 年前



Qualitative Analysis of Anions

觀看次數：9.1萬次 · 5 年前



主頁

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主頁 > 課程發展 > 學習領域 > 科學教育 > 教學資源

科學教育 - 化學

說明	網址
化學課程及評估指引（中四至中六）教師指南 （首次適用於2018/19學年中四學生及2021年的香港中學文憑考試）	詳情
組合科學（化學部分）課程及評估指引（中四至中六）教師指南 （首次適用於2018/19學年中四學生及2021年的香港中學文憑考試）	詳情
化學課程及評估指引（中四至中六）教師指南 （適用於2019及2020年的香港中學文憑考試）	詳情
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高中化學科和組合科學(化學部分)資源目錄 	詳情
教師培訓課程及研討會	詳情
教材	詳情
網上教學資源	詳情

Website:

Learning and Teaching Resources for Senior Secondary Chemistry and Combined Science (Chemistry Part)

Resources for Senior Secondary Chemistry and Combined Science (Chemistry Part) Home Topic ▾ Other websites

Topic V Fossil Fuels and Carbon Compounds

[b. Homologous series, structural formulae and naming of carbon compounds](#)

[c. Alkanes and alkenes](#)

Video	Visualising Chemistry (Part 2) – Exp 6 Photochemical Reaction of Chlorine and Methane
	Videos on Chemistry Experimental Techniques – Generation and Collection of Gases
Learning activity	Visualising Chemistry (Part 2) – Exp 6 Photochemical Reaction of Chlorine and Methane
	Exemplars of Learning Activities – IV. 2 Problems Associated with Drinking Alcohol (For Combined Science (Chemistry Part) only)
Animation	S4-5 Chemistry Animation – Addition Reaction
	S4-5 Chemistry Animation – Substitution Reaction
	S4-5 Chemistry Animation – Cracking
Experiment	Resource Book for Sixth-form Practical Chemistry – Experiment 10 Alcohol Breath Analyser (For Combined Science (Chemistry Part) only)

[d. Addition polymers](#)

YouTube Resources:

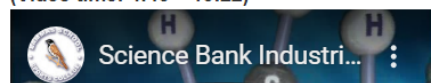
Topic V(a) Hydrocarbons from fossil fuels

Science Bank Raw Materials (1) – Crude Oil
(Video time: 0:00 – 5:15)



Topic V(d) Addition polymers

Science Bank Industrial Chemistry (11) -
2.Plastics & Polymerisation
(Video time: 4:46 – 10:22)



Resources for Laboratory Safety and Management

- 實驗室安全及管理網上課程

- <http://minisite.proj.hkedcity.net/safetyonline/cht/index.html>



- 《科學實驗室安全手冊 》 (2013)

- https://cd1.edb.hkedcity.net/cd/science/laboratory/safety/SafetyHandbook2013_Chinese.pdf



- CLEAPSS (UK) Student Safety Sheets

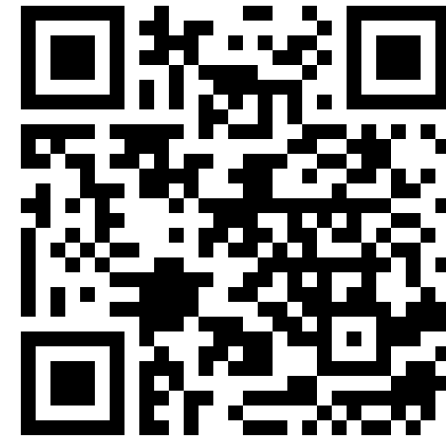
- <http://science.cleapss.org.uk/Resources/Student-Safety-Sheets/>



Discussion session

Discussion questions

- Analyze the concepts involved in the MC questions
- Identify and discuss students' difficulties / misconceptions in relation to the topic / sub-topic
- Suggest teaching approaches / strategies / learning activities to help students learn the topic



<https://forms.gle/kc8342GHhiCs59dU7>