University of Crete

English for Chemistry 2

Kallia Katsampoxaki-Hodgetts (2022)

2810-545102
katsampoxaki@uoc.gr

Welcome to English for Chemistry 2

- Weekly syllabus and (3) textbooks
- Assessment modes: ONLY FINAL EXAM
- Structure of the exam paper
- Project (only optional); requirements
- Your evaluation and comments
- Feedback from exam paper on E-class

Weekly syllabus

Week 1 Induction week; Acids and Bases; Redox reactions

Week 2 How to write a Lab report; Scientific Presentations

Week 3 Separation Techniques; Thin Layer Chromatography

Week 4 Electrochemistry, electrodeposition, batteries

Week 5 Water Treatment Methods; Water as a solvent in organic chemistry

Week 6 Polymers

Week 7 Experimental language; do's and dont's ; academic style and conventions

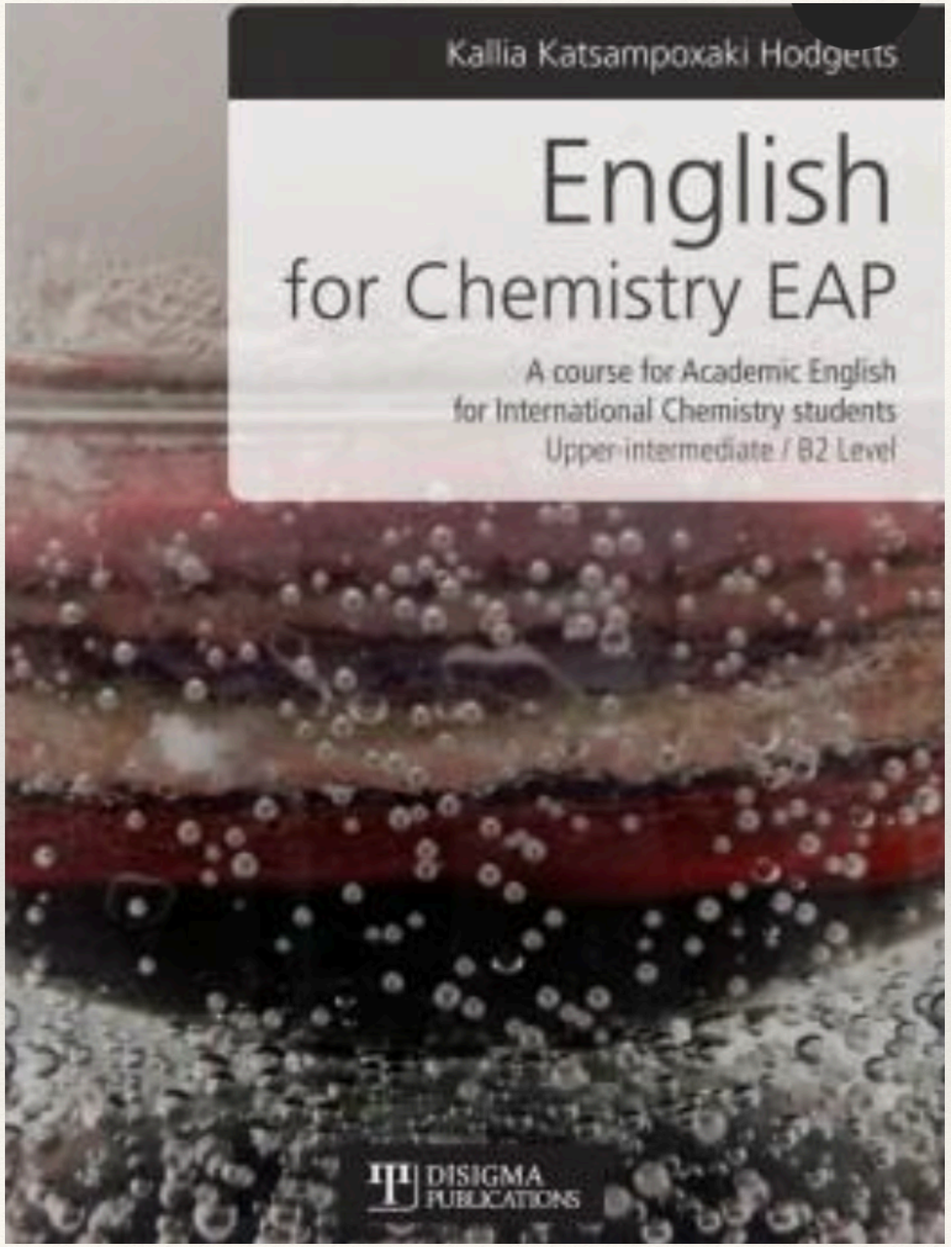
Week 8 Separation Techniques

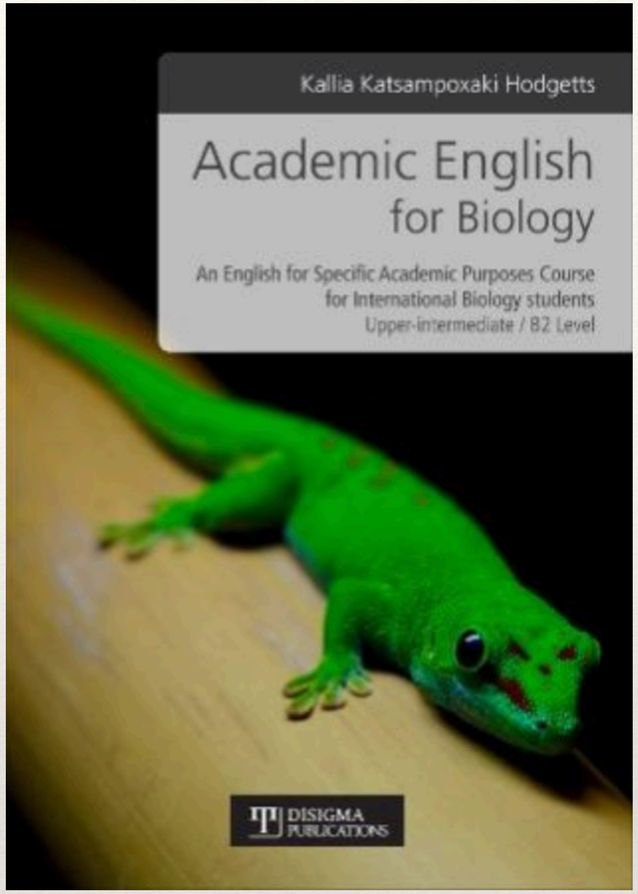
Week 9 Enzymes and big biomolecules

Week 10 Introduction to Organic Chemistry; nomenclature and properties of functional groups

Week 11 DNA Replication Processes & Steps; Transcription & Translation; Mock test

Week 12 Presentations of Projects and peer-feedback


Kallia Katsampoxaki Hodgetts
English
for Chemistry EAP
A course for Academic English
for International Chemistry students
Upper-intermediate / B2 Level
DISIGMA
PUBLICATIONS


Kallia Katsampoxaki Hodgetts
Academic English
for Biology
An English for Specific Academic Purposes Course
for International Biology students
Upper-intermediate / B2 Level
DISIGMA
PUBLICATIONS

