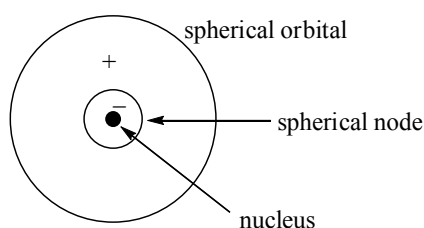
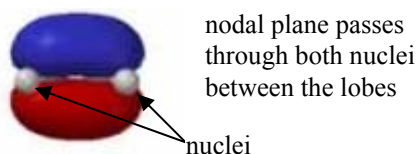


CHEMISTRY 1A (CHEM1101) - November 2007

2007-N-2

- a) The lowest energy configuration is the one with the maximum number of unpaired electrons with parallel spins.
- b) A point plane or surface where the wavefunction (or in general, the amplitude of the wave) changes sign.
- c) A concentration-dependent anisotropic liquid phase formed within a solvent as a result of the shape of the solute molecules plus intermolecular forces.
- d) The energy change accompanying the reaction: $A(g) + e^- \rightarrow A^-(g)$



2007-N-3

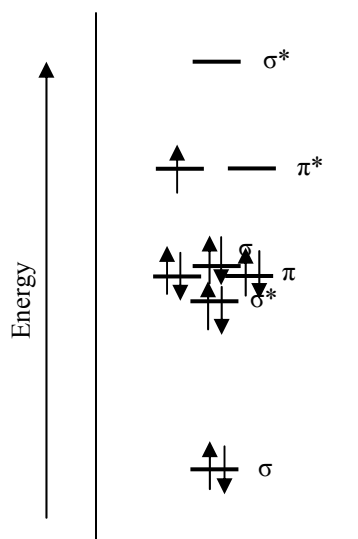
- ${}_{28}^{60}\text{Ni}$
 ${}_{26}^{55}\text{Fe}$
 ${}_0^1n$
- $1.16 \times 10^{-3} \text{ s}^{-1}$
 $1.89 \times 10^{10} \text{ Ci mol}^{-1}$

2007-N-4

- $6.54 \times 10^{-18} \text{ J}$ 30.4 nm
- They have associated matter waves. $\lambda = h/mv$
They have restricted motion, being attracted by the positive nucleus and repelled by other electrons.
- 31.6%

2007-N-5

- 11

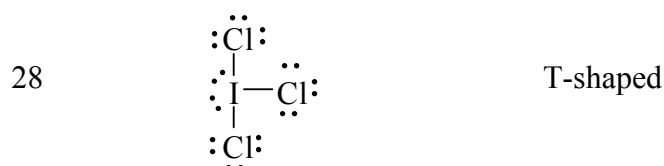
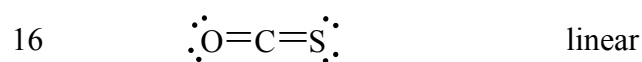
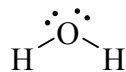


Weaker. N_2 has bond order 3, whereas N_2^- has bond order of 2.5. The extra electron in N_2^- has gone into an antibonding orbital.

Yes, as it contains an unpaired electron in the π^* anti-bonding orbital

2007-N-6

-



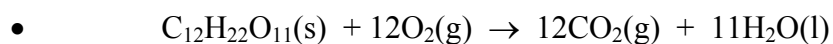
2007-N-7

- $1.36 \times 10^{15} \text{ Hz}$ $9.03 \times 10^{-19} \text{ J}$

345 nm

345 nm is not blocked by ozone, so C–C bond disruption is still possible even with the presence of the ozone layer. Hence one still needs to wear sunblock creams.

2007-N-8



52.4 g

325 kJ

2007-N-9

- >

>

>

>

- chromium

2007-N-10

- $1.35 \times 10^{-11} \text{ M}$

$6.96 \times 10^{-4} \text{ mol}$

2007-N-11



The formation of ammonia is favoured at low temperature and high pressure. However, the reaction is very slow at low temperatures and hence is run at an intermediate temperature of about 400 °C.

The equilibrium is pushed further to the right by removing the ammonia as it is formed (it has a much lower boiling point than hydrogen and nitrogen). The use of a catalyst speeds up the reaction (in both directions) and reduces the need to increase the temperature.

2007-N-12

- $2.2 \times 10^{-38} \text{ M}$