

CHEM1612 (Chemistry Pharmacy 1B) - November 2005

2005-N-2

- 0 sp^2 trigonal planar polar
- 0 sp linear polar
- 6.56×10^{-7} m
- Electron affinity is the energy change accompanying the addition of 1 mol of electrons to 1 mol of gaseous atoms: $A(g) + e^- \rightarrow A^-(g)$.
Electronegativity is a measure of the ability of a bonded atom to attract the shared electrons.
- Electrons in bonds are more delocalised than those in atomic orbitals, i.e. they have a greater wavelength. Since $E=hc/\lambda$, greater wavelength means lower energy.

2005-N-3

- When $[NO_2] = 0.023$ M, $[N_2O_4] = 0.0625$ M
$$K_c = \frac{[N_2O_4]}{[NO_2]^2} = \frac{[0.0635]}{[0.023]^2} = 1.20 \times 10^2 \text{ M}^{-1} \quad \text{QED}$$

 $[NO_2]$ would increase
 $[NO_2]$ would remain unchanged as there is no change to the partial pressures (or concentrations) of NO_2 or N_2O_4 .

2005-N-4

- $-333.6 \text{ kJ mol}^{-1}$
 $-82.4 \text{ J K}^{-1} \text{ mol}^{-1}$
 ΔS° is negative as going from less ordered to more ordered state (3 mol gas to 1 mol gas).

2005-N-5

- 1.67 kJ mol^{-1}
 7.37 kJ mol^{-1}
It will shift to the left. As ΔG° is positive, the reaction is non-spontaneous in forward direction and spontaneous in backward direction.
- copper

2005-N-6

- 2.81 (ionisation is significant and should be solved using quadratic equation)
You'll get an answer of 2.77 if you make the usual assumption that equilibrium concentration of salicylic acid is equal to its initial concentration.

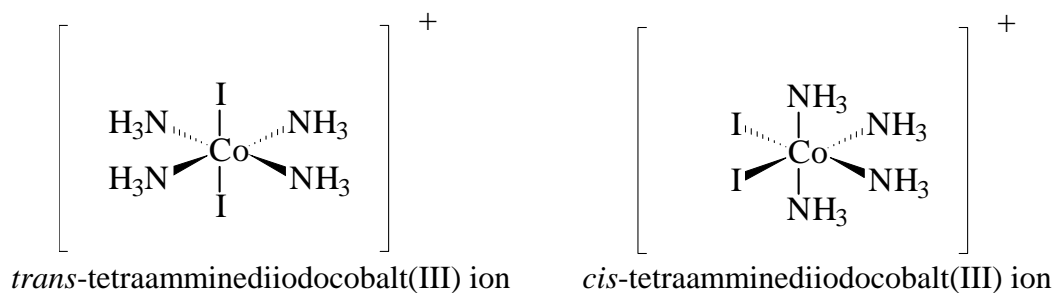
$$6 \times 10^{-7} \text{ M}$$

**2005-N-7**

- $6.1 \times 10^3 \text{ mmHg}$

The polymer would be preferable as it would cause little change in the osmotic pressure of the solution.

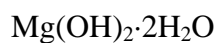
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**2005-N-8**

- $2.53 \times 10^3 \text{ kJ mol}^{-1}$
 $5\text{Fe}^{2+} + \text{MnO}_4^- + 8\text{H}^+ \rightarrow 5\text{Fe}^{3+} + \text{Mn}^{2+} + 4\text{H}_2\text{O}$
- $6.1 \times 10^{30} \text{ M}$

2005-N-9

- 7.4 mg
- yes
- tetraammineplatinum(II) chloride
sodium dihydrogenphosphate

**2005-N-10**

- Rate = $k[\text{NO}_2]^2[\text{H}_2]$
 $k = 260 \text{ M}^{-2} \text{ s}^{-1}$
 $2.2 \times 10^{-4} \text{ M s}^{-1}$

2005-N-11

- They can be stabilised via electrostatic and steric stabilisation.

Hydrophilic colloids may have a charge on their surface that attracts oppositely charged ions (H^+ or OH^- present in water) to form a tightly bound layer known as the Stern Layer. The Stern layer is surrounded by a diffuse layer which contains an excess of counter-ions (opposite in charge to the Stern layer) and a deficit of co-ions. The Stern layer and diffuse layer are collectively known as a double layer. Coagulation of a hydrophilic colloid is prevented by mutual repulsion of the double layers.

Hydrophobic colloids may be stabilised by the use of a surfactant, *e.g.* a long chain fatty acid with a polar head and a non-polar tail. When dispersed in water these molecules arrange themselves spherically so that the polar (hydrophilic) heads are interacting with the polar water molecules and the non-polar (hydrophobic) tails are interacting with each other. This arrangement is called a micelle. The hydrophobic colloid can be stabilized by dissolving in the non-polar interior of the micelle.

