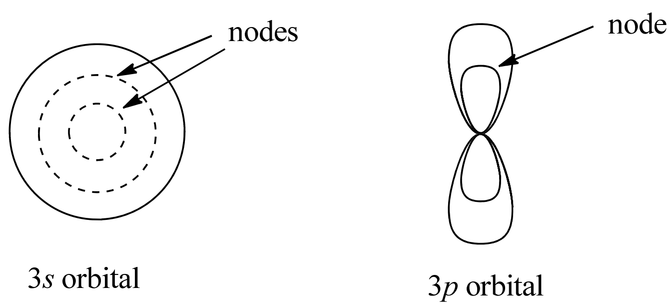
CHEM1108 Chemistry 1A (Life Sciences) - June 2010

2010-J-2

- $^{4}_{2}He$

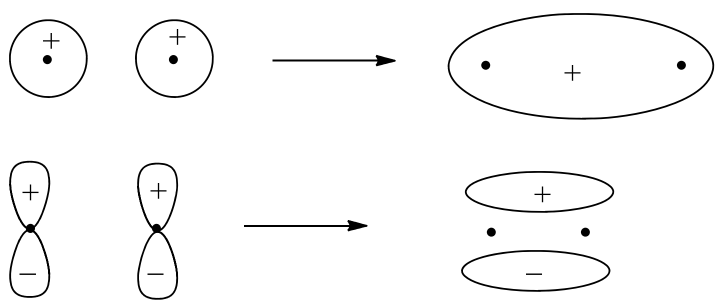
  $^{11}_{5}B$

- 3.4×10^{-19} J 2.0×10^{2} kJ mol^{-1}



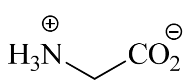
  A node represents the region where there is zero probability of finding the electron.

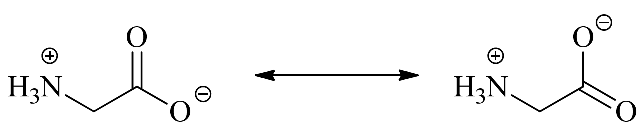
2010-J-3



- There is an increase in resonance stabilisation energy when a free HPO_4^{2-} ion is produced.
  ATP is a high energy molecule due to the 4 negative charges near each other. This is reduced when it's converted to ADP which has only 2 close negative charges.

2010-J-4

- 



  Carbon 1 (acid group) is sp^2 hybridised and the geometry is trigonal planar.
  Carbon 2 (CH_2 group) is sp^3 hybridised and the geometry is tetrahedral.
  The nitrogen is sp^3 hybridised and the geometry is tetrahedral.

  Propionic acid has strong hydrogen bonds, giving it a relatively high m.p. However, glycine has very strong ionic bonds between the NH_3^+ and CO_2^- groups giving it very high m.p.

2010-J-5

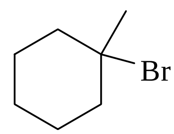
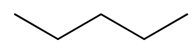
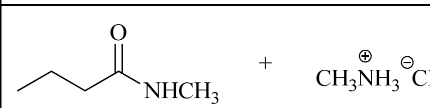
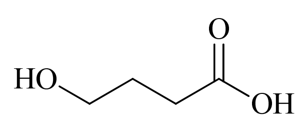
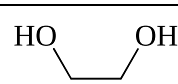
- A weak acid or base is one which only partially dissociates in water:
  e.g. $CH_3COOH(aq) \rightleftharpoons CH_3CO_2^-(aq) + H^+(aq)$

  A strong acid or base is one which completely dissociates in water:
  e.g. $HCl(aq) \rightarrow H^+(aq) + Cl^-(aq)$

  Concentrated and dilute are terms that can be used in reference to any solute, describing the number of moles of solute relative to the volume of solvent. A concentrated solution has a high solute:solvent ratio, whilst a dilute solution has a low solute:solvent ratio.

- NH_3 and HF both have two H-bond per molecule and their b.p.'s are in the expected order - HF has the stronger H-bonds and the higher b.p.
  H_2O has 4 H-bonds per molecule, so although the bonds are not as strong as those of HF, there are twice as many of them. As a result the b.p. of H_2O is greater than that of HF.

2010-J-6

		
	1. NaOH 2. CH_3I	
(*E*)-2-pentene		
	$Cr_2O_7^{2\ominus}$ / $H^\oplus$	
		
		
cyclohexanone	 + $H^\oplus$ catalyst	

2010-J-7

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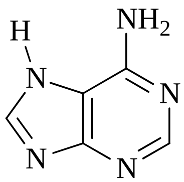
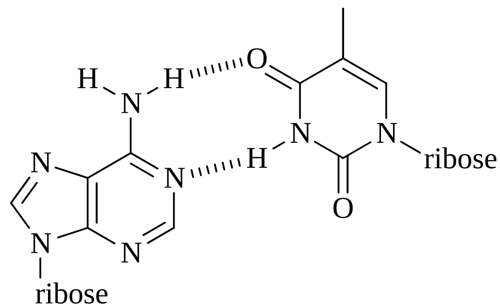


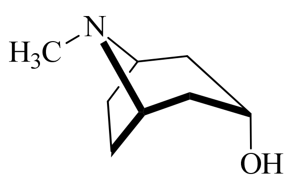
DNA consists of a double strand of polynucleotides. The strands are complementary with C, G, A and T on one strand being paired with G, C, T and A respectively on the other. C (cytosine) and G (guanine) are therefore known as a base pair. Similarly A (adenine) and T (thymine) are another base pair. The two DNA strands are held together by H-bonding between the bases in a base pair.

