

Home learning activities

Subject
Science
Year Group
Year 9
Unit of work / Knowledge organiser
Chemical Changes – 1
Activities
<ul style="list-style-type: none">• Complete the weekly 'Knowledge Check' through 'GCSEPod'.• Watch all 'GCSEPod' clips on the 'Chemical Changes' Unit.• Complete the 'GCSEPod' Questions assigned for this Unit of work and any additional assignments which have been set by your teacher.
Where do you complete the work?
Use computer/phone for 'GCSEPod' or 'Seneca' and study materials.
What to do if you finish the work? (Extension activity)
<ul style="list-style-type: none">• Sign up for 'Seneca Learning' using the 'Sign Up Guide' sheet and the special passcode: j5v9tvzq48. Complete the assignments which have been set.
These websites might help:
<ul style="list-style-type: none">• BBC Bitesize -> Secondary -> GCSE -> Combined Science -> AQA Trilogy -> Chemistry -> Chemical Changes• www.freesciencelessons.co.uk -> GCSE Videos -> Chemistry Paper 1 -> Chemical Changes
If you are struggling with your work or if you have finished.
Please email your classroom teacher directly using the email list found in the Home Learning section of the website.

Section 1: Key Terms

1 Metal oxide	Metals react with oxides to produce metal oxides. This is an oxidation reaction.
2 Displacement reaction	A more reactive metal can displace a less reactive metal from a compound .
3 Oxidation	Two definitions: Chemicals are oxidised if they gain oxygen in a reaction. Chemicals are oxidised if they lose electrons in a reaction. (HT)
4 Reduction	Two definitions: Chemicals are reduced if they lose oxygen in a reaction. Chemicals are reduced if they gain electrons in a reaction. (HT)
5 Acid	A chemical that dissolves in water to produce H⁺ ions .
6 Base	A chemical that reacts with acids and neutralise them. E.g. metal oxides, metal hydroxides, metal carbonate
7 Alkali	A base that dissolves in water . It produces OH⁻ ions in solution.
8 Neutralisation	When a neutral solution is formed from reacting an acid and alkali . General equation: H⁺ + OH⁻ → H₂O
9 pH	A scale to measure acidity/ alkalinity . A decrease of one pH unit causes a 10x increase in H⁺ ions . (HT)
10 Strong acid (HT)	A strong acid is completely ionised in solution. E.g. hydrochloric, nitric and sulphuric acids.
11 Weak acid (HT)	A weak acid is only partially ionised in solution. E.g. ethanoic, citric and carbonic acids.

Section 2: Reactivity

Element	Reaction	Reactivity
12 Potassium	When potassium is added to water , the metal melts and floats. It moves around very quickly. The metal is also set on fire , with sparks and a lilac flame .	
13 Sodium	When sodium is added to water , it melts to form a ball that moves around on the surface. It fizzes rapidly .	
14 Lithium	When lithium is added to water , it floats. It fizzes steadily and becomes smaller.	
15 Calcium	Fizzes quickly with dilute acid .	
16 Magnesium	Fizzes quickly with dilute acid .	
17 (Carbon)		
18 Zinc	Bubbles slowly with dilute acid .	
19 Iron	Very slow reaction with dilute acid .	
20 (Hydrogen)		
21 Copper	No reaction with dilute acid .	

Acids produce hydrogen ions (H⁺) in aqueous solutions. Aqueous solutions of alkalis contain hydroxide ions (OH⁻).

Section 4: Extracting Metals

22 Very unreactive metals	Found naturally in the ground. Don't need extracting .
23 Metals less reactive than carbon	Extracted by reduction with carbon .
24 Metals more reactive than carbon	Extracted by electrolysis .

Section 5: Reactions of Acids

25 With metal	Acid + Metal → Salt + Hydrogen
26 With alkali	Acid + Metal Hydroxide → Salt + Water (Neutralisation reaction)
27 With metal oxide	Acid + Metal Oxide → Salt + Water (Neutralisation reaction)
28 With carbonate	Acid + Metal Carbonate → Salt + Water + Carbon Dioxide (Neutralisation reaction)

Section 6: Making a Soluble Salt

29	Add solid metal, metal carbonate, metal oxide or metal hydroxide to an acid .
30	Add solid until no more reacts .
31	Filter off excess solid.
32	Evaporate to remove some of the water.
33	Leave to crystallise .
34	Remove all water in a desiccator/ oven .

Higher only:

A strong acid is completely ionised in aqueous solution. Examples of strong acids are hydrochloric, nitric and sulphuric acids.

A weak acid is only partially ionised in aqueous solution. Examples of weak acids are ethanoic, citric and carbonic acids.

