SCHOLAR Lesson Outline

curriculum for excellence

subject: Chemistry

Title: Unit 1 -Topic 7 -Bonding Continuum&Polar Covalent Bonding

level: CfE Higher

Activity type	classroom ☑	homework ☑	independent learning ☑	other ☐
Activity objectives(s)	At the end of this topic, you should know that: • The covalent radius is a measure of the size of an atom. • The trends in covalent radius across periods and down groups can be explained in terms of the number of occupied shells, and the nuclear charge. • The trends in ionisation energies across periods and down groups can be explained in terms of the atomic size, nuclear charge and the screening effect due to inner shell electrons. • Atoms of different elements have different attractions for bonding electrons. • Electronegativity is a measure of the attraction an atom involved in a bond has for the electrons of the bond. • Electronegativity values increase across a period and decrease down a group. • Electronegativity trends can be rationalised in terms of nuclear charge, covalent radius and the presence of 'screening' inner electrons.			
Activity resources(s)	Students will need access to the internet and their SCHOLAR login details. Students will need access to a data book.			
Delivery mode	teacher led ☑ student led ☑	Collaboration type	individual ☑ pairs ☐ groups ☑	

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Task description	Computer task Get pupils to navigate to the correct topic - Higher (CfE) Chemistry Unit 1 Topic 1.7 - Bonding Continuum & Polar Covalent Bonding. Navigate through the topic and complete the end of topic test for homework. Students should be familiar with how to use their data books to source periodicity information. • A very simple experiment to test for polar covalent bonding in substances is to run a steady stream of the substance to be tested through a burette and hold a charged plastic rod next to it. If the flow of the substance continues in a straight line the substance it polar but the flow of polar substances will bend in response to the charge. Molymods can be used to predict whether molecules containing polar bonds are themselves polar. • Learners should encounter covalent molecular compounds that contain a metal. Tin(IV) iodide can be formed by gently heating tin and iodine in toluene in a small conical flask. When the mixture is allowed to cool, yellow-brown crystals form which can be collected by filtration. Melting point of SnI_4 is 143 ºC. Tin has an electronegativity of 1.8 and iodine has an electronegativity of 2.6 so this molecule contains polar covalent bonds. • A creative problem solving exercise of the ‘four white powders’ type could be used where learners have white powders and must devise their own experimental method to tell them apart. The powders are: silicon dioxide, glucose, sodium chloride and calcium carbonate. • Common misunderstandings arise when learners focus upon covalent and ionic bonding and fail to appreciate other types of interaction at play. The two activities ‘Interactions’ and ‘Spot the Bonding’ allow consolidation and discussion of intramolecular and intermolecular interactions (Chemical misconceptions: prevention, diagnosis and cure (Volume 2), Keith Taber, Royal Society of Chemistry, 2002) also available online for free. Focus on definitions of "Bonding Continuum", "Polar Covalent Bond","Electronegativity", "Dipole", "Permanent Dipole Interactions", "London Dispersion Forces" and "Monatomic". Also focus on the ability of students to describe why each of these trends arises. Whole class You may wish to give feedback to students on their progress. Display a report of the exercise. Card sorts can be a good way of checking students understanding of the concepts covered in this topic.

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Differentiation (Alternative use)	With an able group of students,you may wish to set this as a homework task to review the topic when you have completed it. With weaker students, you may wish to carry this out as an in class activity so you can answer any questions they may have as they attempt the exercise.
Hints & Tips	This task is best done in pairs or individually. Go round the class and get students to explain their answers. Focus not only on identifying the type of bonding present in a substance but also explaining how these occur. It is a good idea to get students to show you their score when they finish the exercise. If they do not get full marks you can send them back to have another try while the rest of the class finish off. Some teachers like to generate a report while students are logged in so that they can be shown what the teacher can see. This will highlight progress and any pupils who are just clicking reveal, as full marks can only be achieved by entering correct answers. There is online training available to help you learn how to do this. When you are logged in you will see a course called Succeed with SCHOLAR. Unit 1 Topic 7 introduces you to the reporting system. Choose some questions for students to try from the textbook / past paper questions in advance so faster pupils can move onto these. Questions in the end of topic test give extra practice.
Notes	Pupils will need access to a data book. The SCHOLAR section of this material should take approx 30 minutes.