Year 10
Subject: Chemistry
Topic/Unit: Chemical Analysis
When: Half Term 5

Huntington School
Learn and succeed

Overview: Why this? Why now?
Chemical analysis is the process of identifying what substances are made of and how pure they are. This unit is essential because it teaches students how to verify the safety and quality of products, such as medicines and food. By understanding these techniques, students can see how science is applied in forensics, environmental monitoring, and healthcare.

Building on...building to:
This unit builds on earlier concepts of **elements, compounds, and mixtures**. It applies prior knowledge of **bonding and ions** to practical scenarios. This knowledge leads to further study in organic chemistry and the industrial use of resources.

Sequence summary:
- **Purity and Formulations:** Students define "pure" substances as those containing only one element or compound. They explore **formulations**, which are mixtures designed for a specific use, such as paints, fuels, or medicines.
- **Chromatography:** Learners investigate how substances are separated based on their solubility in a **mobile phase** and attraction to a **stationary phase**. They calculate **R_f values** to identify components in a mixture.
- **Gas Testing:** Students perform chemical tests to identify **hydrogen** (squeaky pop), **oxygen** (relights a glowing splint), **carbon dioxide** (turns limewater cloudy), and **chlorine** (bleaches damp litmus paper).

Separate science only
- **Testing for Positive Ions (Cations):** Using **flame tests**, students identify metal ions such as lithium (crimson), sodium (yellow), and potassium (lilac). They also use **sodium hydroxide** to form coloured precipitates for ions like copper (blue) and iron (green/brown).
- **Testing for Negative Ions (Anions):** Students use specific reagents to detect **carbonates**, **sulfates**, and **halides** (chlorine, bromine, and iodine), observing the resulting precipitate colours.
- **Instrumental Methods:** The unit concludes by comparing traditional lab tests to **instrumental methods** like **flame emission spectroscopy**, which are faster and more accurate.

Key Vocabulary:
Pure, Formulation, Chromatography, R_f Value, Precipitate, Cation, Anion, Spectroscopy, Halide, Mobile Phase.

Assessments:
- **Formative:** Retrieval "Quick Quizzes" on gas tests and ion colours. Practical "Plan" tasks where students write logically sequenced instructions.
- **Summative:** A formal end-of-unit assessment focusing on identification tables and the advantages of instrumental methods.

Able and interested:
Students will evaluate the use of **spectroscopy** in monitoring environmental toxins. They will also practice writing complex **ionic equations** for precipitation reactions.

Inclusion, Personal Development and Wider Skills:
Lessons include **dual-coding** techniques and flashcards to support memory. Students develop **lab safety awareness** when handling irritants like hydrogen peroxide.

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.