Assessment modes

In English 1, there were many OPTIONS:

1. Final exams 100%
2. Final exams (80%) & Presentation (20%
3. Classwork [Note-taking] (20%)

In **English 2**, there are three options:

- Final Exam (100%)
- Final Exam (80%) and Project (20%)
- Final Exam (80%) and Lab report (20%)

Mode & Structure of exam paper

- The test will be on Moodle (online)
- There are may multiple choice and many open-ended questions.
- It contains a closed book and an open book part.
- Online EXAM: Duration of Closed book part 90 min and duration of open book exam 60 min (Note-taking and writing part)

Components of Closed book part (90 min):

- Technical vocabulary (Check out the glossary at the end of your textbooks)
- Academic vocabulary
- Academic style and Scientific Conventions
- Grammar
- Reading comprehension of short paragraphs
- Evaluation of Powerpoint slides and Presentation narratives
- **Focus of open book exam** [60 min]
- Note-taking and writing part (summary, essay, report)

Project (only optional): description and requirements

- You will be working in groups of 3 or 4
- You can choose your own team (You can change team any time)
- You will be having 6-8 online meetings with your team
- Meetings will be recorded and saved by ONE of you for reference only (use of Zoom is recommended)
- You can only speak English during the meetings
- You will be trained and complete all tasks together as a group
- You will be evaluating the work of others and
- You will be creating your own Youtube video sharing your expertise. In this video, you can use any of the materials created or presented during team meetings.

Project (only optional): description and requirements

What is the project about?

a. Read two Scientific articles and create

b. Two Infographics &

c. Two Graphical Abstracts

- You follow the steps and guidelines and learn how to make them
- You identify the criteria for effective/appropriate ones (for research purposes)
- You evaluate others' work and present your work justifying your choices
- You keep a journal (a think-aloud report) sharing what composition/ design/ other skills are required and what challenges you are facing during every stage.

Welcome to English for Chemistry 2

VISUALIZATION OF RESEARCH ARTICLES INTO INFOGRAPHICS

STEP-BY-STEP ACTIVITIES

TASK 1: GET TO KNOW ABOUT THE PURPOSE INFOGRAPHICS

Watch: All you need to know about infographics
Read: Why are infographics so important today?

TASK 2: ANALYSE & COMPARE INFOGRAPHICS

Make groups of 3-4 students. Choose two infographics, analyze them and answer the following questions:

- **Who do you think is the expected audience? Why?**
- **What is the purpose of these infographics?**
- **What textual elements do you consider effective for the composition/design of an infographic? How do these elements differ from other sources of information in a research article?**
- **What visual elements do you consider effective for the composition/design of an infographic?**

Suggested Reading: Cool Infographics, Daily Infographic, YLMSportScience Infographics, Infographics –

VISUALIZATION OF RESEARCH ARTICLES INTO GRAPHICAL ABSTRACTS

STEP-BY-STEP ACTIVITIES

TASK 1: GET TO KNOW ABOUT THE PURPOSE GRAPHICAL ABSTRACTS

Watch: How to make effective Graphical Abstracts
Read: Visual Abstracts: Redesigning the Landscape of Research Dissemination

TASK 2: ANALYSE & COMPARE GRAPHICAL ABSTRACTS

Make groups of 3-4 students. Choose two Graphical Abstracts, analyze them and answer the following questions:

- **Who do you think is the expected audience? Why?**
- **What is the purpose of these Graphical Abstracts?**
- **What textual elements do you consider effective for the composition/design of a Graphical Abstract? How do these elements differ from other sources of information in a research article?**
- **What visual elements do you consider effective for the composition/design of a Graphical Abstract?**

Further reading & resources: Visual Abstracts: Redesigning the Landscape of Research Dissemination, Promoting your research using infographics and visual abstracts, Professor Andrew Ibrahim's visual abstract primer, CDC information on visual abstracts, Free visual/graphical abstract template, A very quick video demo on laying out a visual abstract in PowerPoint, How to make a visual abstract (YouTube lecture by Professor Andrew Ibrahim)

17.

INFOGRAPHICS

Read time: 4 minutes

Overview

This chapter discusses one specific type of SciComm: The Infographic.

Sections in this chapter

- The rise of infographics
- Creating an infographic
- Examples of infographics
- Science meets art
- Share

The Rise of Infographics

The Rise of Infographics

Infographics are visual communications that use icons, illustrations, and limited text. They have a fascinating history and have risen in popularity as a way to visualize "big data", for example,[1] data related to worldwide effects of climate change or global pandemic data. Infographics present these complex systems in a way that makes it easy to see how things relate to one another. By providing a view of the big picture, infographics can give non-experts instant insight that can lead to real change (Figure 17.1).

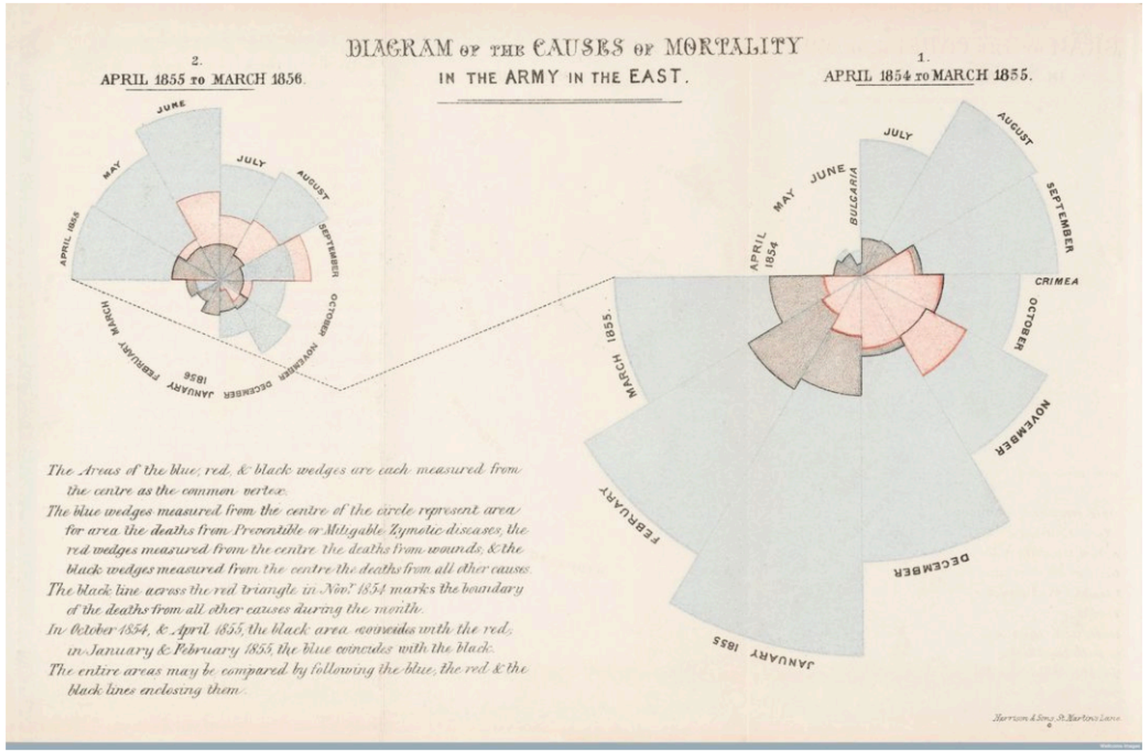


Figure 17.1. *An early example of an infographic, created by the nurse Florence Nightingale, which shows causes of mortality during the Crimean War (Wellcome Library, London). Unlike a large table of numbers, this graphic clearly shows how many deaths were due to poor hygiene; this led to quick efforts from the government to improve sanitation conditions.*

Creating an Infographic

Infographics are designed to show "big data" in the most minimalistic way, and so the audience, scope, and purpose of the infographic must be well defined in the planning stage.

