

UNIT 1 - MATTER

Content

Revision

- Solid, liquid and gaseous states
- Diffusion and Brownian motion
- Separation techniques
- Balancing equations
- Atomic structure & periodic table
- Bonding & structure

Extension

- Structure of ceramics
- The Avogadro number
- Ionic equations
- The mole
- Stoichiometry
- Key equations in stoichiometry
- Empirical formulae determination
- Percentage yield & percentage purity

Resources & ICT

- Textbook
- Study guide
- Keynote
- Online resources available from BM website
- Internet research

Types of assessment

- Quality of practical work
- Exercises from textbook and study guide
- Multiple choice questions from past papers
- Structured questions from past papers
- Peer assessment
- Judgements on effort and attitude towards learning

Students to Know

- The inter inversion between solid, liquid or gaseous states
- The relationship between the position of an element in the periodic table and its physical and chemical characteristics
- The type of bonding depends on the atoms involved in it
- The consequences of bonding on structure; examples of the four main types of structures

Students to Understand

- The significance of a mole and the use of Avogadro number
- How ions are made and their charges calculated
- How the formula of a compound can be found knowing the charges of its ions
- The principle of calculations behind the determination of number of moles, volumes of gases or concentration of a species

Students to be able to Do

- Perform stoichiometric calculations using number of moles
- Answer factual questions and show good exam technique
- Give details of their stoichiometric calculations

Cross curricular links

- Biology; chromatography
- Geography; salt evaporation ponds
- Economy; economical importance of crude oil in our society, varying price of rhodium
- Physics; the kinetic theory of matter
- Maths; using formulae

Differentiation incl. EAL

- Extension tasks for students who previously studied material or have a good grasp of it
- Group work considerations; mixed ability

Learning styles activities

- Lectures
- Individual and group exercises
- Quizzes
- Test
- Presentation production
- Poster production



Global citizenship, internationalism, local environment

- Connections with daily used elements: bromine, helium, iron...
- Distillation facilities in oil refineries
- Images in the presentation connect to international or to local culture (Sydney's steel bridge, aluminium sculpture in Vevey...)
- Mendeleev proposal of a Periodic Table: reactions of the scientific community to new concepts and models



UNIT 2 - PHYSICAL CHEMISTRY

CHEMISTRY 2

Content

- Enthalpy changes
- Exothermic and endothermic processes
- Bond making and bond breaking
- Energy sources
- Reaction rates
- Collision theory
- Photochemical reactions
- Reversible reactions
- LeChâtelier's principle
- Haber and Contact processes
- Redox reactions
- Oxidation state
- Electrolysis
- Aluminium extraction
- Electrolysis of brine
- Copper electro refining
- Electroplating

Resources & ICT

- Textbook
- Study guide
- Keynote
- Online resources available from BM website
- Internet research

Types of assessment

- Quality of practical work
- Exercises from textbook and study guide
- Multiple choice questions from past papers
- Structured questions from past papers
- Peer assessment
- Judgements on effort and attitude towards learning

Students to Know

- Definitions of physical chemistry concepts: enthalpy, exothermic, endothermic, reaction rate, collision theory, photochemical, Le châtelier's principle, odd reaction, electrolysis, electroplating
- Examples of exothermic and endothermic reactions
- The conditions used in the industry to perform the Haber process, the Contact process, aluminium extraction, brine electrolysis and copper electro refining

Students to Understand

- How to determine if a reaction is exothermic or endothermic
- The factors affecting the rate of a reaction
- The concept of dynamic equilibrium
- The products obtained from an electrolysis experiment may differ depending on the conditions (temperature, concentrations...)

Students to be able to Do

- Perform calculations with enthalpy changes
- Answer factual questions and show good exam technique

Cross curricular links

- Biology; photosynthesis
- Geography; ore deposits in the world
- Economy; economical importance of aluminium and of the products obtained from brine
- Physics; electricity production

Differentiation incl. EAL

- Extension tasks for students who previously studied material or have a good grasp of it
- Group work considerations; mixed ability

Learning styles activities

- Lectures
- Individual and group exercises
- Quizzes
- Test
- Presentation production
- Poster production



Exothermic reaction

Gabriel Pollard / CC BY-SA 2.5

Global citizenship, internationalism, local environment

- Ore deposits in the world
- Aluminium production plant in Russia
- The needs for aluminium in industrialised countries
- The uses of batteries, discussion about energy consumption



