CHEM1611 Chemistry 1A (Pharmacy) - June 2006

2006-J-2

- $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$
  $n = 4 \quad l = 0 \quad m_l = 0$
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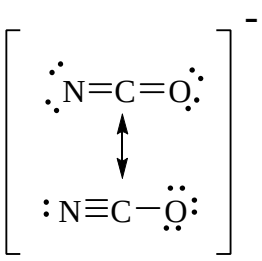
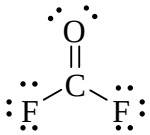
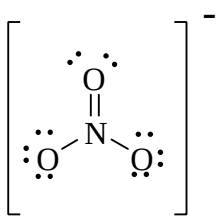
		
YES	NO	YES

- 4 atoms Fe per haemoglobin molecule

2006-J-3

- 0.57 g
  0.050 M

2006-J-4

- trigonal planar sp^2 trigonal planar
  tetrahedral sp^3 tetrahedral
  tetrahedral sp^3 bent
  tetrahedral sp^3 trigonal pyramidal
- Polarisability of atoms increases as the size of the atoms increase. The greater the polarisability, the greater the dispersion forces, so the expected b.p. order would be $C_3H_7OH < C_3H_7SH < C_3H_7SeH$. C_3H_7OH also has hydrogen bonding because of the OH groups. H-bonding is a stronger intermolecular force than dispersion forces and thus C_3H_7OH has an abnormally high b.p. This pushes its b.p. above that of C_3H_7SH, but the effect is not enough to push it above the b.p. of C_3H_7SeH.

2006-J-5

- hypobromous acid
  hypobromite ion
  ammonia
  ammonium ion

Species	HBrO	NH_3	BrO^-	NH_4^+
pK_a of acid	8.64	×	×	9.24
pK_b of base	×	4.76	5.36	×

2006-J-5 (cont.)

$HBrO(aq) \rightleftharpoons H^+(aq) + BrO^-(aq)$ $\quad K_{a(HBrO)} = 10^{-8.64}$

$H^+(aq) + NH_3(aq) \rightleftharpoons NH_4^+(aq)$ $\quad K = 1/K_{a(NH_4^+)} = 1/10^{-9.24} = 10^{+9.24}$

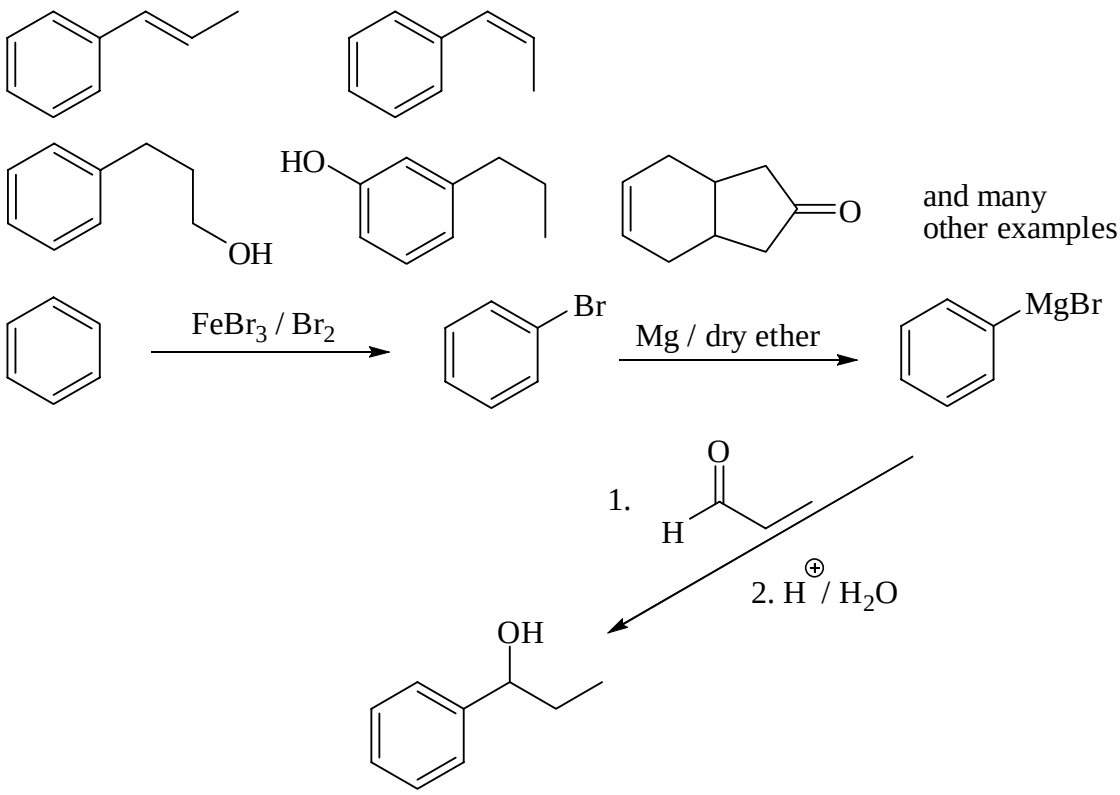
$HBrO(aq) + NH_3(aq) \rightleftharpoons BrO^-(aq) + NH_4^+(aq)$ $\quad K = K_{a(HBrO)} \times 1/K_{a(NH_4^+)}$

$= 10^{-8.64} \times 10^{+9.24}$

$= 10^{+0.64} > 1$

Therefore equilibrium lies to the right.