Purpose

In science, infographics are used to inform, explain, entertain, or to spur action. In the example above, Florence Nightingale had a clear purpose for making her infographic: to get the attention of the government so they would take action to improve sanitary conditions. When creating your own infographic, make sure you have a clear message you are trying to convey to the reader. Knowing the purpose of the infographic will help you know which data and information are essential, and what can be left out.

Audience

Closely linked to the purpose of your infographic is it's intended audience. Who are you trying to convey your message to? Review the chapter "Knowing your audience" and think about how the age, education, location, and other demographics may influence how you design your infographic.

Scope

The best infographics have some sort of narrative or story that the viewer/reader can follow, one that aligns with the key message and purpose of the visualization. Once you have your audience and purpose, it's easy to define the scope of your infographic and build a narrative. Write a script or storyboard for this narrative. Start with a hook, like an intriguing question, which will draw in the reader to the details.

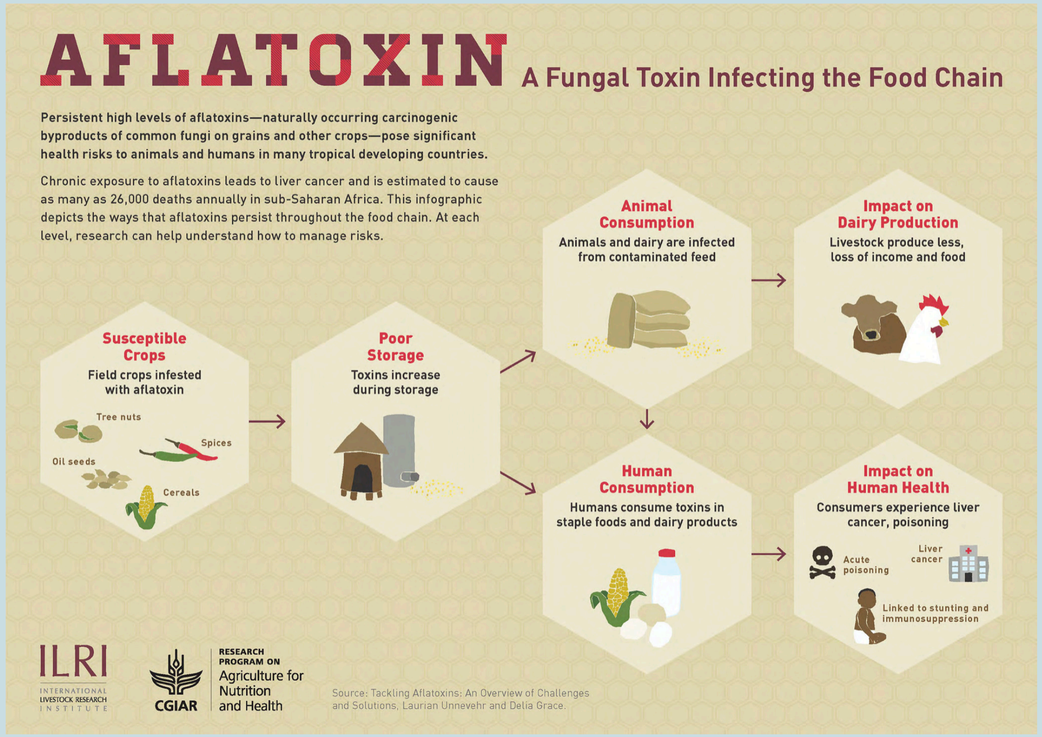
Group work (7 min)

Work in groups of three and identify the purpose, audience and scope of this infographic

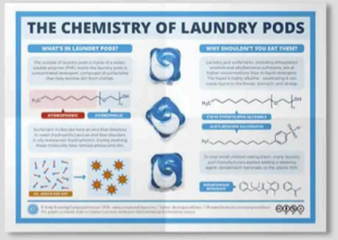
Purpose: Inform and explain

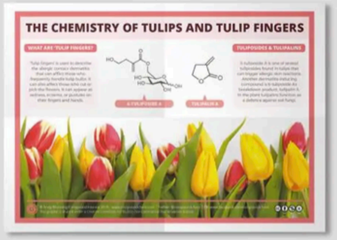
Audience: General but informed public, possible research donors

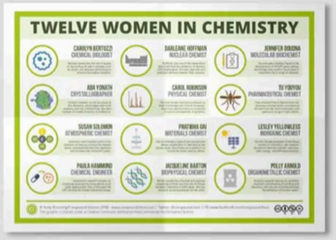
Scope: Impacts of the fungus on human systems and health in Africa

