L2 STRUCTURE & BONDING
CHEAT SHEET

STUDY TIME

ABOUT THE STANDARD

- This standard is broken in to a few key parts
  - Types of solid and their similarities and differences
  - Lewis structures, shape and polarity
  - Enthalpy changes

STRATEGIES FOR SUCCESS

- Get your calculations down:
  - There is almost definitely going to be an enthalpy calculation involving bond enthalpies, and a table like this

BOND	BOND ENTHALPY ($Kjmol^{-1}$)
C-C	346
C-H	413
O-H	463
C=O	799

  - This is almost always an excellence question so if you have these down then it's a really good way to boost your grade. The way to do it is to calculate the total bond enthalpy on one side of the equation and then do the same for the other side. Then take the number you got for the reactant and subtract off the number you got for the products!
- Learn the how to pick solid types:
  - Something else that is for sure going to come up is the different types of solid. FIrst things first it's a good idea to get familiar with picking out which sort of solid a compound is just by looking at the formula. If the element is from over the on the right hand side of the periodic table hanging out near sulfur, chlorine, phosphorus etc. then it's probably a molecular solid. If it's from anywhere else then it's probably a metal held together with metallic bonding. Of course in the middle the line does get a bit fuzzy but if you do enough examples you'll start to pick things up in no time. Ionic solids should be really easy to pick because you should all be familiar with your table of ions from last year right! So if you see a compound that has a positive ion like magnesium and negative ion like chloride you know it's probably an ionic solid.
  - The other type of solid is you giant covalent network solids. There are only three of these you need to be aware of, graphite, diamond and SiO2.
- Learn how to explain the properties of compounds:
  - It's all well and good to know that ionic solids are not conductive in the solid state but are conductive when you dissolve them in water or melt them. However you need to explain why they are conductive. A great way to start answering a question like this is with definitions. For example: "Ionic solids are made

up of positive and negative ions arranged in a lattice held together by strong electrostatic forces". Full stop. "In order for something to be conductive it needs to have free moving charged particles" full stop. At this point you can start to link the two. " when in the solid state, the ions are locked in place and so are not free to move and so ionic solids are not conductive. However when melted those ions are free to move which allows them to conduct electricity.
    - Using a structure like this where you kind of define the property and the solid separately and then link the two together is a great way to answer these questions.
- Lewis structures:
    - Again this is something that is guaranteed to come up in the exam so here's a quick method that's a little different to the one you were probably taught.
    - Try and think about how many bonds each atom likes to form by looking at its number of valence electrons. For example let's look at CO2. Carbon has 4 valence electrons since (almost) everything likes to have 8 electrons for its full outer shell, we can see that carbon is missing 4 electrons. This means it will form 4 bonds. If we look at oxygen in a similar way, then we can see that since it has 6 valence electrons and is missing 2 it will form two bonds. Well if we have a carbon atom that wants four bonds and 2 oxygens that want 2 bonds each then we just need to put the puzzle together. O=C=O
    - One big thing is to not forget about filling in your lone paris these are very important and if you don't fill them in in your Lewis structure it will not be marked as correct!
    - The exceptions to this are boron and beryllium. Boron only likes to form 3 bonds and beryllium only likes to form 2 so keep this in mind if they throw one of these curveballs at you!

OVERALL

- This exam is very predictable so past exams are really useful and pretty much everything shows up every year.
- We've covered some important strategies and things to remember, but we haven't covered everything.
- We really recommend going through the last 3-4 years of exam papers, and also using the StudyTime Walkthrough Guide and Checklist to really check and consolidate your knowledge and feel 100% prepared!