2006-J-6

- 

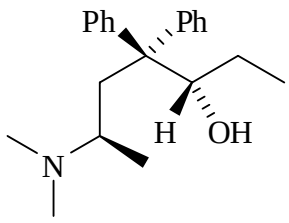
2006-J-7

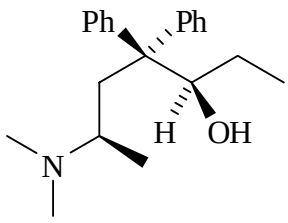
- $C_{21}H_{27}NO$

  $-N(CH_3)_2 > -CH_2C(Ph)_2COCH_2CH_3 > -CH_3 > -H$

  (*R*)

  tertiary amine, ketone, arene (aromatic ring)





diastereoisomers

2006-J-8

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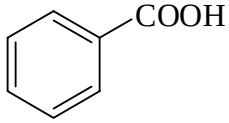
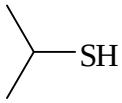
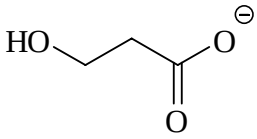
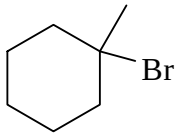
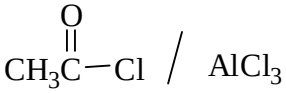
$N(CH_3)_3$	
	
	
	
	
	
	
1. $LiAlH_4$ / dry ether 2. $H^{\oplus}$ / H_2O	

2006-J-9

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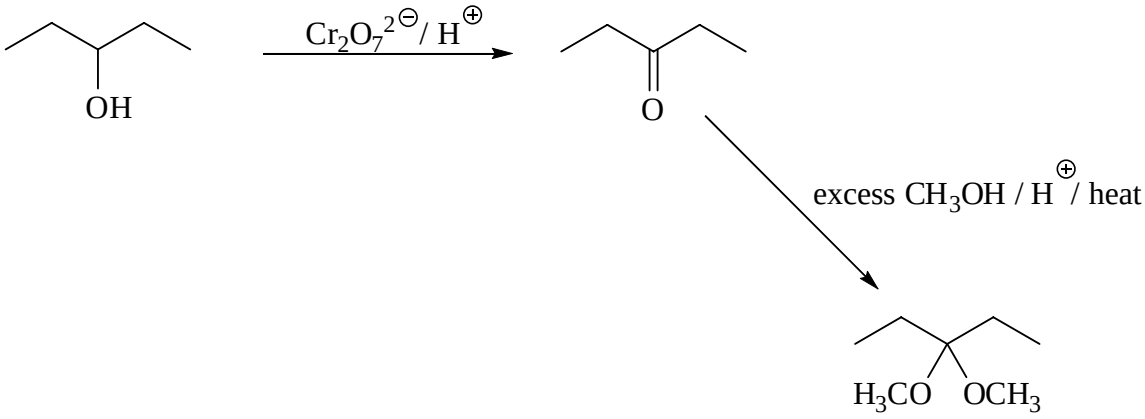
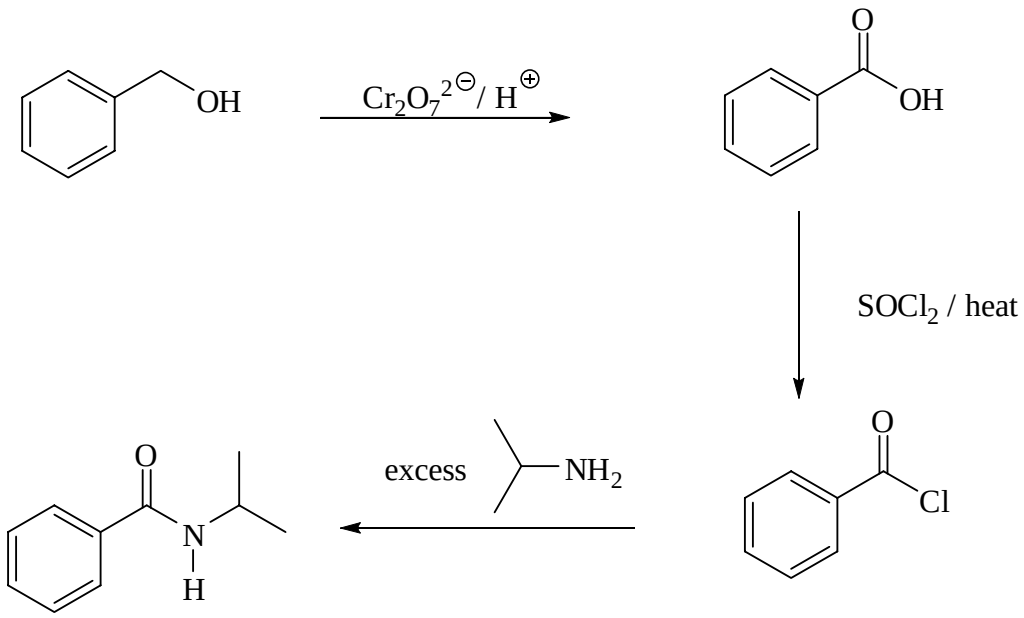