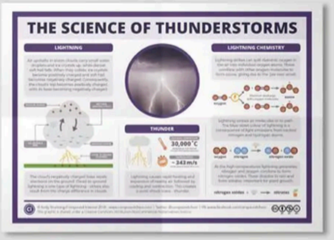


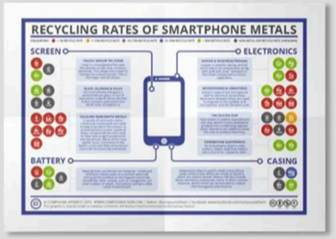
Infographics

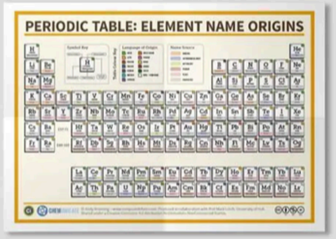


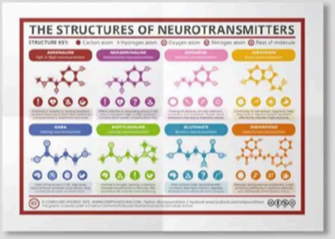


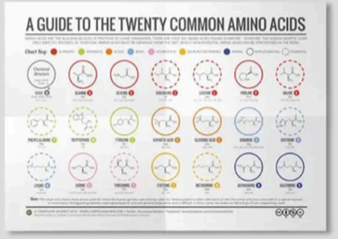


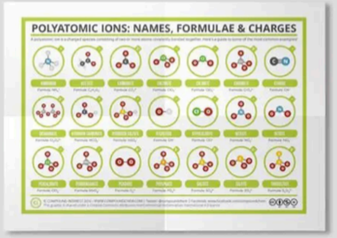


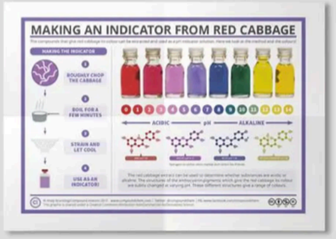


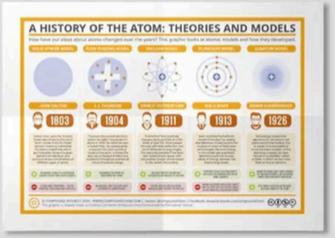


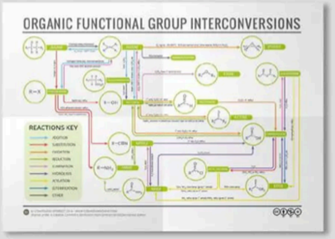










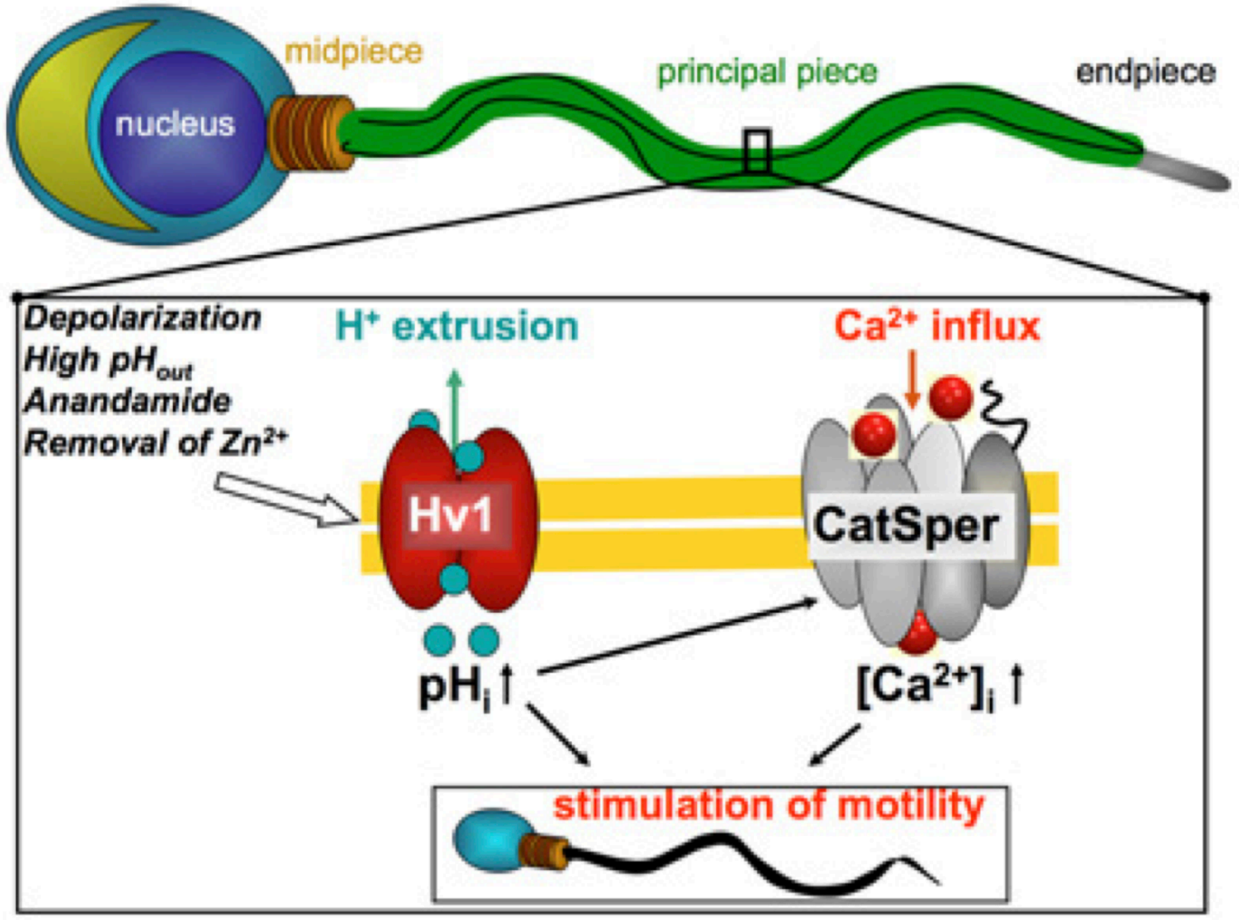


COMPOUND iNTEREST

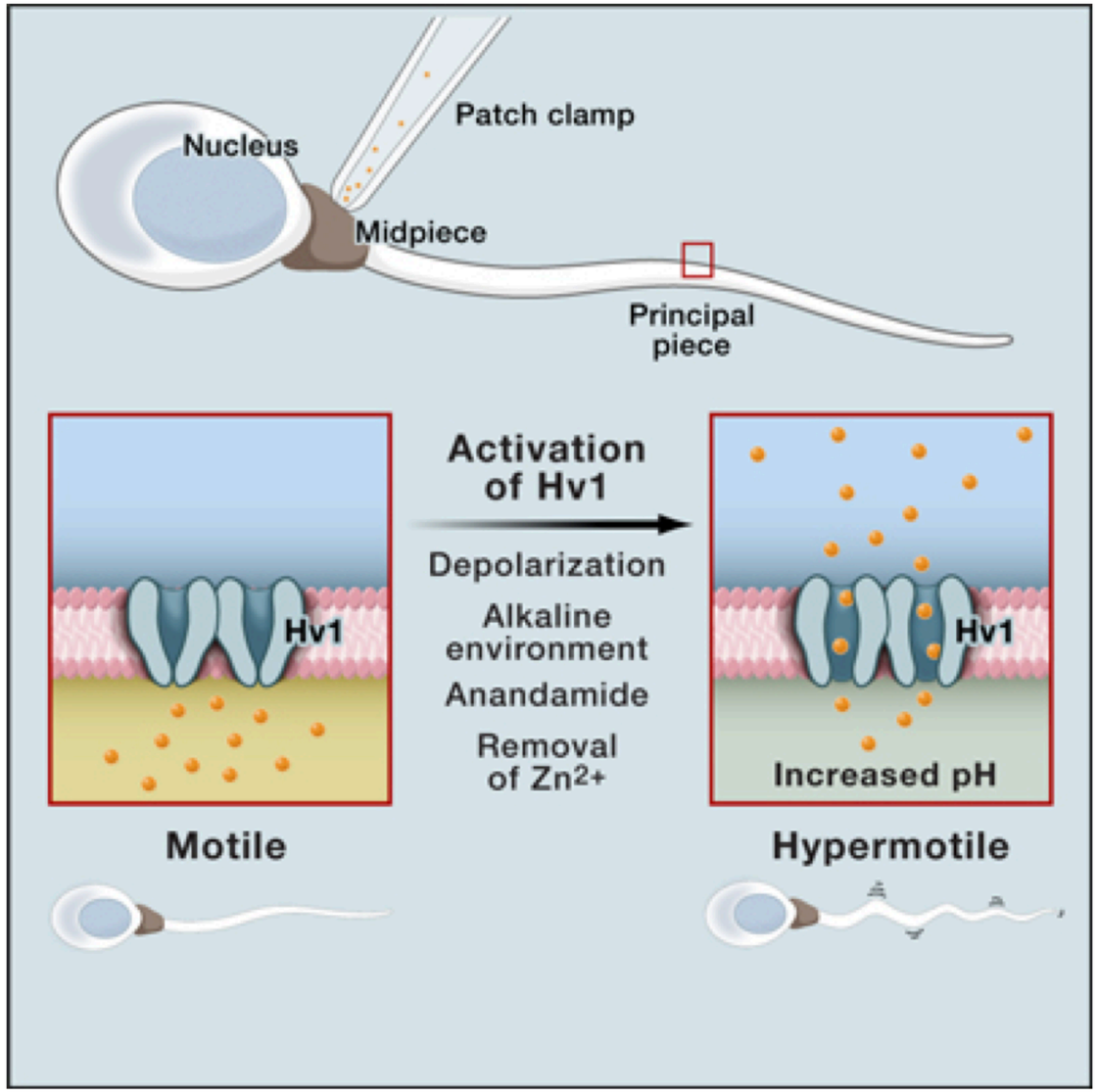
www.compoundchem.com

Good & bad example of graphical abstract in Chemistry Paper (Chem, Cell, Nature)

BEFORE



AFTER



Your evaluation and comments (2022)

- Thank you for all the positive feedback! I really appreciate the time you took to write all these encouraging comments!
- Pedagogical methods (Pairs, groups, online, etc)
- Politeness, Dialogue & Feedback (Not correction)
- Development of Listening skills
- Pace & content (Level too difficult, too fast)
- Focus on Writing (Speaking and Grammar)
- Glossar

Απάντηση
Η Κ. Κάλλια είναι εξαιρετική στην δουλειά της . Πολύ βοηθητική, επικοινωνιακή και παραστατική . Καταφέρνει να διεγείρει το ενδιαφέρον για το αντικείμενο .
Φιλικό περιβάλλον Προσιτή
-Διάλογος μεταξύ καθηγήτριας-φοιτητών Ομαδικές εργασίες Ελάχιστος φόρτος εργασίας για το σπίτι
- βοηθητικό το 20% bonus - σωστή οργάνωση του eclass
-ενδιαφερον για τους φοιτητές, ενθάρρυνση για ερωτήσεις, κινητοποίηση για το μάθημα , διατήρηση της φιλοσοφίας διδασκαλίας του μαθήματος,
-μιλάει στα αγγλικά -είναι συνεπής -χρησιμοποιεί διαφορετικές μεθόδους διδασκαλιας κάθε φορά -αναπτύσσει την επικοινωνιακοτητα με εμάς -χρησιμοποιεί to the point οπτικοακουστικό υλικό
