

Covalent Bonding

Teaching Ideas

Learning Objective: To understand how a covalent bond is formed.

Success Criteria:

- To recall knowledge from unit 4.1 of the periodic table.
- To define keywords.
- To describe how a covalent bond is formed.
- To draw the formation of a covalent bond in various ways.
- To define the properties of simple molecules.

Context: This is the third lesson of the GCSE chemistry key stage 4 AQA 4.2 'Structure, Bonding and The Properties of Matter' topic.

Resources

Lesson Pack

molecular model kit

periodic tables

optional: mini-whiteboards

Starter

As students enter the classroom and settle, please show slide 3. This is a 'Spot the Difference' activity asking students in pairs to spot the differences between two pictures: one of sodium chloride ionically bonded and one of chlorine molecule covalently bonded. There is an embedded three minute timer. This starter activity allows students to reflect and apply their knowledge of ionic bonding from the last two lessons and use it to compare against an unknown picture of bonding. Answers are shown on slide 4.

Main Activities

Covalent Bonding

Slides 5-7: On slide 5 the basics of covalent bonding are introduced, building on the key points students uncovered in the starter activity. A guided example of how chlorine becomes a covalently bonded molecule is given on slides 6 and 7 resulting in the formation of a dot and cross diagram. There is a 'Pause for Thought' question on slide 7, asking students to consider why it is important to use dots **and** crosses, which leads onto the next activity.

Dot and Cross Diagrams

Slides 8-10: These slides contain a step-by-step method for drawing a dot and cross diagram. Slide 8 answers the previous 'Pause for Thought' question by highlighting it is important to know which electrons are shared from which atom. Slides 9 and 10 go through a sequence of steps on how to draw a dot and cross diagram for a chlorine molecule. Students should have access to periodic tables and could follow along in their exercise books, or alternatively on mini-whiteboards as these are easier to wipe clean if mistakes are made.

Building and Drawing Covalent Bonds Activity

Slide 11: Students complete one of the differentiated Building and Drawing Activity Sheets which requires the use of molecular building kits and access to periodic tables. On the sheet, students are encouraged to practice the steps just covered. Each of the six molecules should be built one at a time and the students should be encouraged to complete each row of table, before moving onto building the next molecule. There is an extra column for drawing the displayed formula, to allow for students to

become familiarised with this alternative way of representing covalent bonds, and some examples are given on both sheets. The lower ability sheet has other completed sections, to allow for patterns to be identified and copied. The higher ability sheet has fewer completed sections and also two challenge questions asking for advantages and disadvantages of representing covalent bonds as dot and cross diagrams.

Properties of Simple Covalent Molecules

Slides 12-13: Slide 12 continues the focus on chlorine and introduces the background to its name and its state of matter. On slide 13, chlorine (alongside the other halogens of group 7), are introduced as being 'diatomic' alongside a picture of some halogens and their colours.

Keyword Definitions

Slide 14: Slide 14 shows students three keywords and their definitions – covalent bond, intermolecular forces and diatomic molecules. Students are encouraged to write down these definitions.

Properties of Simple Covalent Molecules Activity

Slide 15: Students complete the [Properties of Simple Covalent Molecules Activity Sheet](#) to identify the basic properties of simple covalent molecules by interpreting a set of data. Questions are also included to encourage students to explain the science behind these properties, plus apply some of the keywords from the previous slide.

Covalent Bonding Exam Style Question

Slide 16: Students follow the worksheet to demonstrate their knowledge of covalent bonding by answering exam style questions. There is also a teacher assessment sheet that could be completed after the lesson where formative feedback can be given.

Plenary

Slides 17-18: In pairs, students read each of the nine clues and guess the keyword or key point from the description 'What Am I?' This reinforces the key points and terminology from the lesson and allows for the teacher to gauge the acquisition of vocabulary and level of knowledge. Answers are shown on slide 18. Remind the students of today's success criteria on slide 19 of the PowerPoint.

Suggested Homework

Students could research about covalent bonding in giant covalent structures in preparation for the next lesson in the topic. Alternatively, students could complete the [Covalent Bonding Exam Style Question](#) if not completed during class time.