BRILLANTMONT
International School

October-November - 5 weeks

UNIT 3 - ORGANIC CHEMISTRY

Content

Revision

- Natural fuels & crude oil
- Alkanes, alkenes, alcohols: structure, preparation, reactions
- Addition polymerisation
- Condensation polymerisation
- Polyesters, polyamides
- Uses of plastics; pollution

Extension

- Organic acids: reactions
- Esters
- Addition vs. polymerisation
- Food constituents
- Proteins, fats, carbohydrates and the associated monomers

Resources & ICT

- Textbook
- Study guide
- Keynote
- Online resources available from BM website
- Internet research

Types of assessment

- Quality of practical work
- Exercises from textbook and study guide
- Multiple choice questions from past papers
- Structured questions from past papers
- Peer assessment
- Judgements on effort and attitude towards learning

Students to Know

- Definitions of these terms: distillation, homologous series, functional group, general formula, isomerism, monomer, polymer, addition and condensation polymerisation
- Structures and reactions of alkanes, alkenes, alcohols, organic acids, esters
- The bromine water test for alkenes
- The structure of natural macromolecules found in food

Students to Understand

- The connection between functional groups and their specific reactivity
- How natural macromolecules can be related to synthetic polymers; similarities and differences in structures and in linkages

Students to be able to Do

- Determine which monomers are necessary in order to produce a particular polymer
- Deduce from the previous information whether the polymer is produced by addition or condensation
- Recall the properties of proteins, fats and carbohydrates and the conditions for their hydrolysis
- Answer factual questions and show good exam technique

Cross curricular links

- Biology; proteins and amino acids, chromatography of amino acids
- Economy; economical importance of synthetic and natural polymers
- PSHE; balanced diet

Differentiation incl. EAL

- Extension tasks for students who previously studied material or have a good grasp of it
- Group work considerations; mixed ability

Learning styles activities

- Lectures
- Individual and group exercises
- Quizzes
- Test
- Presentation production
- Poster production



Japanese moulded plastic food replicas

Bantosh / CC BY-SA 3.0

Global citizenship, internationalism, local environment

- Consequences of plastic pollution; ways to reduce consumption and impact of plastic wastes
- The influence of oil extraction processes on the environment, the 2010 Deepwater Horizon oil spill
- Discussion about the TRIDEL plant in Lausanne
- Field trip to the Peugeot factory in Sochaux, France ; plastic production line, plastic assembly line



UNIT 4 - INORGANIC CHEMISTRY

Content

Revision

- pH scale and indicators
- Properties of acids & bases
- Strong and weak species
- Salts preparation
- Anions, cations, gas detection
- Reactivity series
- Competition reactions
- Metal extraction: iron and zinc
- Steel production
- Use of metals: Al, Zn, Fe, Cu
- Rusting

Extension

- Amphoteric oxides
- Thermal stability
- Water treatment
- Air & oxygen
- Air pollution and catalytic converters
- Carbon compounds
- Calcium compounds
- Fertilisers
- Sulphur compounds

Resources & ICT

- Textbook
- Study guide
- Keynote
- Online resources available from BM website
- Internet research

Types of assessment

- Quality of practical work
- Exercises from textbook and study guide
- Multiple choice questions from past papers
- Structured questions from past papers
- Peer assessment
- Judgements on effort and attitude towards learning

Students to Know

- Uses and the compounds of selected elements: iron, zinc, aluminium, copper, calcium, nitrogen and sulphur
- The tests for selected cations, anions and gases
- The meaning of pH and the techniques employed to determine it

Students to Understand

- The principle of catalytic converters
- The chemical connections between the main calcium compounds
- The operating principles of a blast furnace; chemical equations involved in iron production and purification
- Equations of thermal decomposition of metal carbonates, hydroxides and nitrates

Students to be able to Do

- Select from a list the likely amphoteric oxides
- Recall the conditions of temperature and pressure to achieve the Haber process and the Contact process
- Answer factual questions and show good exam technique

Cross curricular links

- Biology; fertilisers, effect of the pH on plant growth
- Economy; economical importance of some elements and their compounds, i.e. sulphur and sulphuric acid
- Geography; natural resources

Differentiation incl. EAL

- Extension tasks for students who previously studied material or have a good grasp of it
- Group work considerations; mixed ability

Learning styles activities

- Lectures
- Individual and group exercises
- Quizzes
- Test
- Presentation production
- Poster production



Třinec Iron & Steel Works, Třinecké železářny

Global citizenship, internationalism, local environment

- Blast furnace in Northern Germany and in China
- Air and water pollution ; air and water purification
- Local water purification system
- Discussion of the evolution of steel production by country