-διάλογος στο μάθημα -Ανάρτηση σημειώσεων -Ασκήσεις από το βιβλίο -οπτικοακουστικο υλικό -οργάνωση στον τρόπο διεξαγωγής του μαθήματος
-Το γεγονός πως η καθηγήτρια μιλούσε διαρκώς στα αγγλικά και με βοήθησε αυτό να τα θυμηθω
Η ενθάρρυνση για διάλογο κατά την διάρκεια του μαθήματος και η άμεση ανταπόκριση στις ερωτήσεις των φοιτητών. Η επίλυση πολλαπλών, διαφορετικών ασκήσεων και παραδειγμάτων.

Office hours

Tuesday 9.00-10.00 in Amphitheatre A2 [Chemistry Department]

Friday 12.00-13.30 Room 202, Administration Building 2 (KOSMITIA)

Telephone 2810545102

Email katsampoxaki@uoc.gr

What have we seen so far?

- Weekly syllabus and (3) textbooks
- Assessment modes: ONLY FINAL EXAM
- Structure of the exam paper
- Project (only optional); requirements
- Your evaluation and comments
- **Feedback from exam paper on E-class**
- **Mock-test (?)**

9 Acids and Bases

Themes
Acids, bases, hydronium ion concentration, hydroxy ions concentration, conjugation, dissociation, amphoteric solvent

Definitions

Grammar
Relative clauses

Chemistry nomenclature
Reading a Chemical Formula
Chemical Affixes and Prefixes

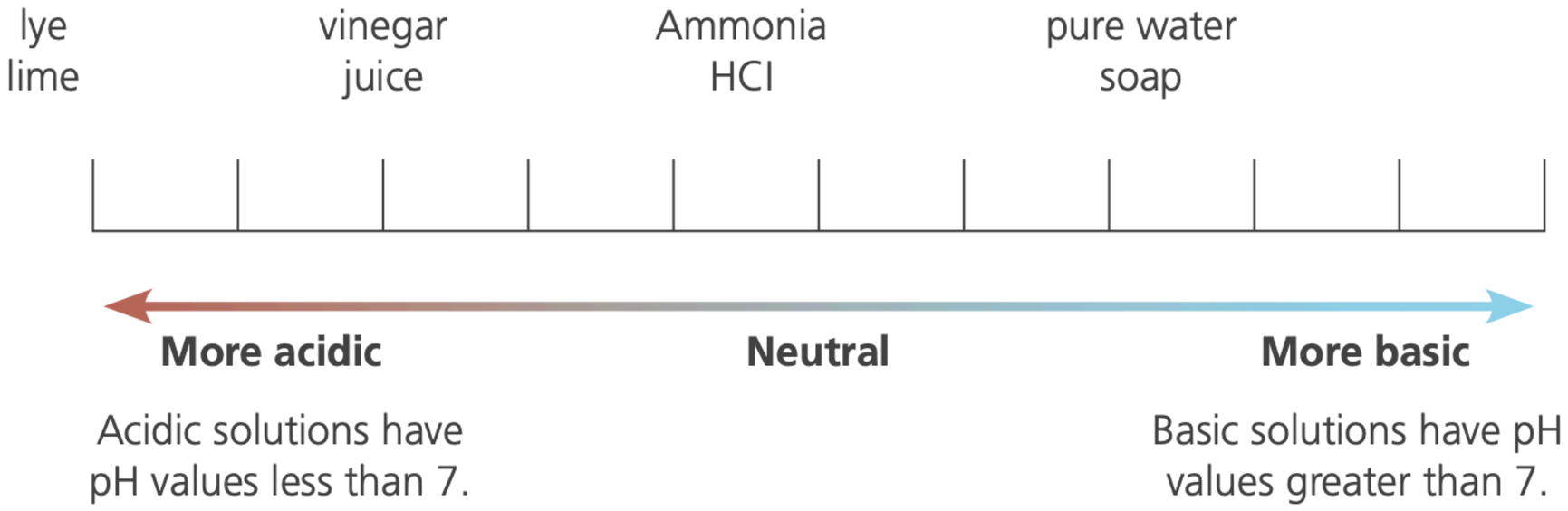
Academic writing
Reporting graphs and charts

Discussion

1 In pairs, work out the properties of acids and bases based on their definitions (Arrhenius, Bronsted-Lowry and Lewis)

2 What are the limitations of the Arrhenius definition?

3 Which of the following substances are acids? Which are bases? Place them in the scale below.



Acids and Bases; definitions

An Arrhenius acid is a compound that increases the H+ ion concentration in aqueous solution.
An Arrhenius base is a compound that increases the OH− ion concentration in aqueous solution.

