

CHEMISTRY 1B (CHEM1102) - June 2012

2012-J-2

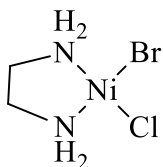
- In Group 17 oxyacids, electron density is drawn away from the O atom as the electronegativity of the halogen increases. This in turn draws electron density away from the O–H bond and weakens it. The weaker the O–H bond, the stronger the acid. Cl is more electronegative than Br so HOClO_3 is stronger acid than HOBrO_3 .

In binary acids such as HBr and HCl, the H–Br bond is longer than the H–Cl bond as Br is larger than Cl. The H–Br bond is therefore weaker than the H–Cl bond and HBr is thus a stronger acid than HCl.

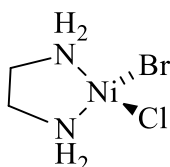
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Cu^{2+} is d^9	↑↓	↑↓	↑↓	↑↓	↑	is paramagnetic
Ti^{3+} , d^1	↑					is paramagnetic
Ti^{4+} , d^0						is diamagnetic

- bromidochlorido(ethylenediamine)nickel(II) or bromidochlorido(ethane-1,2-diamine)nickel(II)



square planar



tetrahedral

No. Both structures are superimposable on (*i.e.* identical to) their mirror images.

2012-J-3

- | | | |
|--|--|---|
| +III | +III | +V |
| 4 | 6 | 6 |
| 5 | 3 | 0 |
| $\text{Na}^+(\text{aq}), [\text{FeCl}_4]^{-}(\text{aq})$ | $[\text{CrCN}(\text{NH}_3)_5]^{2+}(\text{aq}), \text{Br}^{-}(\text{aq})$ | $\text{K}^+(\text{aq}), [\text{VO}_2(\text{ox})_2]^{3-}(\text{aq})$ |

2012-J-4

- 3.77
- 10.77
- 0.42 mol

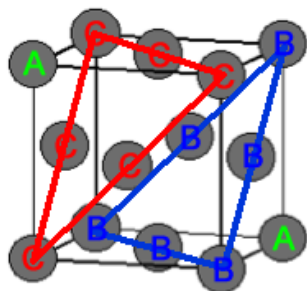
2012-J-5

- $1 \times 10^{-5} \text{ M}$
 $1 \times 10^{-9} \text{ M}$

No. The lethal $[\text{Ba}^{2+}(\text{aq})]$ is 40 times greater than the $[\text{Ba}^{2+}(\text{aq})]$ in normal aqueous solution.

2012-J-6

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4

2012-J-7

- sublimes
liquid

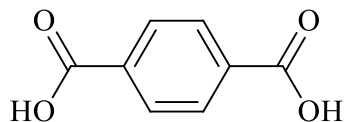
N. The increase in pressure can never cause the solid to liquid phase change due to the slope of the solid/liquid equilibrium line.

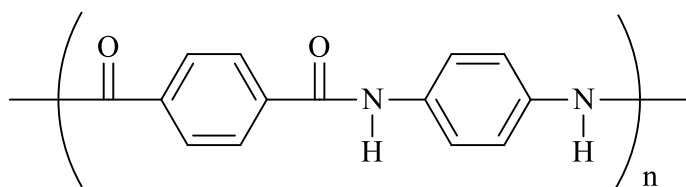
2012-J-8

- Energy from light causes the water to split. The energy input is constant and this determines the maximum rate of reaction. (Essentially, light is the limiting reagent.) Increasing the amount of catalyst increases the amount of light captured (0 - 200 catalyst loading), but can't increase it above the amount being provided (plateau region).