For a given concentration of aqueous solutions, the stronger an acid, the lower the pH.

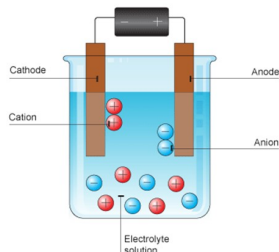
As the pH decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10.

pH scale



Test solutions using an indicator solution or a pH probe

Year 9: Chemical Changes & Energy Changes



Positive
Anode
Negative
Is
Cathode

Section 7 Electrolysis key terms

38 Electrolysis	The process of splitting an ionic compound by passing electricity through it.
39 Electrolyte	An ionic compound that is molten (melted) or dissolved in water . The ions are free to move .
40 Electrode	An electrical conductor that is placed in the electrolyte and connected to the power supply .
41 Cathode	The electrode attached to the negative terminal of the power supply .
42 Anode	The electrode attached to the positive terminal of the power supply .

Section 8: What is discharged in electrolysis?

Electrolyte	Cathode	Anode
43 Molten Compound	Metal	Non-metal
44 Dissolved compound (aqueous solution)	The metal if the metal is less reactive than hydrogen . Hydrogen is produced if the metal is more reactive than hydrogen .	Oxygen is produced unless the solution contains halide ions (chloride, bromide, iodide) when the halogen (chlorine, bromine, iodine) is produced.

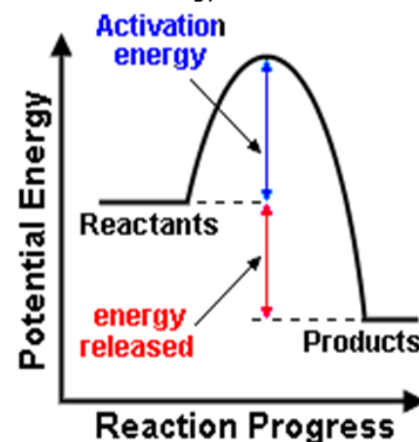
Section 9: Aluminium Electrolysis

45 Cryolite	Aluminium oxide is dissolved in cryolite to lower its melting point . This saves money on energy costs .
46 Cathode	Positive Al³⁺ ions move to the cathode . Aluminium is produced. Al³⁺ + 3e⁻ → Al
47 Anode	Negative O²⁻ ions move to the anode . Oxygen is made. 2O²⁻ → O₂ + 4e⁻ Wears away as the carbon anode reacts with oxygen to form carbon dioxide .

Section 7 Energy Changes Key Terms

1 Conservation of energy	Energy is not created or destroyed , only transferred from one store to another
2 Exothermic	A reaction that transfers energy to the surroundings so the temperature of the surroundings increases , e.g. combustion and neutralisation reactions. Used in self-heating cans and hand warmers .
3 Endothermic	A reaction that takes in energy from the surroundings so the temperature of the surroundings decreases , e.g. thermal decomposition . Used in sports injury packs .
4 Activation energy	The energy needed for particles to successfully react .
5 Breaking bonds	Energy is needed to break bonds.
6 Forming bonds	Energy is released when bonds are formed.

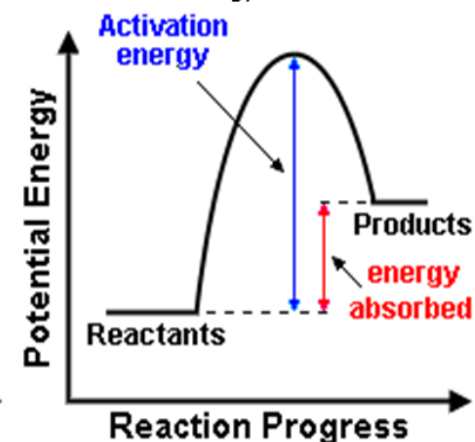
7 Exothermic Energy Profile



Exothermic reaction

9 Energy released from forming bonds is **greater than** the energy needed to break bonds. (HT)

8 Endothermic Energy Profile



Endothermic reaction

10 Energy released from forming bonds is **less than** the energy needed to break bonds. (HT)

'Seneca Learning' Sign-Up Guide

Passcode: j5v9tvzq48

Step 1: Open an internet browser - *Any browser except Internet Explorer will work.*

Step 2: Go to SenecaLearning.com

Step 3: Click on "Get Started" or "Sign Up"

Step 4: Create your account - *If you don't know your parent email, then type: N/A.*

Step 5: Click on "Classes & Assignments" - *You'll find this in the top menu.*

Step 6: Click on "Join Class" - *It's the green button in the top right corner.*

Step 7: Type the code from your teacher - *If you received a link instead, then open the link.*