

## Science Department

### Long-term sequencing KS5 Y12 Chemistry

#### Intent

As a team we have consistent high expectations based on an ambitious constructed curriculum, designed to build confidence through core substantive knowledge and disciplinary skills. The principles of science of learning and sequencing are weaved throughout with links to prior knowledge to ultimately support knowing and remembering more. We wish to develop enquiring minds of students that question the world around them. They should be able to interpret data and information from a range of sources using mathematical techniques and comprehension skills. They will be able to follow methods to get valid results and analyse the results to reach reasoned conclusions. We expect students to be able to manipulate a range of scientific apparatus and work safely to gather their results. They should be able to gather and record results with a suitable degree of accuracy and precision. When representing results we expect pupils to be able to present their information in an appropriate table or graph. As a department we are driven by principles of Catholic faith which means we ensure equity of access through our curriculum planning/design and that students are not disadvantaged because of their socio-economic status or SEND/ additional need. Chemistry pupils should have a key understanding of reactivity of groups and properties of periodicity through a thorough understanding of organic functional groups and mechanisms. Pupils will be able to interpret changes in physical reaction conditions, using maths and key practical skills to articulate their learning and enable them to develop key transferable skills for future study and job prospects.

We aim to encapsulate an enjoyment of our subject through our teaching with the aim to inspire our pupils to continue their scientific education for future learning or employment. Our curriculum enables all pupils to do and be of their best and unlocks opportunity for further education

#### **HALF TERM 1:**

##### **STUDENTS MUST KNOW;**

##### **Atomic structure**

Atomic Structure

The TOF Mass Spectrometer

Electron Configuration

Ionization Energies and Trend

RP1: Making a standard solution and performing titrations

##### **Amount of substance**

Avogadro's number and Moles

Significant figures and Standard form

Gas volumes

RFM and Percentage of an element in a compound

Empirical formula

Ideal gas equation

#### **HOW THIS WILL BE ASSESSED:**

#### **HALF TERM 2:**

##### **STUDENTS MUST KNOW:**

##### **Amount of substance**

Standard solutions and molarity

Titration Calculations and errors

Predicting masses

Atom economy

Predicting and writing ionic formula

*RP1: Making a standard solution and performing titrations*

##### **Bonding**

Ionic bonding

Covalent bonding

Charge clouds

Shapes of molecules

Polarisation

Intermolecular forces

Metallic bonding and properties of metals

#### **HALF TERM 3:**

##### **STUDENTS MUST KNOW:**

##### **Energetics**

Enthalpy

Bond enthalpies

Measuring enthalpy changes

Hess's Law

##### **Organic Chemistry**

Introduction to Organic Chemistry

Naming and drawing Organic Compounds

Isomers

Alkanes

Complete and incomplete Combustion

Cracking

*RP2: Measuring enthalpy change*

#### **HOW THIS WILL BE ASSESSED:**

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<p>Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit</p>	<p><b>HOW THIS WILL BE ASSESSED:</b> Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit</p>	<p>Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit</p>
<p><b><u>HALF TERM 4:</u></b> <b>STUDENTS MUST KNOW:</b> <b><u>Haloalkanes</u></b> Alkanes and petroleum Alkanes as fuels Synthesis of chloroalkanes Halogenoalkanes Nucleophilic substitution Elimination reactions</p> <p><b><u>Alkenes</u></b> Alkene reactions and addition polymerisation</p> <p><b><u>Kinetics</u></b> Reaction Rates Catalysts Measuring reaction rates</p> <p><b><u>Equilibria and Redox</u></b> Reversible reactions Industrial processes Equilibrium constant and factors affecting it Redox reactions and equations.</p> <p><b>HOW THIS WILL BE ASSESSED:</b> Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit, end of unit assessment.</p>	<p><b><u>HALF TERM 5:</u></b> <b>STUDENTS MUST KNOW:</b> <b><u>Alcohols</u></b> Alcohols Dehydration of alcohols Ethanol production Oxidation of alcohols Analytical techniques <i>RP5: How to distil a product from a reaction</i></p> <p><b><u>Inorganic Chemistry</u></b> The periodic table Periodicity Group 2 and Group 7 and Tests for ions <i>RP4: Testing for cations and anions including halides</i></p> <p><b>HOW THIS WILL BE ASSESSED:</b> Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit, end of unit assessment.</p>	<p><b><u>HALF TERM 6:</u></b> <b>STUDENTS MUST KNOW:</b></p> <p><b><u>A2 Organic</u></b> Optical Isomerism Aldehydes and ketones Carboxylic acids and their derivatives <i>RP6: Tests for functional groups</i></p> <p><b><u>A2 Kinetics</u></b> Rate equations Equilibrium constant <math>K_p</math> for homogeneous systems <i>RP3: Measuring the rate of reaction with changes in temperature.</i></p> <p><b>HOW THIS WILL BE ASSESSED:</b> Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit, end of unit assessment.</p>