2012-J-9

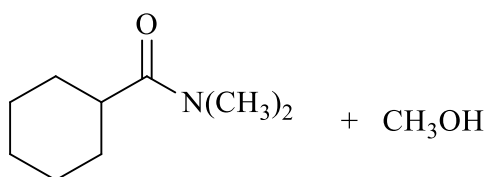
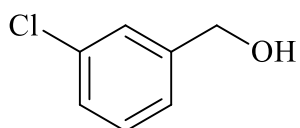
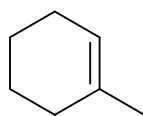
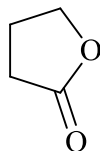
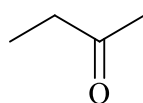
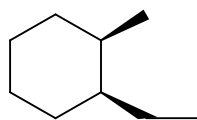
- sp^3 sp^2





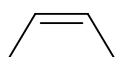
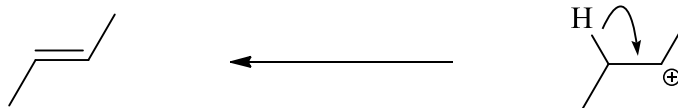
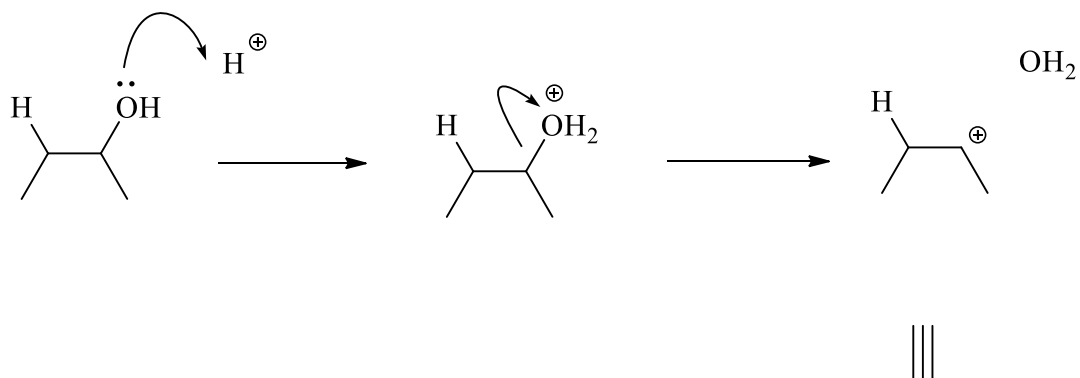
2012-J-10

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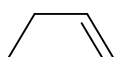


2012-J-11

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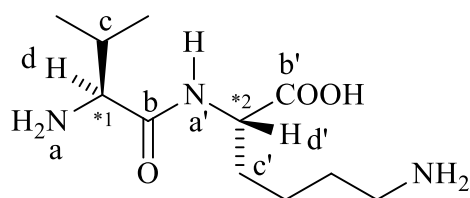
(Z)-2-butene



1-butene

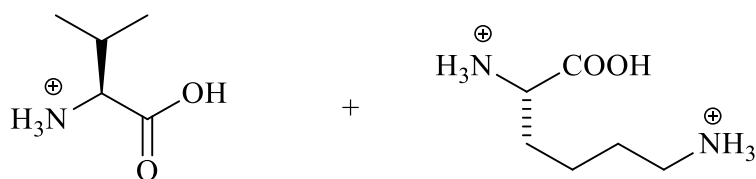
2012-J-12

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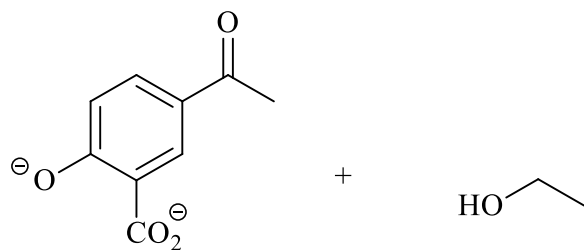
Around C^*1 , the priority of the groups are $a > b > c > d$. Looking down the $\text{C}-\text{H}$ bond the groups $a \rightarrow b \rightarrow c$ go anticlockwise. Therefore configuration is (S)-.

Around C^*2 , the priority of the groups are $a' > b' > c' > d'$. Looking down the $\text{C}-\text{H}$ bond (i.e. from behind the plane of the paper) the groups $a' \rightarrow b' \rightarrow c'$ go anticlockwise. Therefore configuration is (S)-.



