* <http://mathcentral.uregina.ca/qq/database/qq.09.00/nishi1.html> (for deriving the angle of a tetrahedral shape).
* You may well have to consider whether something is enough to outweigh the effect of something else. Don’t get caught up in explaining why, just that it is the case.

# Acids and Alkalis

* For solutions 1 M HCl which is 1 Molar HCl which is 1 moldm-3 HCl.
* All acid-water reactions are reversible however some have so little of the reversible reaction occurring that we simply write:



* + The H+ (aq) is a hydronium ion. A single H+ is far too reactive to exist on its own in water.

*Virtually 100% of hydrochloric acid has dissociated so there’s an equal ratio of H+ and Cl-.*

* Likewise, water is in an equilibrium between H2O and H+ and HO- ions but it’s more skewed to the water side.
* However, a weak acid does not dissociate completely when dissolved. The position of equilibrium between water and ethanoic acid is much further to the left.
* A similar logic is used for weak and strong bases. A weak base is seen below.



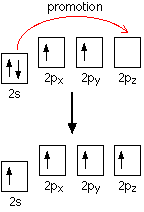
*You can see that the base has accepted a proton hence it’s positive charge.*

# Atomic Radius

* Atomic radius is usually measured by measuring the distance between the nuclei of two touching atoms and halving the distance. Hence, you have different measures of atomic radius. Such as covalent radius and van der Waals’ radius.

# Bonding and Hybridisation

* Don’t get too hung up on the noble gas structure. Boron is fine with making 3 bonds - it tries to make as many bonds as possible so that it releases maximum possible energy so it can be as stable as possible. It won’t form a B3+ as the ionisation energies up to this point are too high to be compensated for.
* Consider methane whose electron structure is…

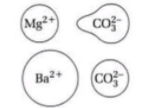


*This carbon is now said to be in an excited state.*

* It pays a small amount of energy to promote an electron so that it can form 4 bonds rather than 2 and become even more stable.
* However, you need 4 identical orbitals to form 4 identical bonds. Thus electrons rearrange themselves into 4 identical hybrid orbitals called sp3 hybrids (composed of 1 s-orbital and 3 p-orbitals).
* Likewise, you will have PCl5 forming sp3d hybrids - 5 hybrid orbitals of equal energy - whilst SF6 forms sp3d2 hybrids. Something like nitrogen cannot expand the octet as it doesn’t have reasonable access to a 3d orbital (actually it does but the energy required to promote an electron here and form is so great that it cannot be compensated by bond making).

# Group 2

* Ease of thermal decomposition decreases down the group for group 2 carbonates as the metal ion polarises the carbonate ion less. Smaller metal ions are closer to the carbonate ion (due to reduced atomic radius and less sells) and thus polarise it more leading to the carbonate ion’s electron density being distorted. The more distorted it is, the more difficult it is to form strong bonds making it easier to decompose. Larger metal ions hardly distort the carbonate ion.



* The solubility increases down the group for group 2 hydroxides. E.g., Mg(OH)2 is one of the least soluble as Mg has a higher charge density than others (due to less shells) meaning only the most energetic water molecules can overcome this attraction. Moving down the group, charge density decreases so the attraction decreases so more water molecules have sufficient energy to overcome this attraction.

# London Forces

* More electrons ⇒ increased number of delta positive and negative dipoles ⇒ stronger electrostatistic forces of attraction.
* Increased surface area ⇒ more area over which electrons can interact ⇒ higher probability of instantaneous dipoles ⇒ more dipoles generated ⇒ stronger electrostatic forces of attraction.

# Malleability

Malleable means that the metal can be shaped by moving layers around. It won’t shatter if hit with a hammer whereas an ionic compound will. This is because a layer in the ionic compound will move across and be adjacent to a like-charged layer, leading to repulsion tearing apart the layers

# Markovnikov's Rule

* <https://www.youtube.com/watch?v=kOzxbRDoq08>