**Home learning set will consist of a combination of: Exam questions, Question booklets and practical workbooks.**

**Science Department**

## Long-term sequencing KS5 Y13 Chemistry

### HALF TERM 1:

#### STUDENTS MUST KNOW;

##### Kinetics:

- Orders of reaction
- Rate constant
- Rate determining step
- Kc
- Arrhenius equation
- Kp

*RP 7a: Measuring rates of reaction by an initial rates method*

*RP7b: Measuring rates of reaction by a continuous monitoring method*

##### Aromatic Chemistry

- Reactions of Benzene
- Acylation
- Benzene mechanisms

##### Amines Polymers and DNA

- Reactions of Amines
- Amino acids and DNA
- Formation of Polymers
- Polyamides
- Synthesis of Organic Compounds

#### HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall, mid-point knowledge check, end on unit assessment.

Mid point knowledge check through each unit , end of unit assessment.

### HALF TERM 2:

#### STUDENTS MUST KNOW:

##### Thermodynamics:

- Enthalpy changes
- Born Haber Cycles
- Trends in Lattice enthalpies
- Entropy change
- Free Energy change

##### Transition Metals:

- Transition Metals
- Naming Complexes
- Coloured ions
- Colour and Colorimetry
- Colorimetry

#### HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall, mid point knowledge check through each unit ,end of unit assessment.

### HALF TERM 3:

#### STUDENTS MUST KNOW:

##### Reactions of ions in aqueous solutions:

- Variable Oxidation States
  - Metal-aqua ions
  - Reactions of Metal-aqua ions
  - Substitution reactions
  - Chelation
  - Cisplatin
  - Transition Metal catalysts
  - Catalyst efficiency
- RP11: Carry out simple test-tube reactions to identify transition metal ions in aqueous solution*

##### NMR Spectroscopy:

- Infra-red Spectroscopy
- H-NMR Spectroscopy
- C-NMR Spectroscopy

##### Chromatography:

*RP 12: Separation of species by thin-layer chromatography*

#### HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall, mid point knowledge check through each unit,end of unit assessment.

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<p><b>HALF TERM 4:</b>  <b>STUDENTS MUST KNOW:</b>  <u>Electrode potentials and Electrochemical cells:</u></p> <ul style="list-style-type: none"> <li>•Cells and batteries</li> <li>•Electrode Potentials</li> <li>•Electrochemical Series</li> <li>•REDOX</li> <li>•Electrochemical cells</li> <li>•RP8: <i>Measuring the EMF of an electrochemical cell</i></li> </ul> <p><u>Acids and bases:</u></p> <ul style="list-style-type: none"> <li>•Lewis Acids and Bases</li> <li>•Acidity reactions</li> <li>•Bronsted Lowry Acids and Bases</li> <li>•Calculating pH</li> <li>•Weak acids and bases</li> <li>•Calculating Kw</li> <li>•pH titration curves</li> <li>•RP9: <i>Investigate how pH changes when a weak acid reacts with a strong base and when a strong acid reacts with a weak base</i></li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b>            Low stakes quizzing, questioning, retrieval practice and recall            Mid point knowledge check through each unit, end of unit assessment.</p>	<p><b>HALF TERM 5:</b>  <b>STUDENTS MUST KNOW:</b> .            Exam practise for Paper 1 and 2</p> <ul style="list-style-type: none"> <li>•RP10a: <i>Preparation of a pure organic solid and test of its purity</i></li> <li>•RP10b: <i>Preparation of a pure organic liquid</i></li> </ul> <p><b>HOW THIS WILL BE ASSESSED:</b>            EOTT at the end of every unit.            LRW which encompass a combination of the units covered so far            Papers are constructed using            Practice marking at KS5 especially with newer members of staff            Experienced exam markers part of the team and moderation process.</p> <p><b>HOW THIS WILL BE ASSESSED:</b>            Low stakes quizzing, questioning, retrieval practice and recall            Mid point knowledge check through each unit, end of unit assessment.</p>	<p><b>HALF TERM 6:</b>  <b>STUDENTS MUST KNOW:</b>            Exam practise for Paper 2 and 3</p> <p>EXAM</p>
<p><b>Home learning set will consist of a combination of: Exam questions, Question booklets and practical workbooks.</b></p>		

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