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| **The Periodic Table (14 lessons)** – In this unit you will build on your knowledge of particles and chemical reactions from Year 7 Chemistry to discover what everything on our planet is made up of, why helium is used to make balloons float and why ‘Francium’ is so reactive that only 25 grams of it occur at any time in the entire crust of the Earth!  We will also learn how scientists have been making discoveries about atoms since 400BC and how some scientists were able to ‘predict the future’ without the use of modern technology. You will learn how bridges, aeroplanes and kitchen foil are all formed from rocks in the ground you walk on. | | | | |
| **Core Questions for the Unit** | 1. **A simple (Dalton) atomic model** 2. What is an atom? 3. How has the model of the atom developed through time? 4. What is the structure an atom? 5. **The periodic Table** 6. What is the periodic table? 7. What information does the periodic table tell us? 8. How are elements organised in the periodic table? 9. **The principles underpinning the Mendeleev Periodic Table** 10. How has the periodic table developed through time? 11. How did Mendeleev build the periodic table we use today? 12. **The varying physical and chemical properties of different elements** 13. What are the differences between physical and chemical properties? 14. What are the physical and chemical properties of group elements? 15. **The properties of metals and non-metals** 16. Where are metals and non-metals found on the periodic table? 17. What are the chemical and physical properties of metals? 18. What are the chemical and physical properties of non-metals? 19. How do the properties of different metals make them suitable for their uses? 20. **The Periodic Table: periods and groups; metals and non-metals How patterns in reactions can be predicted with reference to the Periodic Table** 21. What are the chemical and physical properties of group 1 elements? 22. What are the chemical and physical properties of group 7? 23. Displacement reactions and group 7. 24. What are the chemical and physical properties of group 0 elements? 25. **The reactivity series and reduction**   a) What is the order of metals and carbon in the reactivity series  b) How can be used carbon in obtaining metals from metal oxides | | | |
| **Scientific skills** | Making predictions  Recording observations of chemical reactions  Forming conclusions based on observations  Understanding risks associated with certain chemical reactions  Analysing data | | | |
| **Links to other subjects** | Design and technology – Properties of materials  Maths – Numeracy and graph analysis  MFL – How scientists across the globe communicate  English – Presenting information and communicating findings  History – History of scientific discoveries | | | |
| **Development of new knowledge** | A simple (Dalton) atomic model  The periodic Table  The principles underpinning the Mendeleev Periodic Table  The varying physical and chemical properties of different elements  The Periodic Table: periods and groups; metals and non-metals How patterns in reactions can be predicted with reference to the Periodic Table  The properties of metals and non-metals  The order of metals and carbon in the reactivity series  The use of carbon in obtaining metals from metal oxides | | **Strengthening of prior**  **Knowledge** | **Year 7:**  The difference between chemical and physical changes  Differences between atoms, elements and compounds  Chemical symbols and formulae for elements and compounds  Conservation of mass chemical reactions  Word equations  **Year 5:**  Is able to describe a materials physical properties (hardness, solubility, transparency, conductivity, magnetism).  Demonstrates an understanding of reversible and irreversible changes.  **Year 2:**  Is able to name the materials that make up objects around me.  Has the ability to compare the properties of some materials.  Demonstrates the ability to compare the suitability of everyday materials for particular uses (e.g. wool for jumpers/rubber for soles of shoes).  **Year 1:**  Has the ability to identify and name everyday materials.  Is able to describe what an object is made from.  Is able to describe the physical properties of everyday materials using some scientific words (e.g. hard/ shiny/bendy/transparent).  Has the ability to independently sort and group objects by their physical properties. |
| **Vocabulary:**  These are the main words we will be using. | **Tier 2 Words:**  **Evaluate**  **Compare**  **Describe**  **Explain**  **Contrast**  **Noble**  **Model**  **Pattern**  **Develop**  **Property**  **Conduct**  **Design**  **Display** | **Tier 3 Words:**  **Periodic table**  **Element**  **Electrons**  **Neutrons**  **Protons**  **Atomic mass**  **Displacement**  **Reactivity**  **Brittle**  **Ductile**  **Conductivity**  **Halogens**  **Alkali metals**  **Subatomic** | **Reading Opportunities**  **Numeracy Opportunities** | * <https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/1> * <https://www.wired.com/2009/09/the-development-of-the-atomic-model/> * <https://www.rsc.org/periodic-table/history/about> * <https://www.theguardian.com/science/grrlscientist/2013/may/10/1> * Textbooks * Plotting data, describing and explaining patterns in data |
