Year 7
Subject: Science (Chemistry)
Topic/Unit: Matter and the Particle Model
When: Half Term 2

Huntington School
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Overview: Why this? Why now?
This unit introduces the fundamental concept that everything in our universe is composed of physical substance known as **matter**. By understanding that all materials are made of tiny, invisible **particles**, students can explain why substances behave differently. This knowledge is essential for predicting the properties of new materials and understanding the physical world at a molecular level.

Building on...building to:
This work builds on primary school foundations regarding solids, liquids, gases, and basic material properties. It leads to an advanced ability to use the **particle model** to describe complex material behaviours and prepares students for future studies in chemical reactions and separating mixtures.

Sequence summary:
1. **Foundations of Matter:** Defining matter and particles using the **John Dalton model**, which represents atoms as solid spheres.
2. **State Properties:** Investigating the characteristics of solids, liquids, and gases, including **compression**, flow, shape, and volume.
3. **Laboratory Skills:** Mastering the safe operation of a **Bunsen burner**, including the use of safety and blue flames.
4. **Thermal Expansion:** Using the "ball and ring" experiment to observe how particles take up more space as they vibrate when heated.
5. **Changes of State:** Naming processes such as **sublimation** and **evaporation** while understanding that mass is always **conserved** during these physical changes.
6. **Data and Analysis:** Conducting practical experiments to record the heating of icy water and learning to plot accurate **line graphs** with titles, units, and lines of best fit.
7. **Gas Dynamics:** Exploring **Brownian motion** (random particle movement) and **diffusion**, the process where particles move from high to low concentrations.

Key Vocabulary:
Matter, particle, Dalton model, **compression**, thermal expansion, conservation of mass, boiling point, **Brownian motion**, and diffusion.

Assessments: Students will be assessed through quick-recall quizzes on definitions and state properties. Practical competency will be checked through a safe Bunsen burner setup. Students will complete exam style questions and will be working towards their first assessment in this half term.

Able and interested: Higher-attaining students can investigate "smart" materials like **Nitinol wire**. They may also explore why different substances, such as lead and wax, have vastly different melting points based on the strength of attraction between their particles.

Inclusion, Personal Development and Wider Skills: This unit develops significant **mathematical proficiency** through the use of continuous variables, scales, and graph analysis. Personal safety is emphasized through rigorous laboratory protocols.

Homework and Independent Learning:
Students will be set weekly homework assignments using the Sparx online learning platform.