2008-N-2

- 5.7×10^{-5} M 5.7×10^{-5} M

  9.67

2008-N-3

2.2×10^{-4} M

The solubility of $CaCO_3$ will increase.
Increasing $[H^+]$ decreases $[CO_3^{2-}]$: $CO_3^{2-}(aq) + H^+(aq) \rightarrow HCO_3^-(aq)$
Decreasing $[CO_3^{2-}]$ means that more $CaCO_3$ dissolves to maintain the K_{sp} equilibrium.
The overall equation is: $CaCO_3(s) + H_2CO_3(s) \rightarrow 2HCO_3^-(aq) + Ca^{2+}(aq)$

2008-N-4

- Going down the group, the atoms get bigger and have more electrons and hence have bigger more polarisable electron clouds. Dispersion forces therefore increase going down the group and the m.p. and b.p. increase accordingly.
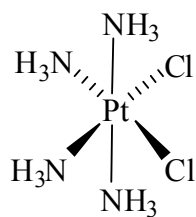
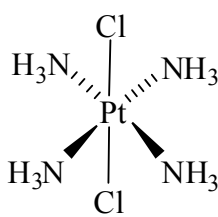 m.p. 113.6 °C   b.p. 184.4 °C

  decrease the pressure

  nothing will happen

2008-N-5

- $[PtCl_2(NH_3)_4]Cl_2$

  tetraamminedichloridoplatinum(IV) chloride

  cis-   *trans-*

  geometric (*cis-*, *trans-*) and coordination sphere
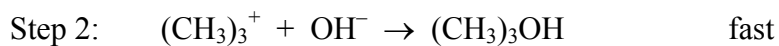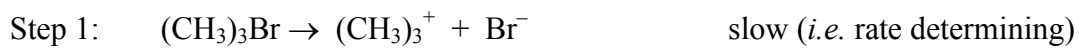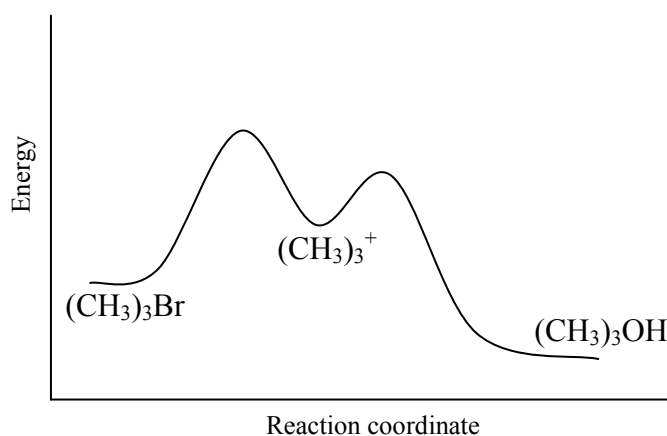
  d^6

2008-N-6

- Rate = $k[(CH_3)_3Br]$

  $1.0 \times 10^{-2} \text{ s}^{-1}$

  The slow rate determining step involves $(CH_3)_3Br$ only.

  Possible mechanism is:

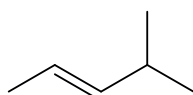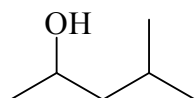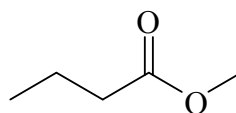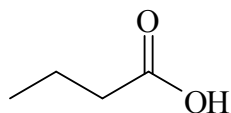 Step 1: $(CH_3)_3Br \rightarrow (CH_3)_3^+ + Br^-$ slow (*i.e.* rate determining)

  Step 2: $(CH_3)_3^+ + OH^- \rightarrow (CH_3)_3OH$ fast

2008-N-7

- 0.26 mol

2008-N-8

- ReO_3

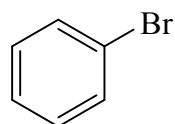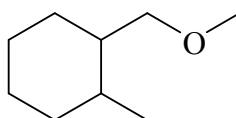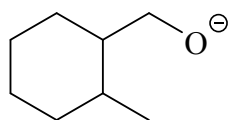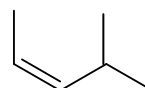 6   2

  12

  3.8×10^{-10} m

2008-N-9

-
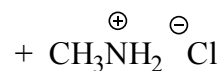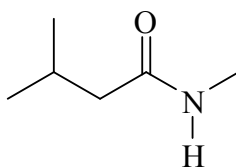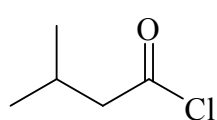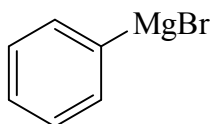
2008-N-10