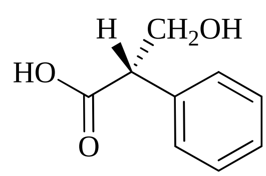


2010-J-8

• $C_{17}H_{23}O_3N$

amine, alcohol, ester, aromatic ring (arene)





(*S*)-

No. It is a *meso*-isomer (*i.e.* has a plane of symmetry) and therefore optically inactive.

2010-J-9

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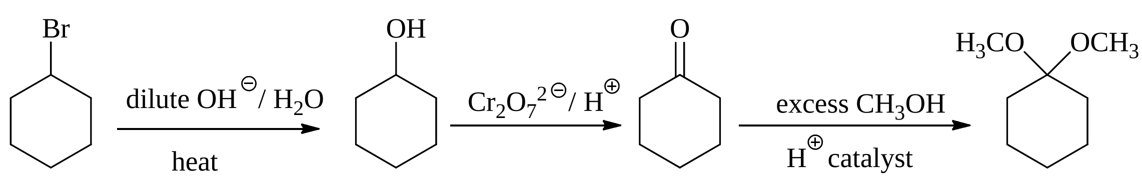
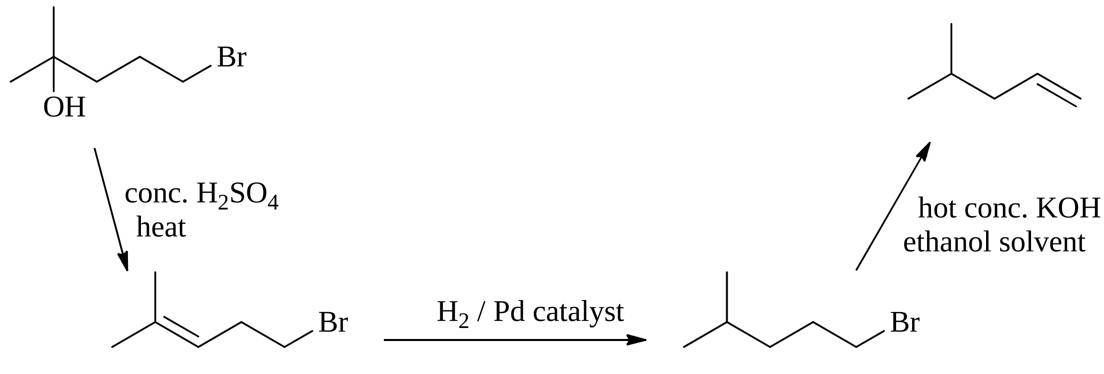
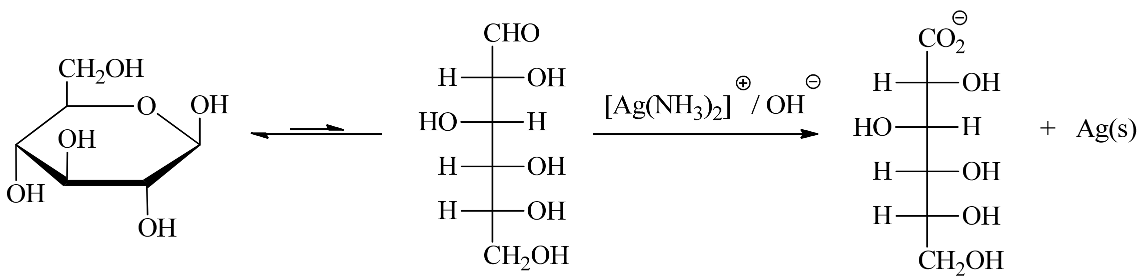


2010-J-9 (continued)



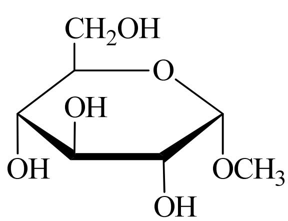
2010-J-10

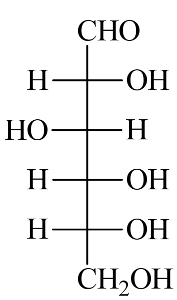
- Tollens reagent, $[Ag(NH_3)_2]^+/OH^-$.
  This will give no reaction with (L), but will oxidise (M). In the process, the $[Ag(NH_3)_2]^+$ ion is reduced to metallic Ag which deposits as a silver mirror.



H^+/H_2O/heat

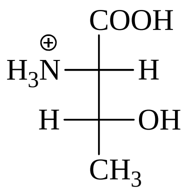
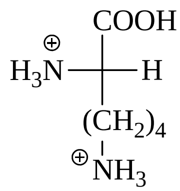
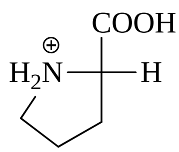
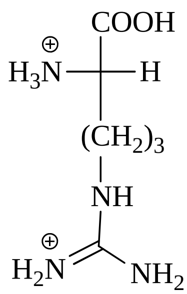
excess CH_3OH / H^+ catalyst





primary alcohol, secondary alcohol, acetal

2010-J-11

- 




2010-J-12