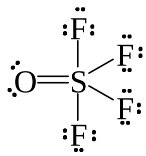
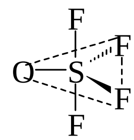
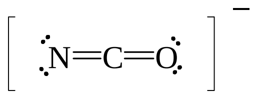
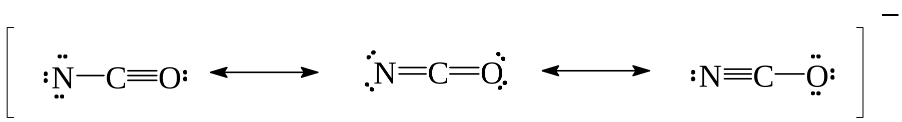
CHEM1909 (1LS Advanced Course) - November 2004

2004-N-2

- 1.64×10^{-5} photon atom^{-1} s^{-1}
-

	sp^3d	
	sp	N—C—O linear



negligible contributor

2004-N-3

- ΔH°_f = –333.6 kJ mol^{-1}

  ΔS° = –82.4 J K^{-1} mol^{-1}

  Three mole of gaseous reactants going to 1 mole of solid and 1 mole of gaseous products. This is a decrease in randomness and hence ΔS° is negative.

2004-N-4

- 1.28 mol

  3.88 M^{-2}

2004-N-5

4.00×10^{-4} atm^{-2}

78.1 kJ mol^{-1}

the equilibrium will shift to the right (products)

the equilibrium will shift to the right (products)

the equilibrium will shift to the right (products)

the equilibrium will shift to the right (products)

2004-N-6

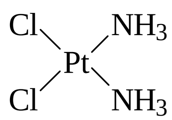
- 17.0 g

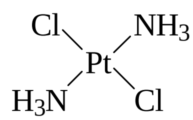
  23.6 mmHg = 0.0311 atm

  100.256 °C

2004-N-7

- 4×10^{-11} M
-





cis-diamminedichloroplatinum(II)   *trans*-diamminedichloroplatinum(II)

2004-N-8

- Reduction: $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$

  Oxidation: $Sn(s) \rightarrow Sn^{2+}(aq) + 2e^-$

  Overall: $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 3Sn(s) \rightarrow 2Cr^{3+}(aq) + 7H_2O(l) + Sn^{2+}(aq)$
- 29.8 hour

2004-N-9

- 0.021 M
- pH = 3.60   pOH = 10.40
- Brønsted-Lowry base is a proton (H^+) acceptor: $NH_3 + H^+ \rightarrow NH_4^+$

  Lewis base is a species that can donate a lone pair: $:NH_3 + H^+ \rightarrow NH_4^+$

  Arrhenius base is one that contains OH^- ions that are released on dissolution in water. Ammonia generates OH^- ions in its reaction with water, it does not contain them in its formula, hence not Arrhenius base.

2004-N-10

-

blood	red blood cells	water/plasma
milk	casein	water
cell	nucleus, ribosomes, etc	cell fluid/ctyoplasm

- It acts as a surfactant because the polymer contains both hydrophobic regions (C–H) and hydrophilic regions (O–H, COOH). The hydrophobic areas adhere to the particle and the hydrophilic areas allows dispersal into the aqueous medium.

  The long chains of the polymer are dispersed in the water, disrupting the free flow of the water molecules and thus increasing the viscosity of the solution.

2004-N-11

- 1.2×10^{-6} M s^{-1}

  Rate = k[benzene][HNO_3]

  $k = 1.2 \times 10^{-4}$ M^{-1} s^{-1}

2004-N-12

Fast equilibrium gives $K = [NO_2^+][HSO_4^-][H_2O]/[HNO_3][H_2SO_4]$

$\Rightarrow$ $[NO_2^+] = K[HNO_3][H_2SO_4]/[HSO_4^-][H_2O]$

Rate = k[benzene]$[NO_2^+]$ {The slow step is rate determining}

= k[benzene]$K[HNO_3][H_2SO_4]/[HSO_4^-][H_2O]$

= k_1[benzene]$[HNO_3]$ {consistent with given rate equation}

- 50 mg