-
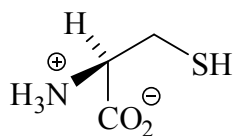
Absolute configuration is (*R*)-
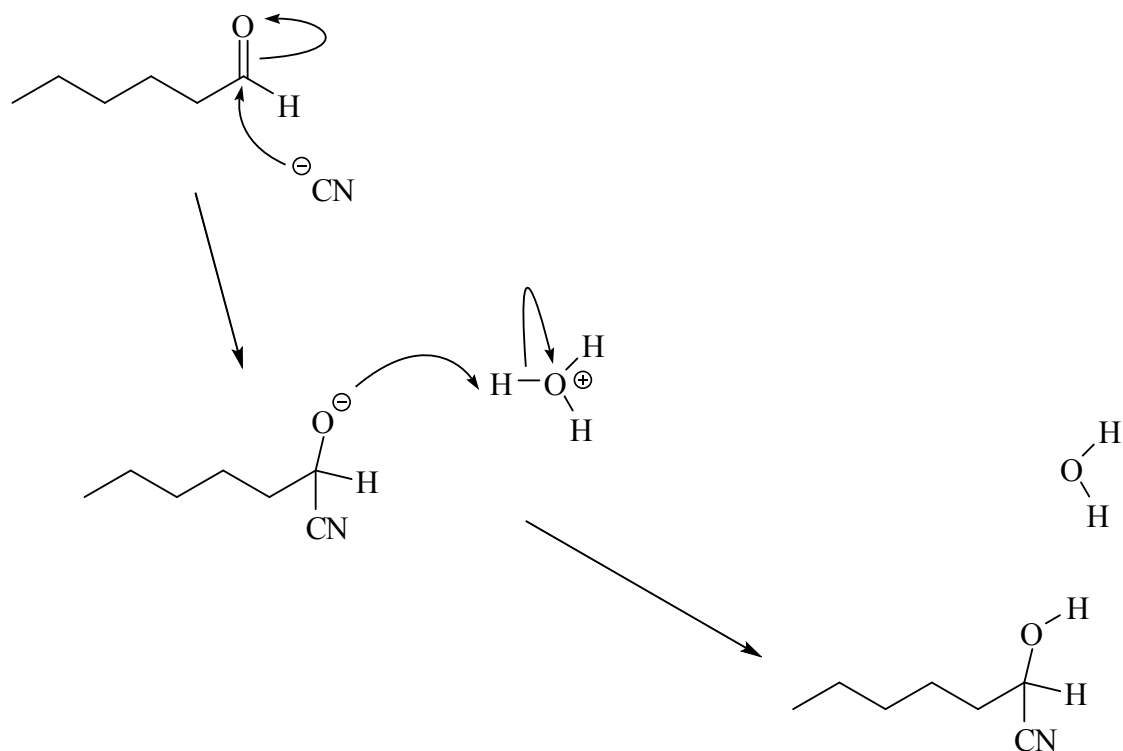Priorities: –NH$_2$ > –CH$_2$SH > –COOH > –H
With H at back, the order of –NH$_2$ → –CH$_2$SH → –COOH goes clockwise

2008-N-11

2008-N-12

strong base removes
relatively acidic proton

intramolecular
S_N2 reaction
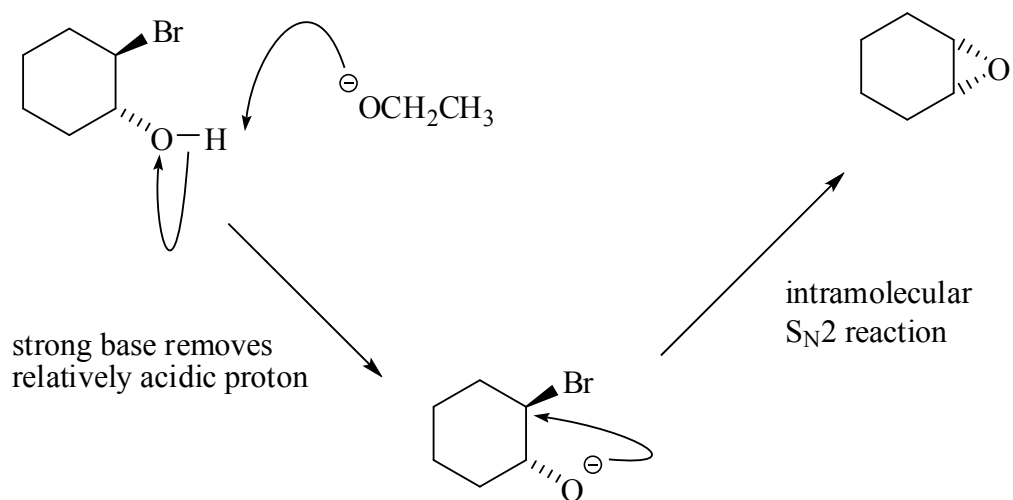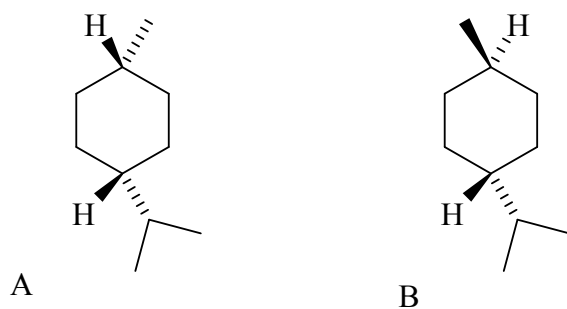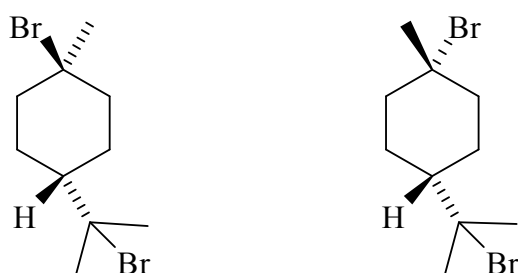
-