The Brønsted-Lowry theory describes acid-base interactions in terms of proton transfer between chemical species.

In the Lewis theory of acid-base reactions, bases donate pairs of electrons and acids accept pairs of electrons.

4 Read the information about the properties of acids and provide the ones for bases. There is one example.

ACIDS	BASES
are ionic compounds	are ionic compounds
derived from Latin word "acere"	
have a sour taste	
are electrolytes; conduct an electric current	
are proton donors	
their strength is proportional to the concentration of hydronium ions (H3O+)	
can neutralise a base	
reacts with base to form water and salt	
have a low pH	
turns litmus red	

Acid-base chemistry can play an **indispensable** role in our lives. One might find bases in **detergents**, cleaners, soaps, lye as well as ammonia. To develop an understanding of how **widespread** the use of acids is, we should consider a strong acid, such as hydrochloric acid (HCl), which is **secreted** in our stomach in order to break down the food and **accelerate** digestion, and at the same time it is commercially known as muriatic acid and it is used in industry to clean metals that are to be plated or **coated**. Nitric acid has numerous **applications** that range from explosives and plastics to dyes. Edible acids such as phosphoric acid are also found in fizzy drinks adding to the flavour. Sulphuric acid can serve as a useful tool in car batteries since it **contributes** towards the storage and production of electricity.

To help us develop a concept of the acidity and basicity of a solution, let's consider how acids and bases react in water, which is one of the most important **amphoteric** solvents. It is strongly hydrogen bonded and highly polar, which permits the dissolution of more

chemicals than any other common liquid. It can act as either an acid or a base. The fact that water can **convert** all the molecules of an acid or base to ions in a reversible reaction, indicates that it can **dissociate** to form H_3O+ and OH-, respectively. When dissolved in aqueous solutions, acids dissociate to produce hydronium ions, whereas bases, when dissolved in water, tend to increase the concentration of hydroxide ions.

The strength of acids and bases is determined by the **degree** of dissociation. The greater the concentration of hydronium ions, the stronger the acid. The more hydroxide ions, the stronger the base. Strong acids such as nitric acid (HNO_3), hydrochloric acid (HCl) and sulphuric acid (H_2SO_4) dissociate completely and they allow little or no reversibility of the reaction. Hence, the singe arrow:

$$HCl + H_2O \rightarrow H^3O + Cl -$$

Strong bases also ionise **virtually** 100%. These are NaOH (Sodium hydroxide), LiOH (Lithium hydroxide) and KOH (Potassium hydroxide).

The majority of weak acids and weak bases dissociate **slightly**. Acids and bases establish a dynamic equilibrium as **conjugate** pairs. If a base acts as a hydrogen ion acceptor, it forms a conjugate acid and vice versa. Strong bases have a weak conjugate acid and strong acids have a weak conjugate base.

To represent the degree of acidity or basicity of a solution, we need to use an acid-base **indicator**, which is a weak acid or base. This can **approximate** or determine the PH scale, in other words, the representation of the hydronium ion concentration by a number. The **values** of the PH scale **range** form 0 to 14. The former indicates acidic solutions and the latter alkaline ones. If the concentration of OH- ions and H+ ions are equal then the substance is considered to be neutral. For instance, lemon juice is acidic since it measures 2.3, whilst in the middle of the scale, pure water measures 7 making it neutral.

Reading comprehension

Task 3 Underline the incorrect phrases and rewrite them correctly.

a Sulphuric acid is produced in our stomach. .....

b Nitric acid is an edible acid. .....

c Lye is an amphoteric solvent. .....

d Hydronium ions are only present in pure water. .....

e When dissolved in aqueous solutions, bases dissociate to produce hydronium ions. .....

f Acids increase the concentration of hydroxide ions when dissolved in water. .....

g Weak acids and bases ionise completely. .....

h Only a fraction of strong acids and bases dissociate.

i A acid-base conjugate is a pair of strong acids and bases. .....

j Strong acids are titrated in the presence of an indicator and change colour. .....

Vocabulary building

Task 4 Read the text and find the synonyms of the following words. They are not in the order they appear in the text.

a Burning

b Speed up

c Used

d Extent, scale

e In small quantities

f Significant, essential

g Washing powder/liquid

h turn into, change

i covered with a surface layer

j worsen

k happens

l numbers

m uses

n in effect

o ionize

p graduated

q vary or extend between

r find nearly exact

s quantity/degree

Acids and Bases

Bronsted-Lowry acids & bases

Partially, compared, donates, Lone pair, Species, amphoteric, dissociate

From Khan Academy

- A **Brønsted-Lowry acid** is any …… that is capable of donating a proton
- A **Brønsted-Lowry base** is any species that is capable of accepting a proton, which requires a …… of electrons to bond to the H+
- Water is **……**, which means it can act as both a Brønsted-Lowry acid and a Brønsted-Lowry base.
- Strong acids and bases ……..completely in aqueous solution, while weak acids and bases ionize only ……
- The **conjugate base** of a Brønsted-Lowry acid is the species formed after an acid …… a proton. The **conjugate acid** of a Brønsted-Lowry base is the species formed after a base accepts a proton.
- The two species in a conjugate acid-base pair have the same molecular formula except the acid has an extra H …… to the conjugate base.

Acids and Bases

Bronsted-Lowry acids & bases

- A **Brønsted-Lowry acid** is any **species** that is capable of donating a proton
- A **Brønsted-Lowry base** is any species that is capable of accepting a proton, which requires a **lone pair** of electrons to bond to the H+
- Water is **amphoteric**, which means it can act as both a Brønsted-Lowry acid and a Brønsted-Lowry base.
- Strong acids and bases **dissociate** completely in aqueous solution, while weak acids and bases ionize only **partially.**
- The **conjugate base** of a Brønsted-Lowry acid is the species formed after an acid **donates** a proton. The **conjugate acid** of a Brønsted-Lowry base is the species formed after a base accepts a proton.
- The two species in a conjugate acid-base pair have the same molecular formula except the acid has an extra H **compared** to the conjugate base.

