Advanced Higher: Molecular Orbitals

The bonding in some molecules is to complex to describe using VSPER theory.

For these molecules we can use _____ _____ theory instead. When atomic orbitals overlap during bonding, molecular orbitals form.

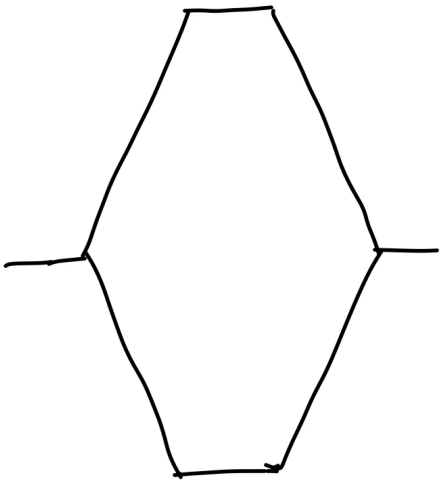
The number of molecular orbitals that form is equal to the number of atomic orbitals involved.

For the simplest diatomic molecule, _____, this means that two atomic orbitals combine to form two molecular orbitals. One _____ orbital and one _____-_____ orbital form.

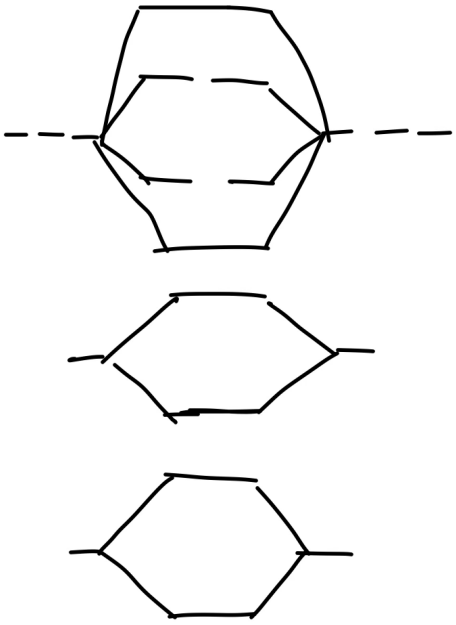
The bonding orbital encompasses both nuclei and the attraction between the nuclei and the electrons forms the bond.

Like atomic orbitals, molecular orbitals can hold a maximum of _____ electrons.

Hydrogen molecular orbital diagram



Fluorine molecular orbital diagram



Non-polar covalent bond.

polar covalent bond

ionic bond

Sigma molecular orbitals /sigma bonds

pi molecular orbitals /pi bonds

Carbon

Hybridisation is the process of mixing orbitals within an atom to generate a set of new atomic orbitals called hybrid orbitals which are degenerate.

Alkanes

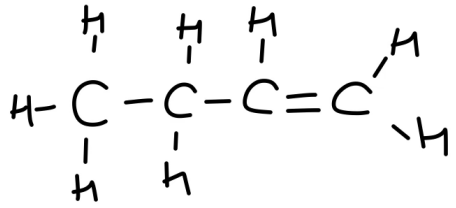
Alkenes

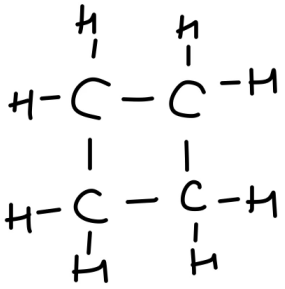
Alkynes

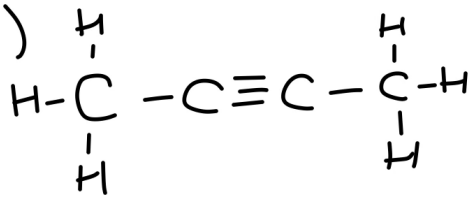
Benzene

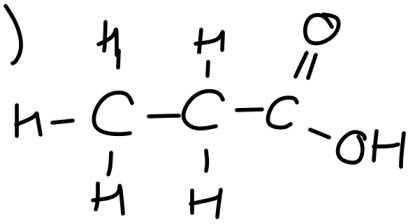
?

