**Work through the ChemCAL modules "*Atoms, Electrons and Orbitals*"
and "*Electronic Structure of Atoms and Ions*".**

Work through the iChem module on "Inorganic Nomenclature".

1. Complete the table below giving the full electron configuration for ground state atoms and ions.

	Na	$1s^2\ 2s^2\ 2p^6\ 3s^1$
(a)	S	
(b)	Cu(II)	
(c)	V(III)	
(d)	Br$^-$	
(e)	Ca^{2+}	

2. The energy required to ionise a gaseous hydrogen atom is 2.18×10^{-18} J. Calculate the frequency (in Hz) and wavelength (in nm) of the radiation which has just sufficient energy to cause this ionisation.

3. Which of the following sets of quantum numbers are valid?

	n	l	m_l	m_s		n	l	m_l	m_s
(a)	1	0	0	½	(b)	4	4	3	- ½
(c)	2	1	-1	½	(d)	3	2	0	0
(e)	2	1	1	½	(f)	6	2	-2	½

4. Which *one* of the following groups consists solely of *d*-block or transition metals?

   (a)   carbon, silicon, germanium, lead, mercury
   (b)   arsenic, antimony, bismuth, tungsten, tellurium
   (c)   chromium, manganese, iron, cobalt, nickel
   (d)   aluminium, gallium, indium, thallium, bismuth

5. ^{18}F is used in positron emission tomography – PET. It is synthesised by bombarding a ^{20}Ne target with ^{2}H.

   (a)   Write a nuclear equation for the formation of ^{18}F and so identify the by-product of this synthesis.
   (b) ^{18}F undergoes positron decay with a half life of 109.7 minutes. Write a nuclear equation to identify the product of this decay reaction.

6. What are the three boundary conditions, applied to electron waves, which enable the Schrödinger equation to be solved?

7.   Sketch the shape of the electron density of a 2s and 2p atomic orbital.

8.   Define the Pauli exclusion principal.

9.   Name the following compounds: NaBr, SO_3, N_2O_5, $Fe(OH)_2$, $Fe(OH)_3$, ICl_3.