# CHEM1001 Problem Sheet 3 (Week 3)

The program "*Nomenclature*" has a range of examples of naming inorganic compounds. It can be downloaded from the page http://www.chemlab.chem.usyd.edu.au/download

1. Using circles to represent electron orbits, give electronic structures for the following.

   (i) N (ii) $Cl^-$ (iii) Ar (iv) $O^{2-}$
   (v) C (vi) $N^{3-}$ (vii) Ca (viii) $Ca^{2+}$

2. Predict whether each of the following species would be a metal or a non-metal.

   (a) An element that has 2 electrons in the $n = 3$ level as its outer shell.
   (b) An element that has an outer shell of 5 electrons in the $n = 3$ level.
   (c) An element that has only 2 electrons.
   (d) An element that has 17 electrons.

3. Give the formula and name of a binary ionic compound formed from the following pairs of elements:

   (i) magnesium and oxygen (ii) barium and bromine (iii) sodium and nitrogen
   (iv) potassium and oxygen (v) aluminium and sulfur (vi) lithium and iodine
   (vii) caesium and chlorine (viii) strontium and nitrogen

4. Name the following compounds.

   (i) $MgCl_2$ (ii) CuO (iii) $Cu_2O$ (iv) $AlBr_3$
   (v) $Fe_2O_3$ (vi) $FeCl_2$ (vii) $Bi_2S_3$ (viii) $SnCl_2$

5. Explain why bonding in ionic solids is non-directional. What factors determine the arrangement of ions in ionic crystals?

6. Explain where does the energy required to overcome the crystal lattice stabilisation energy come from for the following processes.

   (a) an ionic solid is melted
   (b) an ionic solid is dissolved

7. Why is it that ionic solids do not conduct electricity, yet the same compound will conduct when melted? Use sodium chloride as an example.

8. Give formulas for the following compounds.

   (a) potassium chromate
   (b) sulfur trioxide
   (c) iron(III) nitrate
   (d) sulfur hexafluoride