CHEM1907/1908 (1LS Advanced Courses) - June 2003

2003-J-2

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	magnesium chloride	$Mg^{2+}(aq)$, $Cl^{-}(aq)$
Na_2CrO_4		$Na^{+}(aq)$, $CrO_4^{2-}(aq)$
	carbon monoxide	n/a
HIO	hypoiodous acid	
$Fe(NO_3)_3{\cdot}6H_2O$		$Fe^{3+}(aq)$, $NO_3^{-}(aq)$

- Aufbau Principle
  Hund's Rule of Maximum Spin Multiplicity
  Pauli Exclusion Principle
  $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$

  It has two stable oxidation states,Fe^{3+} and Fe^{2+}.

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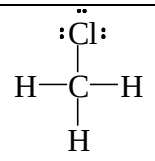	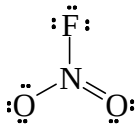	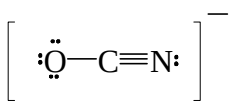
YES	YES	

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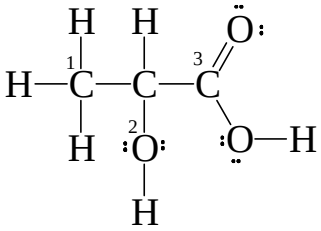
- 

  tetrahedral sp^3

  bent sp^3

  trigonal planar sp^2

  hydrogen bonding, dipole-dipole interactions, dispersion forces

- $$K = \frac{[CH_3CH(OH)CO_2^-][NH_4^+]}{[CH_3CH(OH)COOH][NH_3]}$$

  $$= \frac{[CH_3CH(OH)CO_2^-][H^+]}{[CH_3CH(OH)COOH]} \times \frac{[NH_4^+]}{[NH_3][H^+]}$$

  $$= K_a(\text{lactic acid}) \times 1/K_a(NH_4^+)$$

  $$= 10^{-3.08} \times 10^{+9.24} = 10^{+6.16} >> 1$$

  Therefore equilibrium lies in favour of the products.

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- $3NO_2(g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO(g)$

  6.5×10^{-3} L

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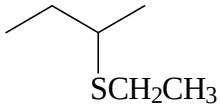
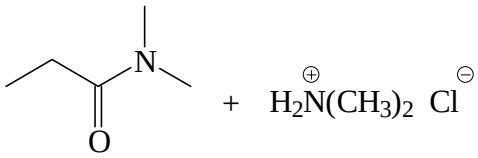
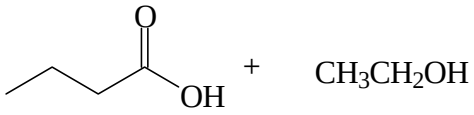
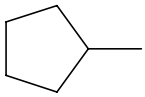
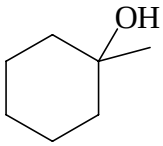
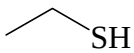
2-bromobutane		
		
ethyl butyrate or ethyl butanoate		
	excess CH_3OH $H^{\oplus}$ / heat	
1-methylcyclopentene		
		
		
	$Cr_2O_7^{2\ominus}$ / $H^{\oplus}$	

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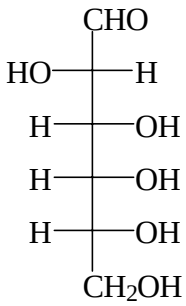

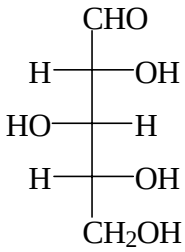

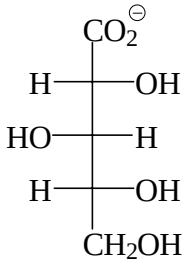

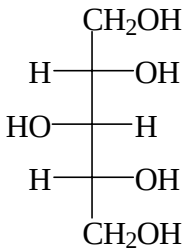

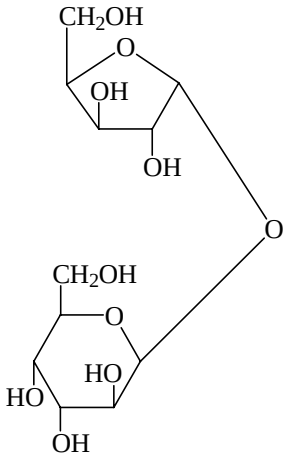

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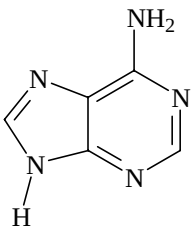
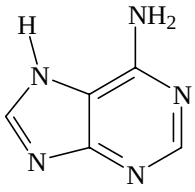
- Indole is aromatic because:
  - it is a fused ring system with all rings co-planar
  - all atoms in the rings are sp^2 hybridised with *p*-orbitals perpendicular to the ring
  - it has 10 π electrons, which obeys the (4n + 2) rule required for aromaticity.

  Indole is not basic as the "lone pair" on the nitrogen is is part of the aromatic π system and thus not free to react.





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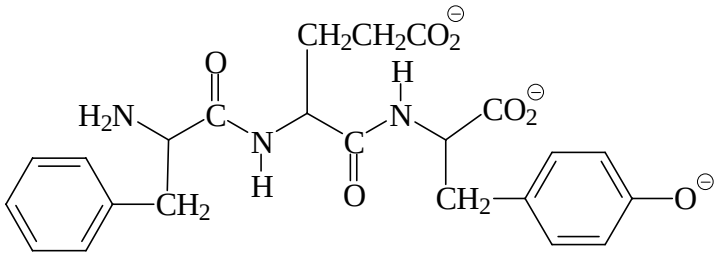

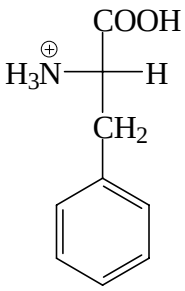

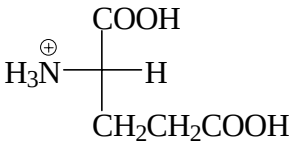

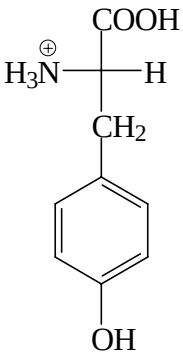

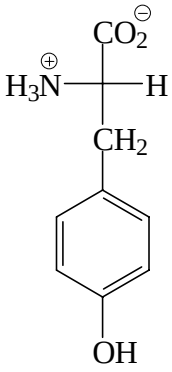

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