| **The activities you are likely to do in lesson.** | **Atomic model**   * DO IT NOW- Check lists and key word spellings and definition sheet. * Decode it now: model * Think pair share: show an images of different models. Students are to answer- what are these? What are they used for? Challenge: evaluate them as models. * Retrieval practice: Link back to year 7- Students have 2 minutes to draw an atom! * Class reading activity: students read text about the model of the atom through history. Students complete comprehension questions. * Thinking map: flow map. Students create a flow map sowing the different atomic models through history. Challenge- explanations as to why these models change through time/ evaluate the different models. * Practical opportunity: students can build their own models of the atom. * Review it now: Students draw the structure of an atom from memory and score points based on how much they can recall.   **The periodic table**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Decode it now: periodic * Retrieval- Link back to year 7- what are atoms, elements and compounds? * Think pair share: What is the periodic table? What does it tell us? * Thinking map- bubble map: students complete a bubble maps summarising the key things the periodic table tells us. * Link to MFL- why is it important for scientists around the world to use chemical symbols? Show element names in different languages and students have to match the word to the correct language. * Engagement: The periodic table song and the Daniel Radcliffe version- how many elements can you write down from the song? Challenge- can you describe any of their uses? * Literacy task: students peer-assess using their blank periodic table and ‘sp’ and spelling error. Students then correct any spelling mistakes in their list. * Fishing for knowledge activity: Students are given a ‘blank’ periodic table only containing the elements. Students must colour ad label the different sections and label the groups and periods. In groups 1 person can come to the front to view the completed periodic table for 40 seconds and feedback information to their groups. * Alternatively, reading activity: student can be given a piece of text with the information and translate this into their periodic table. * Review it now: quiz- how many electrons does each element have in their outer shells?   **The development of the periodic table:**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Decode it now: develop/ development * Video- show students a video about Mendeleev and his role in the development of the periodic table * Reading activity: Class reading about how the periodic table has developed through time * Thinking map: flow map. Students complete a flow map summarising the development of the periodic table and the different models throughout history. * Modelling opportunity: students could complete washing line timelines to show how the periodic table has developed throughout history. * Writing activity: students explain why these changes occurred. Provide a levelled criterion looking into the factors that lead to current periodic table we use. * Reading opportunity: DART new element discovery * Review it now: Two stars and a wish self-assessment and improvements on writing activity.   **The physical and chemical properties of different elements**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Decode it now: property * Retrieval- year 7 what are the differences between chemical and physics changes. How could this knowledge be used to explain what is meant by chemical and physical properties. * Key word definitions: chemical and physics properties with examples * Dual coding opportunity: images of chemical and physics properties- students can identify which are chemical an which are physical. * Thinking map: Tree map- categorising physical and chemical properties * Research opportunity- students research the chemical and physical properties of any 5 elements from the periodic table * Oracy- Students present their elements to the class * Review it now: WWW/EBI of presentations.   **Metals and non-metals**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * ‘The guessing game’ students have 2 minutes to write which of the elements on the board are metals. * Retrieval- ‘What am I’ game covering key words from the unit so far. Students are given three facts and must write down the key word. * Decode it now: conduct * Active reading activity: student must find the correct key words for the definitions- including ductile, brittle * Practical opportunity: students test the properties of metals to conclude some properties of metals. Challenge- explaining why metals can conduct electricity. Link to year 7/8 physics electricity and energy. * Thinking map: Tree map- students categorise the properties of metals and non-metals. Key terms can be put on the board to support. * Students match different metals to their uses. Higher level- justifications to be made for each choice. * Link to technology- Reading activity- DART about the types of metals used in famous bridges around the world * Review it now: Here are the answers, write the questions!   **Electronic structure (optional to support with understanding reactivity in later lessons. This may need to be simplified for lower ability groups)**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Retrieval: show students an image of an element from the period table- Recap quiz- what do the numbers tell you * Decode it now: Subatomic * Students apply this to give the number of electrons, protons and neutrons in a range of elements * Modelling- show students how to draw he electronic structure using the visualiser * Practice as a group drawing some * Students complete independent practice * Review it now: students write the name of the element based on the electronic structure diagram shown on the board.   **Group 1 metals part 1**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Think pair share: Chemical symbols on the board of group 1 metals. ‘What do these have in common’? * Students then draw the group as seen on the periodic table in their books * Retrieval- physical properties of metals * Students watch a video and need to write down how the physical properties of group 1 metals differ from the metals we looked at in the previous lesson. * Thinking map: double bubble map comparing the similarities and differences between metals and group 1 metals. * Decode it now: Reactivity * Practical opportunity: demo group 1 metals properties and reactions with water. Students complete the observation sheet while you show them the physical properties and reactions with water. Show videos of the ones we do not have in school. * Retrieval: Link to year 7 chemical reactions- word equations. * Students then apply what they have seen with the group 1 metals and water to write the general equation then specific word equations for the reactions they observed. Challenge- balanced symbol equations. Support- card sort for the general equation and another card sort to display the word equations. * Review it now: what’s your favourite group 1 element and why? What would you like to learn more about this element?   **Group 1 metals part 2**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Decode it now: pattern * Electronic structure challenge- draw the electronic structure of as many group 1 elements as you can from the top of the group to the bottom. What patterns do you notice? * Students then link this pattern to the pattern they observed in reactivity last lesson * Extended writing opportunity: problem solver, extended writing and redraft- ‘Explain the structure, properties and reactivity of group 1 metals’ * Reading opportunity: DART about the most reactive group 1 metals. * Review it now: 2 stars and a wish for the extended writing piece.   **Group 7 elements**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Think pair share: Chemical symbols on the board of group 7 elements. ‘What do these have in common’? * Students then draw the group as seen on the periodic table in their books * Retrieval- chemical and physics properties of non-metals * Thinking map- bubble map: Students complete a bubble map for each element summarising their properties from the text in the information sheets. * Decode it now: compare * Maths skills- give students data about the melting and boiling points of group 7 elements. Student spot data and describe the patterns. Provide students with data from group 1 and ask them to give a written comparison of their boiling and melting points patterns. * Review it now: Put images og different halogens on the board. Students must identify which halogen it is.   **Group 7 elements part 2:**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Decode it now: Displace * Modelling: model displacement using superheroes/ relationships etc. * Give the rule for displacement of halogens. * Provide students with a result table showing reactions between halogen and salts. They must complete a description of the results and higher-level explanation of the results. * Retrieval- link to year 7 chemical reactions- word equations. Students complete word equations for the displacement reactions in the table. Challenge- balanced symbol equations. * Reading opportunity: DART about the uses of halogens * Review it now: multiple choice quiz about the unit so far   **Group 0 elements**   * Retrieval practice: DO IT NOW Ranging difficulty of recall from the previous lessons and challenge questions * Challenge- find the noble gases on your periodic table and write them in books * Decode it now: Noble * Engagement- the noble gases song. Students write down one fact about each noble gas from the video * Think pair share- what is different about the group 0 elements? Why do you think they do not react? Link to ideas about electronic structure * Maths skills- data about boiling points. Students use this to determine physical property of group 0 elements * Check point quiz about noble gases and self-assessment * Reading opportunity: Class reading activity and grid quiz about the uses and properties of different noble gases. * Thinking map- brace map summarising the key features of group 1, group 7 and group 0 elements. * Review it now: Images of noble gas sues- students must write the name of the noble gas used in each image. | | | |
| **How you will be assessed.** | You will be assessed by:   * A retrieval quiz during the Do It Now of every lesson. * Mini quizzes and challenges during lesson. * A progress assessment in the middle of the unit – Here we will reflect and improve on key areas and complete DIRT work.   An end of unit assessment that assesses your knowledge and skills that you have built in this unit and previous units that we link back to. | | | |