FUNDAMENTALS OF CHEMISTRY 1B (CHEM1002) - November 2002

2002-N-2

4	0	tetrahedral	109.5°
3	1	trigonal pyramidal	107°
2	2	bent	105°

Knowing the exact values of the bond angles for NH_3 and H_2O was not required, just the trend of decreasing values as the number of lone pairs increases.

- Going across a period, the addition of more electrons is accompanied by the addition of more protons in the nucleus. This results in greater attraction between the electrons and the nucleus and the size of the atoms decrease across the period. Going down a group, the outer electrons are screened from the nucleus by the inner electrons, the effective nuclear charge is less and the size of the atoms increase.
- N is a smaller atom than C (see above). The N atoms can therefore approach closer to each other than the C atoms and there is greater overlap of the orbitals. The greater the overlap, the stronger the bond.
- The endpoint is where the reaction is seen to come to an end (eg where the indicator changes colour).
  The equivalence point is where the number of moles of reactant added is exactly that required to complete the reaction.

2002-N-3

- $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^2$

  IV

  6

  octahedral

  $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

  No. Transition metal ions are coloured because they have 3*d* electrons. The Ti in $[TiCl_6]^{2-}$ has lost all of its 3*d* electrons.
- 11.96

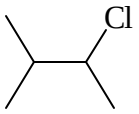
2002-N-4

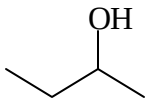
- 3.10

  5.06

  11.12

2002-N-5

- 2-methyl-2-butene 

  2-butanone 

  CH_3OH + CH_3COOH

- **A:** $Cr_2O_7^{2-}$ / H^+ **D:** $HN(CH_3)_2$

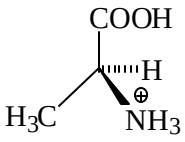
  B: $SOCl_2$ **E:** NaOH

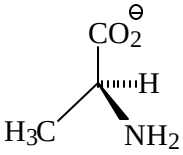
  C: CH_3OH **F:** CH_3Br

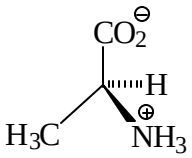
2002-N-6

- #1 sp^2 #2 sp^3 #3 sp^3

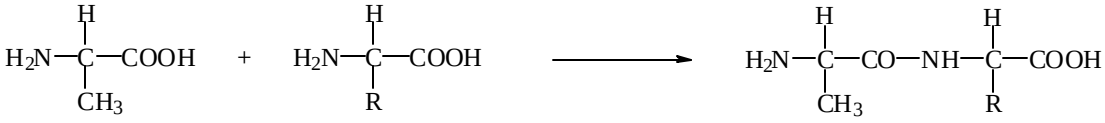
  (*S*)-







It undergoes an acid-base reaction with itself to give a species that has both a positive and negative charge. It therefore has many characteristics of an ionic compound. One of these is its high melting point.

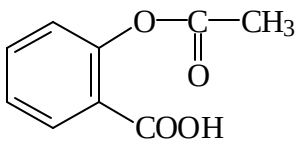


The NH_2 group of one amino acid can react with the COOH group of another amino acid to form an amide. This process can be repeated again and again to produce a biopolymer which contains many amino acids.

2002-N-7

- 1-pentanol

  carboxylic acid, phenol



+ CH_3COOH

acetic acid, CH_3COOH