A

B
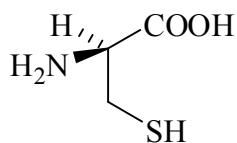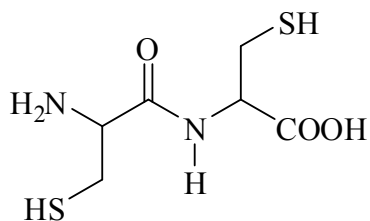
Isomer A would be the major product. The reaction takes place on the surface of the catalyst. The isopropyl group provides steric hindrance to the side of the ring that is *cis* to this group. Both H's therefore are delivered to the other side of the molecule.
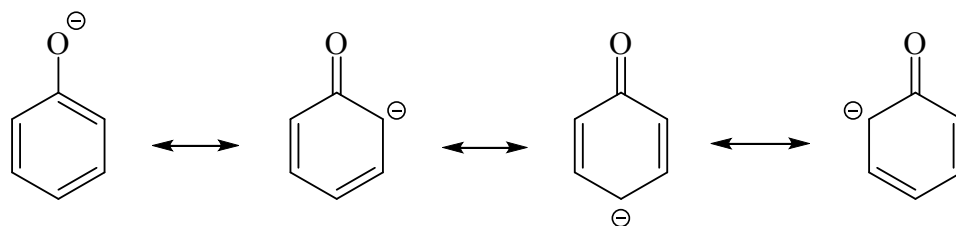

They are diastereoisomers. Both isomers are optically inactive.

Br exists as two isotopes ^{79}Br and ^{81}Br, which occur in approximately equal amounts. There would be 3 molecular ion peaks at *m/z* 296, 298 and 300 due to the ions containing 2 ^{79}Br atoms, 1 ^{79}Br and 1 ^{81}Br atom and 2 ^{81}Br atoms, respectively.
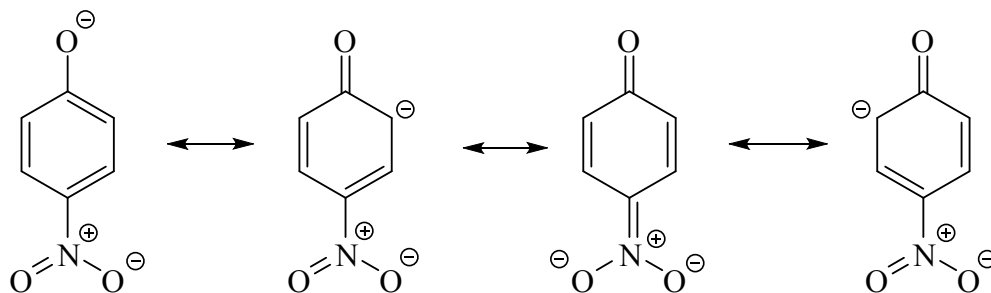
- Phenol is more acidic as the phenoxide ion is resonance stabilised.

Chloroacetic acid is more acidic. The Cl atom is electronegative and pulls electrons from the carboxylic acid, thus weakening the O–H bond.

The *para* isomer is more acidic as the charge on the phenoxide ion can be delocalised into the nitro group. This isn't possible with the *meta* isomer.

- Bromination at the 4 (or 2 or 6) position gives a Wheland intermediate that has four resonance contributors as the lone pair on the oxygen can be donated into the ring to help stabilise the charge.
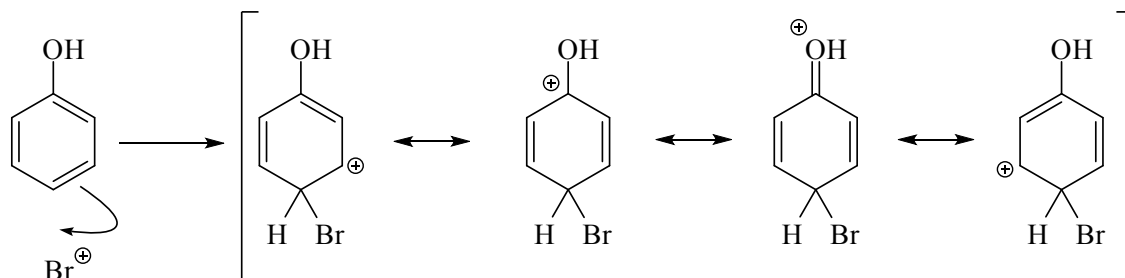
Bromination at the 3 or 5 position gives a Wheland intermediate that has only three resonance contributors - the lone pair on the oxygen cannot participate in the resonance stabilisation.