CHEM1109 (Life Sciences Course) - November 2008

2008-N-2

- –14 kJ mol^{-1}

  Reaction is non-spontaneous ($\Delta G°$ = +3.2 kJ mol^{-1})

2008-N-3

- 567 °C

2008-N-4

- 0.578 M

  291 m

2008-N-5

- 2.23×10^{-5}

  51.2 kJ mol^{-1}

2008-N-6

0.0139 M

7.82×10^{-10} M

2008-N-7

- 2.09

  0.28 g

  Cl is a much larger atom than F and is less electronegative. The H–Cl bond is therefore much longer and weaker than the H–F bond. The H–Cl bond is therefore easier to break and it is the stronger acid.
  HF is actually a weak acid. F is smaller and more electronegative than O, so the H–F bond is stronger than the O–H bond. There is consequently little dissociation of HF when it is dissolved in water.

2008-N-8

- 1.8×10^{-5} M

  no change

  decrease

2008-N-9

- 1.47 V

  5.9×10^{52}

  –301 kJ mol^{-1}

  Reaction is spontaneous as $\Delta G°$ is negative

  Zn(s) | Zn^{2+}(aq) (2.0 M) || Ag^{+}(aq) (0.050 M) | Ag(s)

2008-N-10

- The ration of neutrons to protons (N/Z) is approximately 1 for low atomic numbers ($Z \leq 20$), but it slowly rises to about 1.5 as Z increases.

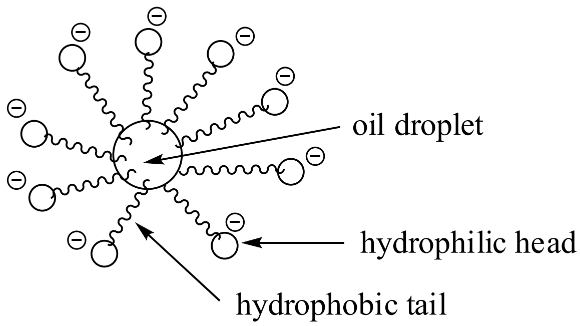
  All elements with $Z > 83$ are unstable.

  Atoms with even numbers of N and Z are more stable than those with odd numbers. There are some particularly stable nuclei where the number of neutrons and or protons = 2, 8, 20, 28,50, 82 and 126.

- The small size of the colloidal particles means that they have a very large total surface area. The colloid can be stabilised by steric and/or electrostatic effects. If surface interactions are unfavourable, they are minimised by flocculation and coagulation.

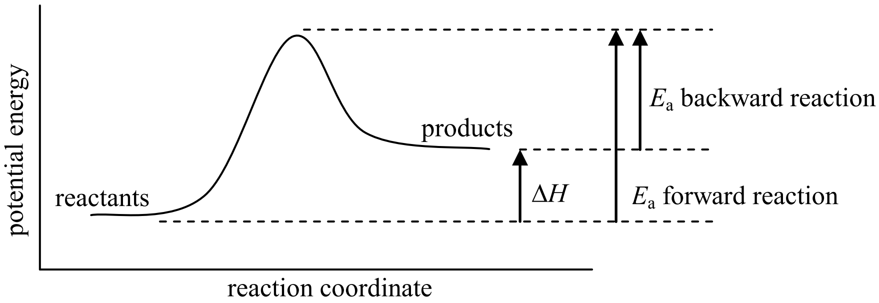
2008-N-11

- Soap molecules consist of a long hydrophobic tail and a charged hydrophilic head. The molecules are able to form micelles (see diagram) in which the tails interact with the oil particles and the heads interact with the water. In this way, the oil is dissolved in the water and can be removed.



- mass of Na = 1.8 g   volume of Cl_2(g) = 0.98 L

2008-N-12

- 

  The backward reaction would be faster as it has a lower activation energy.

2008-N-13

- From Step 1: $K = [N_2O_4(g)]/[NO_2(g)]^2$

  $\Rightarrow \quad [N_2O_4(g)] = K\,[NO_2(g)]^2$

  From Step 2: Rate $= k\,[N_2O_4(g)]$

  $= k\,K\,[NO_2(g)]^2$

  which is consistent with the experimental result.

- 56.4 kJ mol^{-1}

2008-N-14

- 5.3×10^{-13}

  3×10^{43}