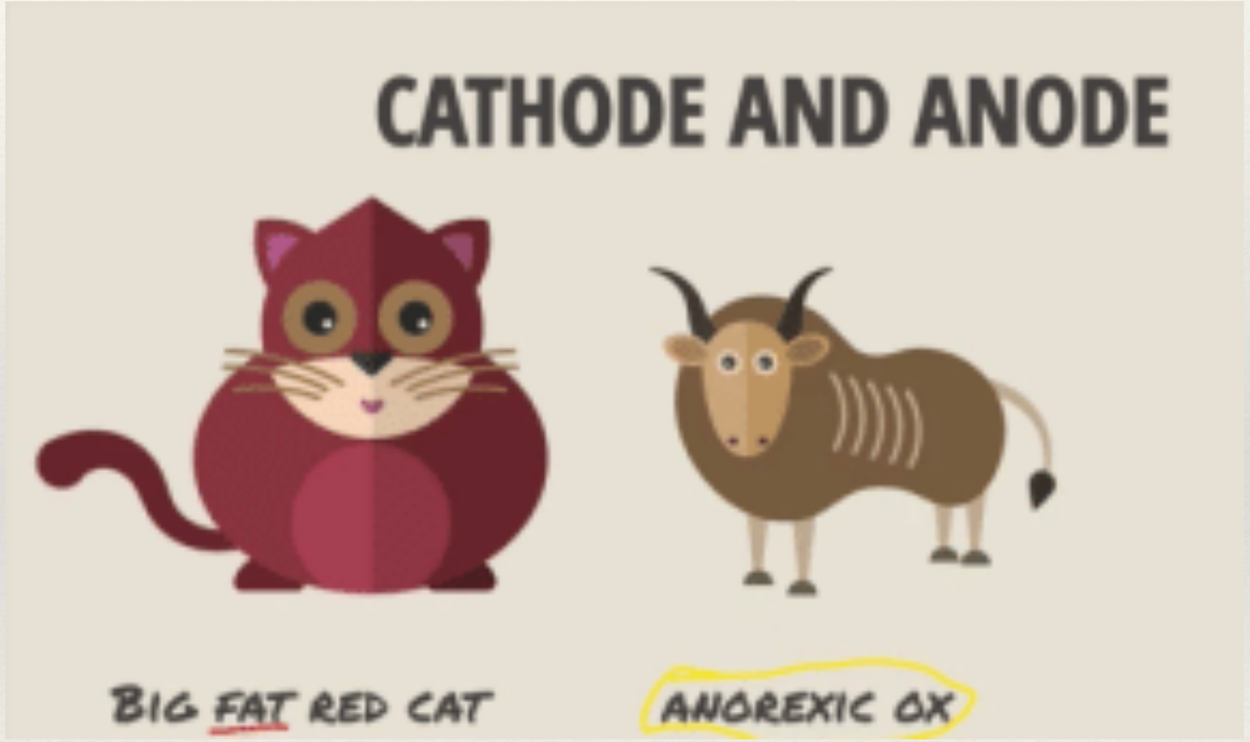
Define redox reactions

Define redox reactions

Oxidation–reduction reactions, commonly known as redox reactions,
are reactions that involve the transfer of electrons from one species to another.

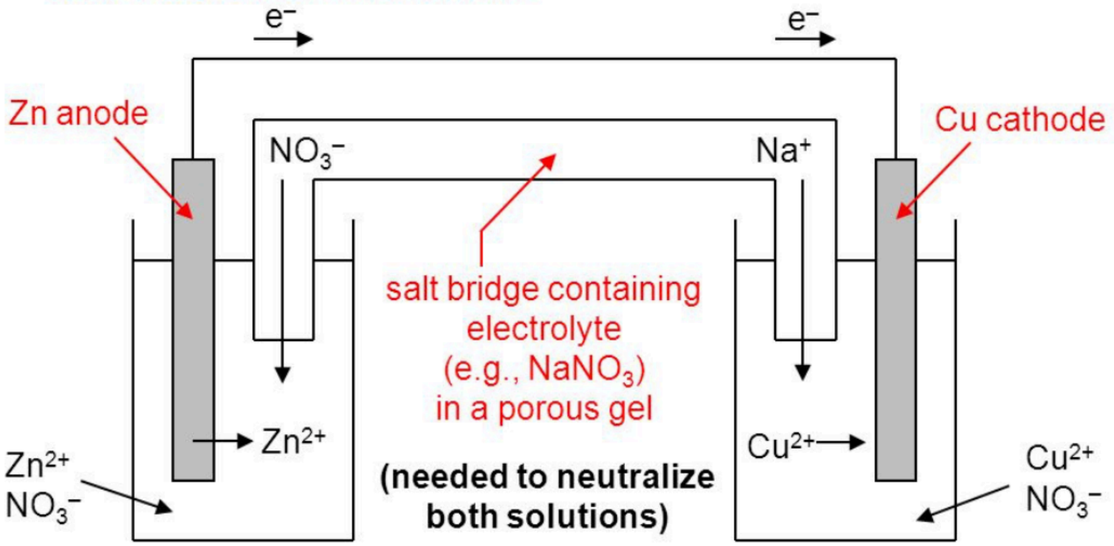
The species that **loses** electrons is said to be oxidized,
while the species that **gains** electrons is said to be reduced.

A clever mnemonic
An anorexic **ox** *was eaten* by a **red** fat cat!



Pair-work
How are the visuals related?

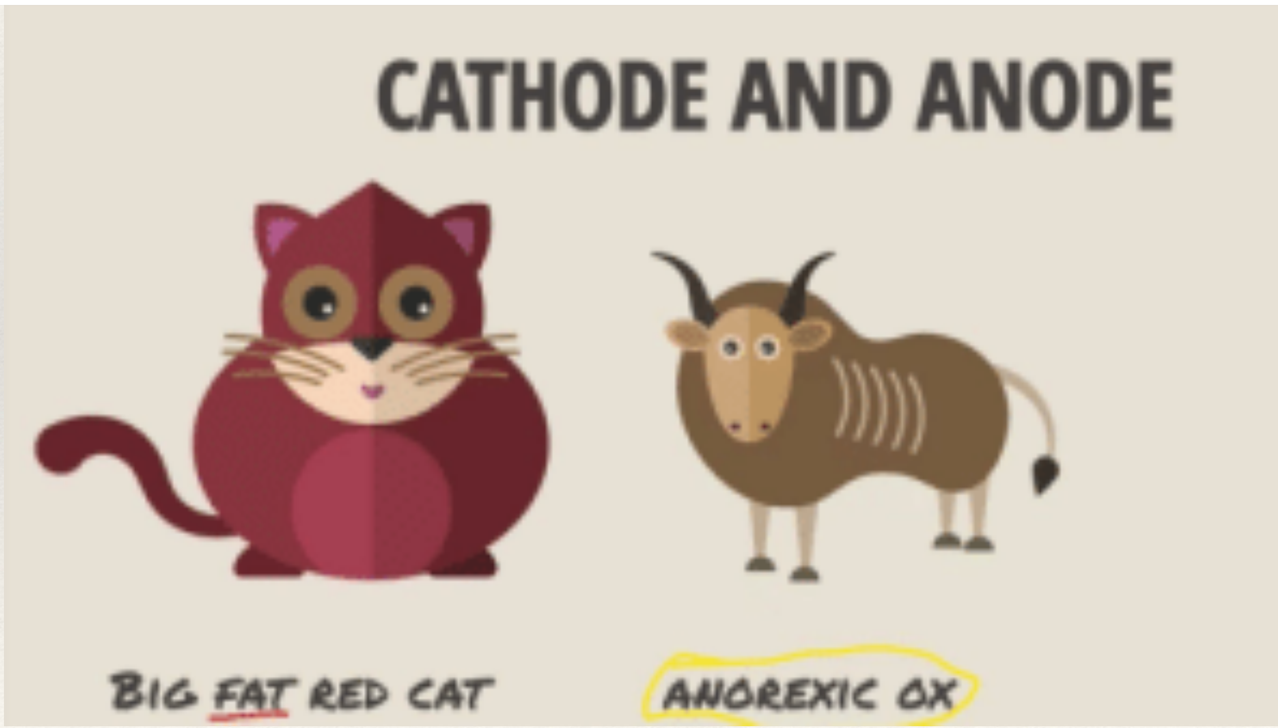
Consider a solution of $Zn(NO_3)_2(aq)$ and $Cu(NO_3)_2(aq)$ with electrodes as shown…



-- Zn anode dissolves into sol'n

-- Cu^{2+} plates out as Cu on the cathode

WHY do the e^- go the way they do?



