CLIL Lesson: Atoms and Molecules

Developer: Joanne Gillespie
Timing: 45 minutes
Age of students: 8-9, 4th Grade
Context and Prior Knowledge: This is at the beginning of a unit about the universe, and follows on from an introduction to the Big Bang

Lesson Steps

1. 2 minutes 0-2	Lead in and Connection to previous learning: *In your last Environmental Studies lesson, what were you talking about with your teacher? [the Big Bang, electrons, neutrons, quarks, light…]* *Today you are going to be learning more about atoms – how they are made, what they are for.* [images – Big Bang, light exploding (slides 2, 3, 5) to elicit and revise vocabulary…]
2. 5 minutes 3-7	Activity 1 – Hypothesising like ancient scientists *A long time ago, in fact thousands of years ago, ancient people looked at the sky and the stars, they looked at trees and grass, they looked at the sand on the beach, and they wondered…they thought … deeply…They came up with some ideas….do you know what we call the ideas that we have about how things work?* [slides 6-9] HANGMAN WITH THE WORD HYPOTHESIS – *what is it? A theory, an explanation, which we have to prove.* *One Greek scientist OBSERVED, developed a HYPOTHESIS, TESTED his hypothesis, and came up with a THEORY. This theory forms the base of all modern science!*
3. 5 minutes 8-12	Activity 2 – Repeating Democritus' experiment *His name was Democritus, and this is one of the many scientific experiments that he did, to prove an hypothesis.* [demonstration: explain how Democritus broke a shell in to dust…use a dry biscuit to demonstrate. Let the students try this…] Explain "*Democritus thought that every single thing was made of tiny pieces – he called these a-tomon – which meant UNCUTTABLE in Ancient Greek. [slides 10-12]* (Paperclip example if necessary – see appendix)
4. 7 minutes 13-19	Activity 3 – learning about the parts of an atom (video and worksheet) Questions to activate interest – slides 13 -15 Video ishttps://www.youtube.com/watch?v=vlSOESXQI7o. Start video at 2:49. Pause frequently to allow time to complete Part A of worksheet. The shell or orbit is not explicit – draw on board and give the learner the vocabulary (orbit – shell). Stop video at 3:46. Learners unfold the worksheet, watch the part of the video again, and choose the best words to complete each sentence. Check answers. KEY: 1. Neutrons are **as heavy** as protons. 2. The nucleus of an atom is **positively** charged. 3. The negative charge of an electron is **equal to** the positive charge of the nucleus. 4. In total, an atom is **neutral**. Last unfolding – rearrange the words. Special fact: An atom always has the same number of protons as electrons. Check answers [slide 16]
5. 10 minutes	Activity 4 – Making an atom together with our bodies Say "*Now you are going to make a demonstration of an atom. I need 6 volunteers.* Groups of 6 = 4 people holding the shell (ribbon), one electron, one proton

20-29	They arrange themselves into an atom shape. *Do you remember what the most common element in the universe is? (Hydrogen). What do you notice about this atom? What is missing? (a neutron)* *Hydrogen is the only stable element without a neutron.* *Let's add another proton, and two neutrons.* Give the role cards to two more volunteers. *Now how many protons do we have? What is missing now? Yes, an electron!* Get another volunteer to be an electron – they attach themselves to the shell opposite the first electron. *Now we have made the second most common element in the universe. Do you remember what that was? Helium.* *Now, if we wanted to go to the next atom, we would need more people that we have! That is because the FIRST shell of an atom only has space for TWO electrons. How many electrons does a Helium atom have? (two) – so we would need another four people to make the next shell, plus what? (elicit three more people – a proton, a neutron and another electron).*
6. 3 minutes 30-32	Activity 5 – Introducing the Periodic Table *How do we know which atom we would make, by adding another shell, electron, proton and neutron? Scientists have discovered more than 100 different elements, and they have arranged them in a table. This is called the Periodic Table.* [slide17-18] Have students come and circle Hydrogen and Helium. Ask what we could have made by adding another shell and one more electron and proton (Lithium - a soft silver-white metal. It is the lightest of the alkali metals.)
7. 8minutes 33 - 40	Activity 6 – making models of atoms using craft kits Show Slide 19 – the number of electrons allowed in each valence shell. *Now you can work in groups* [depends on how many students, but groups of three is best] *I am going to give each group a special ATOMIC BUILDING KIT! There are instructions in the kit – you will need to look at the Periodic Table, and the slide on the board. Only use a maximum of TWO shells today. So…what is the LAST element on the PT that you could make? (Neon = 10 electrons and protons).* Learners make their models, and T circulates and monitors/assists. (The lesson could end here and be continued in the next lesson period)
8. 3 minutes 41-43	Activity 7– from atoms to molecules Ask *How do atoms join together to make things?* Watch video again – from 4:22. Worksheet 2 – from Atom to Molecule. Feedback.
8. Last 2 minutes	Activity 8 – Lesson reflection (exit ticket) – collect as they leave the room. Three questions: What did I learn today? What message would I write to a missing classmate about today's lesson? How well did I participate?
Appendix	Extra activities and demonstrations to deepen understanding, or to clear up misconceptions where necessary: Paperclip example: Take a pile of paperclips. Divide it into two piles, and again, and again, until you have just one paperclip left. The bigger pile represents matter or a pure element – the single paperclip is the smallest unit of that group which still works. Clip some pages together with it. Then cut it with scissors into two pieces. Ask Ss – does it still work? Does it still do its job? NO – so it is like an atom – the smallest piece of an element that still functions as that element. (this idea is taken from https://learning-center.homesciencetools.com/article/chemistry-atoms-science-lesson/)