

Chemguide – questions

COVALENT BONDING (double bonds)

You may need a copy of the Periodic Table.

1. Draw dots-and-crosses diagrams (showing outer electrons only) for the following:
 - a) oxygen, O₂
 - b) carbon dioxide, CO₂
 - c) methanal (formaldehyde). You are unlikely to be familiar with this compound yet. Its molecular formula is CH₂O. You will have to play around to work out how it is joined up. Make sure that you make the maximum possible number of bonds.
 - d) ethene, C₂H₄
2. This question looks in detail at the bonding in ethene from a modern point of view. Although your syllabus may say that you don't need to know about hybridisation, you still need to know the end result. It is much better if you can understand how the modern view of ethene arises.
 - a) Write down the electronic structure of carbon in s and p notation.
 - b) Show what happens when the atom is excited and an electron promoted.
 - c) Before the carbon atoms bond to each other and to hydrogen atoms to make ethene, they undergo hybridisation. What does this mean, and how are the electrons arranged once this has happened?
 - d) We think of the next stage as the formation of sigma bonds between the two carbon atoms and the carbons and hydrogens. What are sigma bonds, and how are they formed?
 - e) Finally, we picture the formation of a pi bond between the two carbon atoms. How does this form, and how is it different from a sigma bond?