Redox Reactions: Crash Course Chemistry #10 - YouTube

All the magic that we know is in the transfer of electrons. Reduction (gaining electrons) and oxidation (the loss of…

YouTube · CrashCourse · 23 Απρ 2013

Listen tot Crash course on Redox reactions

Jot down definitions of terms

Revise definitions so as to adhere to Academic Style requirements

Redox reactions Note-taking task

How did the speaker define these terms?

Oxidation
Reduction
Oxidation Numbers
Redox Reactions
Oxidation Reactions
Balancing Oxidation Reactions

Revise the definitions so as to be appropriate for an academic context

Oxidation
Reduction
Oxidation Numbers
Redox Reactions
Oxidation Reactions
Balancing Oxidation Reactions

Note-taking task: You tube video | Crash course

Redox reactions definitions

Oxidation: Oxygen is the quintessential oxidiser. It pulls electrons off one molecule to make itself more stable.

A process that occurs when atoms or groups of atoms lose electrons, or when a chemical species gains oxygen or loses hydrogen

Reduction: It's when a substance gains electrons, which exactly the opposite of what reduce means.

Reduction is the loss of oxygen or the gain of Hydrogen. In terms of electron transfer, reduction is the gain of electrons.

Oxidation Numbers : System Number assigned with the maximum numbers of electrons sharing them
ON, also called oxidation state, the total number of electrons that an atom either gains or loses in order to form a chemical bond with another atom. It is the hypothetical charge of an atom if all of its bonds to different atoms were fully ionic.

Redox Reactions

Oxidation Reactions

Balancing Oxidation Reactions

Listening 2 Redox reactions

Listen to the lecture about REDOX REACTIONS and complete the missing information:

Oxidation reduction reactions are also called …….. **reactions**.

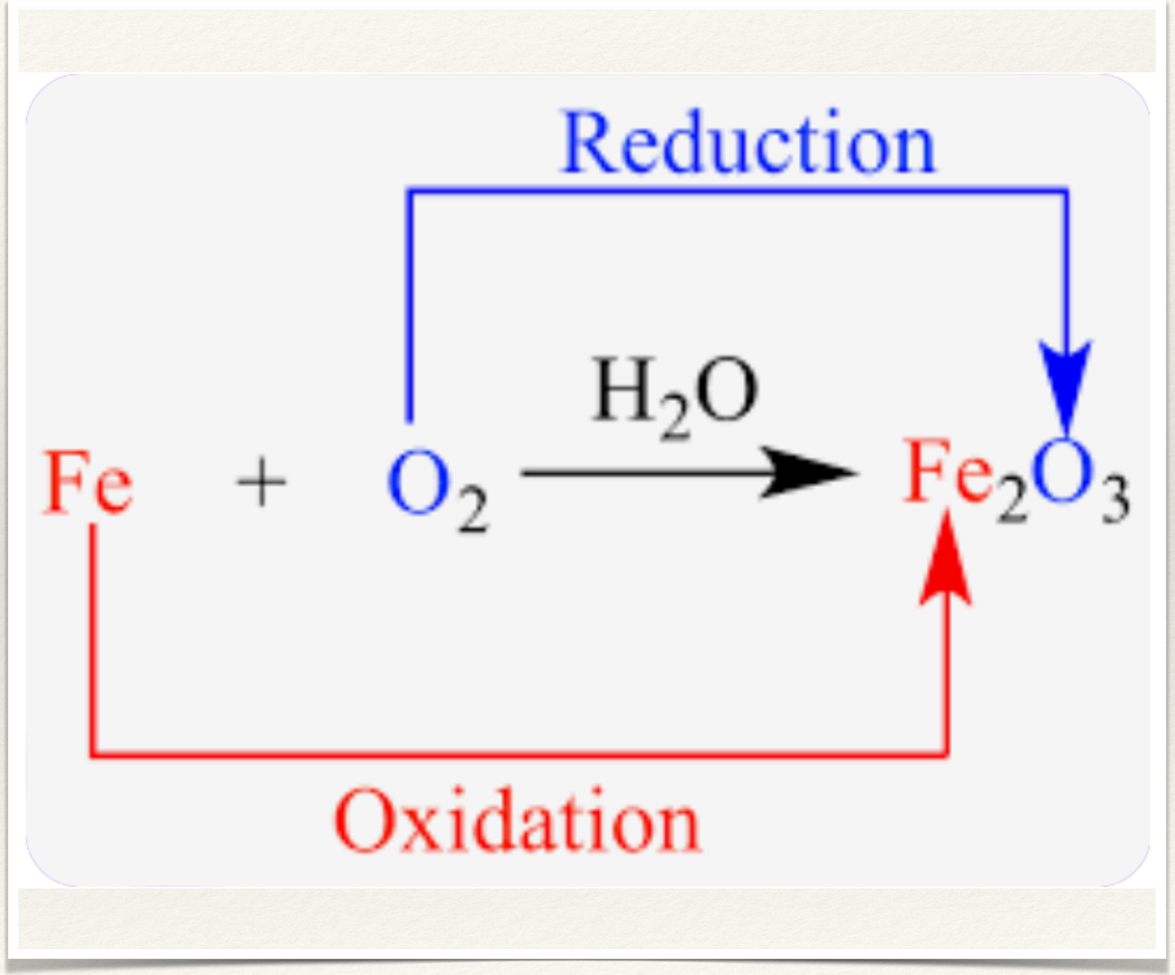
With e-, …….. is denoted.

Redox reactions usually occur between metals and non-metals to **……** in which the metal becomes **……** and the non-metal becomes **……**

Coupled oxidation and reduction means that **……**

When something is oxidized it means the **…..** of electrons, or you can also think of it as the …….. of a positive charge (+).

Reduction is the ….. of electrons or the **……**of a negative charge (-). In the example mentioned, oxygen gained …….. electrons, a negative …… and it was……..



Listening 2 Redox reactions (teacher narration)

Listen to the lecture about REDOX REACTIONS and complete the missing information:

Oxidation reduction reactions are also called **redox reactions**.

With e-, **the transfer of electrons** is denoted.

Redox reactions usually occur between metals and non-metals to **form an ionic compound** in which the metal becomes **a positively charged ion or a cation** and the non-metal becomes **a negatively charged ion or an anion**.

Coupled oxidation and reduction means that **you cannot have one without the other**.

When something is oxidized it means the **loss** of electrons, or you can also think of it as the **gaining** of a positive charge (+).

Reduction is the **gain** of electrons or the **gaining** of a negative charge (-).

In the example mentioned, oxygen gained two **electrons**, a **negative charge** and it was **reduced.**