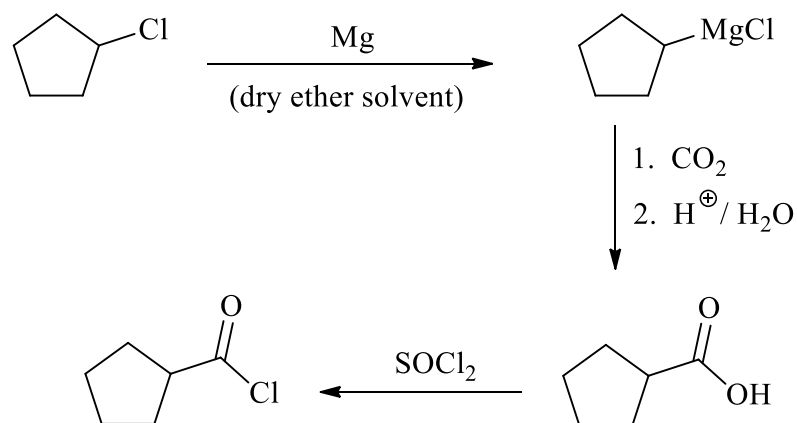
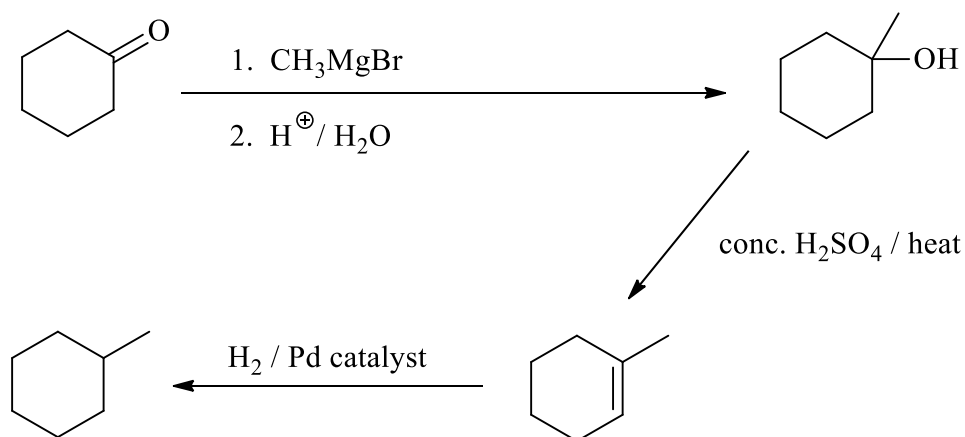
2012-J-13

• $C_{11}H_{12}O_4$



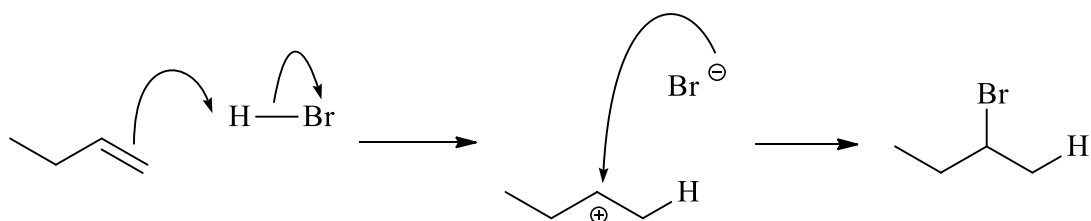
2012-J-14

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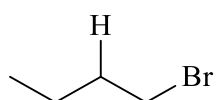


2012-J-15

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Racemic mixture. The carbon where the Br is attached has 4 different groups around it, so is stereogenic. The carbocation from which it forms is planar and so attack by the Br⁻ is equally likely from either the top or bottom side. This results in equal amounts of both enantiomers being formed.



This product is derived from the primary carbocation intermediate. Secondary carbocations are more stable than primary carbocations, so little of this product forms.