## CH1012

## **Tutorial 6**

## Name:

1. Define the term **principal quantum number**. Which 2 quantum numbers define a 2s orbital?

- 2. Inside a bottle of Coke<sup>®</sup> the partial pressure is 3.5 atm at 25°C.  $K_{\rm H}(\rm CO_2, 25^{\circ}C) = 3.3 \times 10^{-2} \text{ mol} L^{-1} \text{ atm}^{-1}$  in water.
  - Calculate the solubility of carbon dioxide in  $Coke^{\text{(B)}}$  under these conditions assuming that the  $Coke^{\text{(B)}}$  is a dilute solution that behaves like H<sub>2</sub>O.
  - Why does the CO<sub>2</sub> bubble out of the Coke<sup>®</sup> when it is opened? (N.B. you will need some calculations here)

Draw molecular orbital diagrams for N<sub>2</sub> and O<sub>2</sub>.
Calculate the bond orders and predict the stability of each of these diatomic molecules using these MO schemes.

4. What is **Hund's Rule**?

٠

Illustrate how this influences the magnetic properties of one of the above molecules.

 Draw skeletal structures and provide IUPAC names for the following compounds: CH<sub>3</sub>CH<sub>2</sub>CH(C<sub>2</sub>H<sub>5</sub>)CH<sub>2</sub>CH(CH<sub>3</sub>)CH<sub>2</sub>COOH

CH<sub>3</sub>CH<sub>2</sub>CHCl(CHO)

6. Draw **a 3-D molecular structure** for 4-chloro-2-cyclohexenone.

7. Determine if there are any chiral centres in the following molecules and assign R or S absolute configurations to the chiral centres you find.