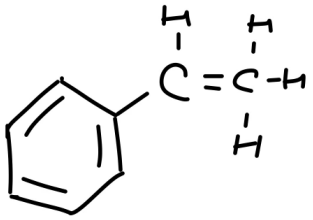
How many sigma and pi bonds are present in each molecule?

a) 

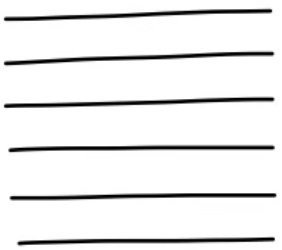
b) 

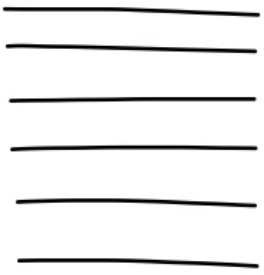
c) 

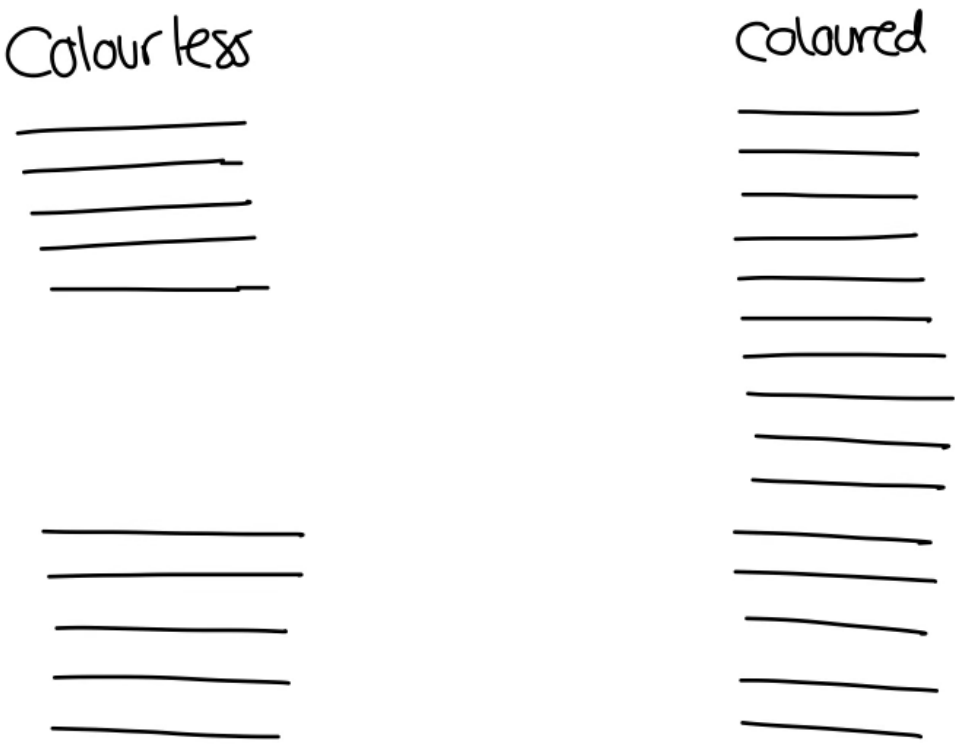
d) 

e) 

Colour in organic molecules







Some organic molecules contain a group of atoms that can absorb light from the visible region; this is called a _____.

Chromophores exist in molecules with _____ _____. A conjugated system is a system of _____ carbon to carbon single and carbon to carbon double bonds. Electrons in the conjugated system are _____.

The longer the conjugated system the smaller the _____ gap. This means light of lower frequency (lower energy) will be absorbed by the compound. When this is in the visible region the compound will show the _____ colour.

?

Complete the table

Colour absorbed	Colour seen
Green-blue	
Red	
Purple	
Yellow	

?

Lycopene is responsible for the colour in tomatoes. Suggest how stain removers might work to remove a stain caused by tomato sauce.