FUNDAMENTALS OF CHEMISTRY 1B (CHEM1002) - November 2006

2006-N-2

- Caves form when limestone is dissolved by ground water that contains carbon dioxide.

  $CaCO_3(s) + CO_2(aq) + H_2O(l) \rightleftharpoons Ca^{2+}(aq) + 2HCO_3^-(aq)$

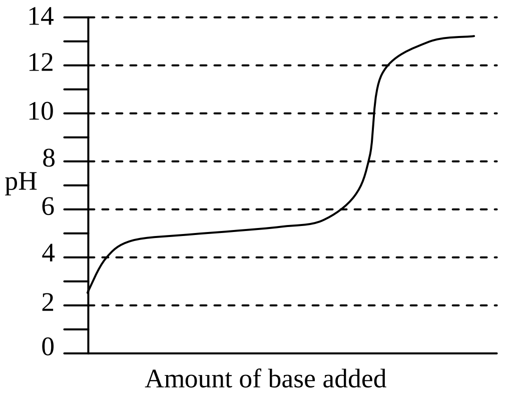
  Stalactites and stalagmites are formed when water saturated with limestone loses some of its dissolved carbon dioxide to the atmosphere. The solubility of the limestone consequently decreases and it precipitates.

  $Ca^{2+}(aq) + 2HCO_3^-(aq) \rightleftharpoons CaCO_3(s) + CO_2(aq) + H_2O(l)$

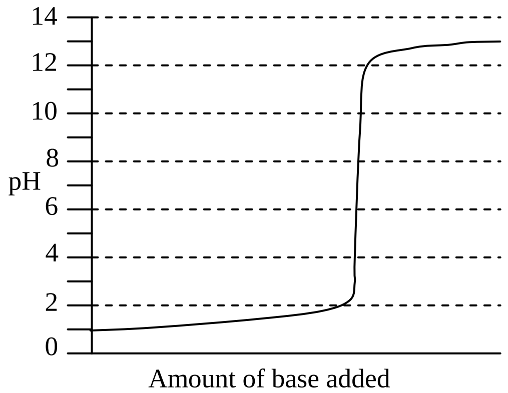
  $CO_2(aq) \rightleftharpoons CO_2(g)$

2006-N-3

- weak acid / strong base



strong acid / strong base



Equivalence point is at pH=7 for the strong acid/strong base case, but >7 for the weak acid/strong base.
The weak acid/strong base curve has an inflexion point at the half equivalence point, whereas the strong base/strong acid curve has no corresponding inflexion point.
The initial starting pH is higher for the weak acid than for the strong acid.

The equivalence point has pH>7 because the salt that exists at that point is basic (the conjugate base of the weak acid undergoes hydrolysis).
The inflexion point occurs at the point of maximum buffering. There is no buffering region in the strong base/strong acid curve.
Assuming equal concentrations, the $H^+(aq)$ concentration in a solution of a strong acid is greater than in that of a weak acid, hence the former has lower pH.

- End point is the first permanent change of the indicator - it's when you see that the reaction has finished.
  Equivalence point is when the stoichiometrically correct amount of reactant has been added.

2006-N-4

- 2.43

  5.06

  12.30

2006-N-5

•	II	4	8	$Na^{+}(aq)$, $[Ni(CN)_4]^{2-}$
	III	6	3	$[Cr(NH_3)_5Cl]^{2+}$, $Cl^{-}(aq)$
	II	6	9	$[Cu(en)_3]^{2+}$, $Br^{-}(aq)$

2006-N-6

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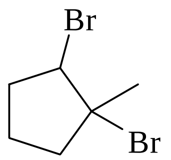
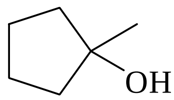
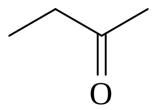
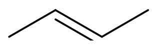


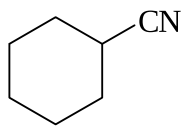
1-methylcyclopentene





2-butanol





bromocyclohexane

2006-N-7

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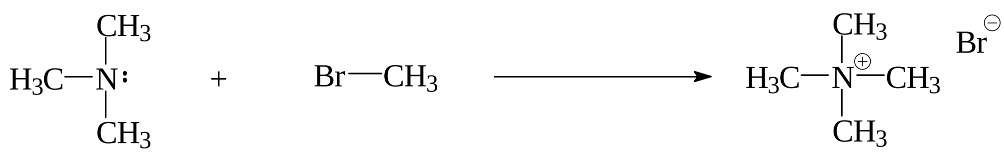
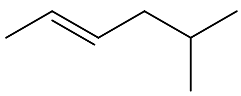
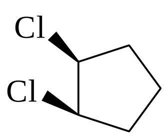


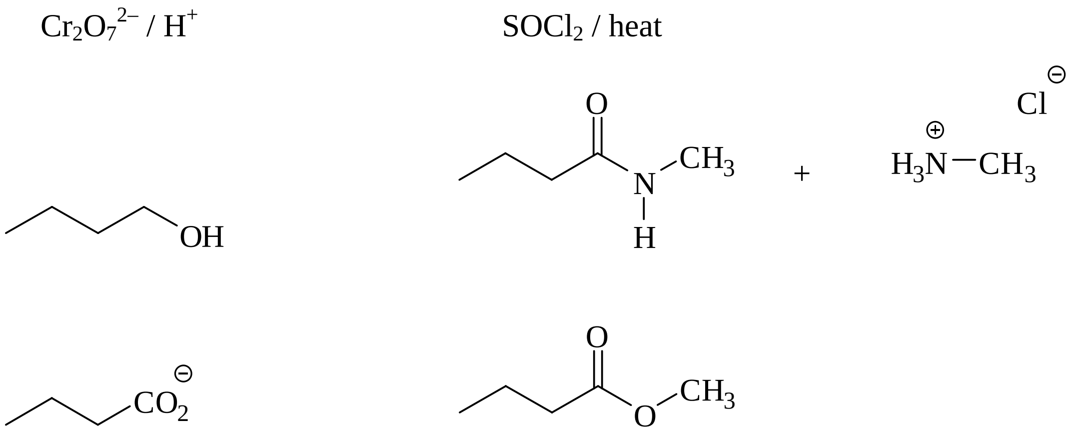
nucleophile

electrophile



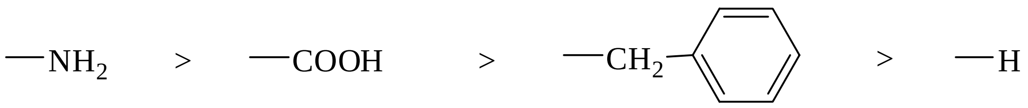


2006-N-8

- 

2006-N-9

- $C_9H_{11}O_2N$



(*S*)

a = arene (aromatic ring) **b** = carboxylic acid