Year 10
Subject: Chemistry
Topic/Unit: C3 Quantitative Chemistry
When: Half Term 3 and 4

Huntington School
Learn and succeed

Overview: Why this? Why now?
This unit introduces the mathematical side of chemistry, focusing on measuring and calculating the amounts of substances involved in chemical reactions. It is a vital bridge between theoretical science and industrial application, ensuring students understand how to predict product yields and manage resources efficiently.

Building on...building to:
This unit builds on the concepts of **atomic structure**, **isotopes**, and **balancing equations** from previous units. It provides the essential mathematical framework required for later topics, including **rate of reaction**, **chemical cells**, and **organic chemistry**.

Sequence summary:
- **Mass and Formulae:** Students begin by calculating **Relative Atomic Mass** and **Relative Formula Mass**, learning to count atoms within complex chemical formulae.
- **The Law of Conservation:** Lessons reinforce the **Law of Conservation of Mass**, specifically investigating why reactions involving gases may appear to change in mass on a balance.
- **The Mole Concept:** Students are introduced to the **mole** and **Avogadro's constant**, practicing conversions between mass and moles.
- **Chemical stoichiometry:** Using balanced symbol equations, students determine **molar ratios** to perform **reacting mass calculations**.
- **Industrial Efficiency:** The unit covers **percentage yield** and **atom economy**, exploring why reactions rarely produce 100% of the expected product in industrial settings.
- **Solutions and Gases:** Students calculate **concentrations** in both mol/dm^3 and g/dm^3. They then apply these skills to **titration calculations** and **gas volume** problems, using the principle that one mole of any gas occupies the same volume at room temperature.
- **Limiting Reagents:** The sequence concludes with identifying **limiting reactants** and using experimental mass data to deduce balanced chemical equations.

Key Vocabulary: Relative Atomic Mass, Relative Formula Mass, Mole, Avogadro's Constant, Conservation of Mass, Stoichiometry, Limiting Reactant, Percentage Yield, Atom Economy, Concentration, Titration, Molar Volume.

Assessments:
- **Formative:** Regular "Do Now" retrieval tasks focusing on calculations and unit conversions.
- **Summative:** Mid-unit quiz on mole-mass calculations and a formal end-of-unit assessment featuring GCSE-style multi-step reacting mass and titration questions.

Able and interested:
Learners will tackle complex **titration problems** requiring unit conversions and use **molar ratios** to balance equations from raw experimental data.

Inclusion, Personal Development and Wider Skills:
Mathematical support is provided through the "box method" for balancing equations and step-by-step calculation strategies. Students develop **analytical skills** by evaluating the environmental and economic impacts of low atom economy in manufacturing.

Homework and Independent Learning:
Students will complete a task set on the SPARX online platform. The task is based on the current topic but also includes consolidation on previous topics. It will automatically adjust the level of challenge as the student complete the activities.