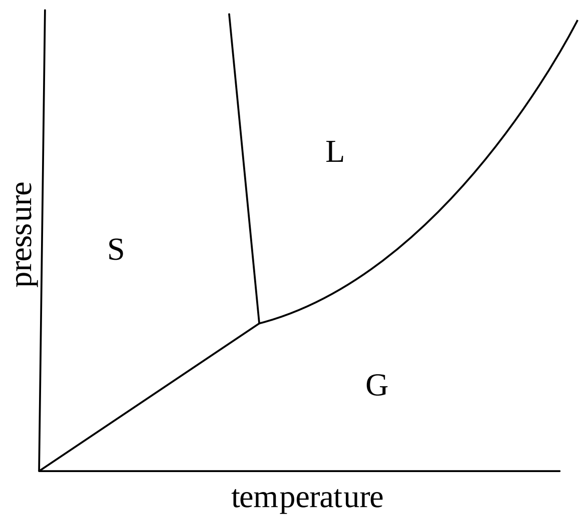
CHEMISTRY 1B (CHEM1102) - June 2006

2006-J-2

- The pressure exerted by the wire melts the ice below it. The wire "melts" its way through the block of ice. As it descends, the pressure is removed and the water refreezes due to contact with the ice.

  This is seen in the accompanying phase diagram - the negative slope of the S/L equilibrium line. If you are on this line and increase the pressure, you move into the liquid region.



2006-J-3

- Allotropes are different structural forms of the same element.

  white phosphorus and red phosphorus, O_2 and O_3, many other examples

  There is a very high activation energy for the conversion from diamond to graphite. This energy is not available under normal conditions.

- They need to collide with sufficient energy to overcome the activation energy for the reaction.

  The molecules need to be oriented in the correct way for reaction to occur.

2006-J-4

10.38

Yes

2006-J-5

- $[CoCl_2(NH_3)_4]^+$

  Cl, N

  $3d^6$

- A strong acid dissociates 100% in water. $HA(aq) \rightarrow H^+(aq) + A^-(aq)$

  A weak acid only partially dissociates. $HA(aq) \rightleftharpoons H^+(aq) + A^-(aq)$

  The percentage ionisation increases as the weak acid is diluted.

  Le Chatelier's principle $HA(aq) + H_2O \rightleftharpoons H_3O^+(aq) + A^-(aq)$

  As more water is added, the reaction is pushed to the right. The amount of acid present doesn't change, but more molecules dissociate.

2006-J-6

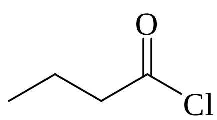
- Buffer systems resist changes in pH.
  They consist of a weak acid (HA) and its conjugate base (A^-) in high concentrations.

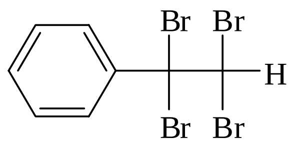
  Added H^+ is consumed by: $H^+(aq) + A^-(aq) \rightarrow HA(aq)$

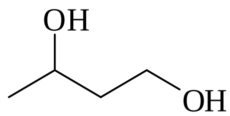
  Added OH^- is consumed by: $OH^-(aq) + HA(aq) \rightarrow H_2O + A^-(aq)$

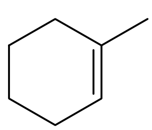
  acetic acid : sodium acetate = 5.56:1

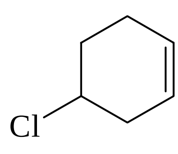
2006-J-7

- 

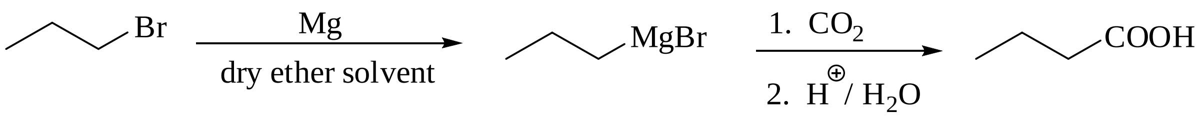




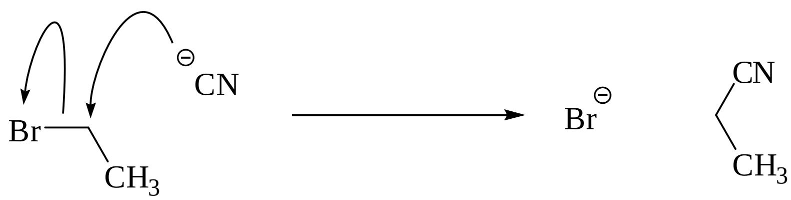




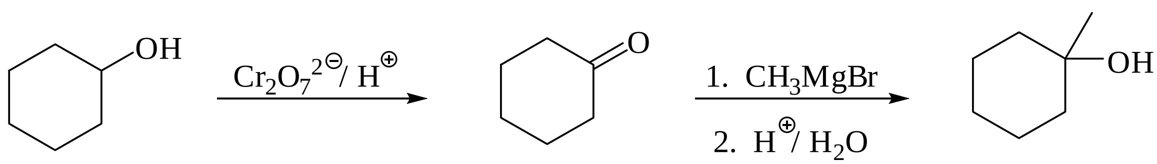
2006-J-8

- **A**: H^+ / H_2O / heat **B**: H_2 / Pd catalyst
- 

2006-J-9

- 

SN2. S = substitution - the general class of reaction
N = nucleophilic - one nucleophile (Br^-) is replaced by another (CN^-)
2 = bimolecular - two species take part in the rate determining step

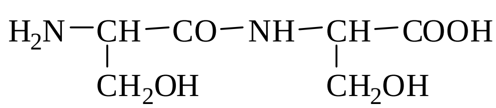
- 

1-methylcyclohexanol

2006-J-10

$-NH_2$ > $-COOH$ > $-CH_2OH$ > $-H$

(*S*)



Primary structure of a protein is the sequence in which the amino acids occur.
eg ala-ser-tyr