2006-J-9 (cont.)



2006-J-10

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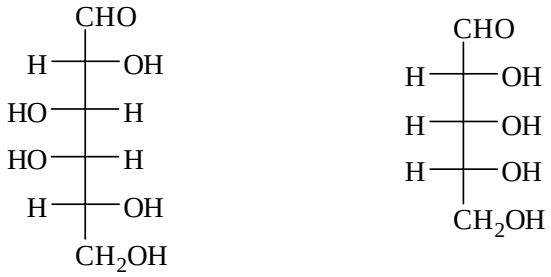

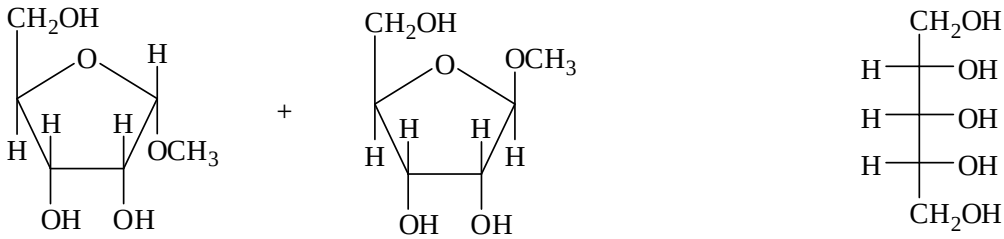

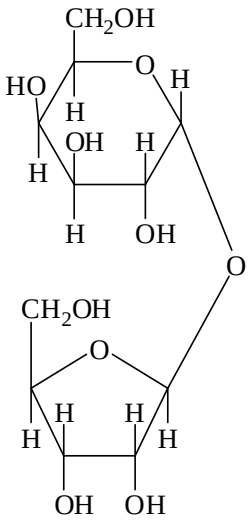

2006-J-11

- 5-hydroxy-5-methyl-2-hexanone
  1-bromo-3-methyl-2-butene

2006-J-12

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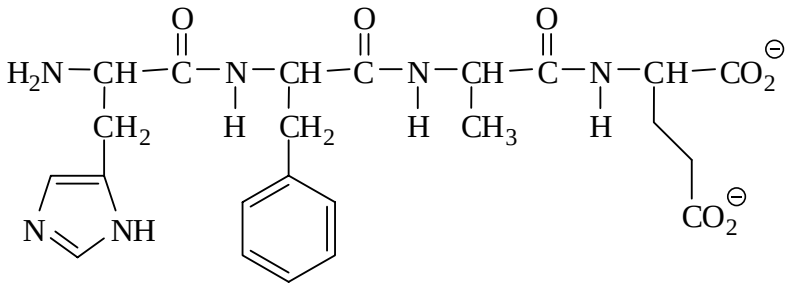

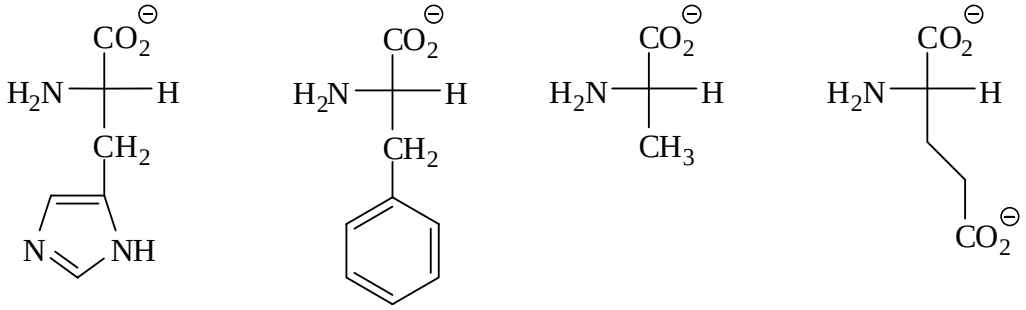

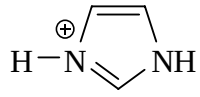

The product is aromatic as all ring atoms are sp^2 hybridised and there are 6 π electrons (4 in π bonds and 2 from the neutral N atom). This agrees with the Hückel rule, which requires (4n+2) electrons in the π system for aromaticity.