CHEM1101 Problem Sheet 4 (Week 4)

1. Briefly explain why the atomic radius increases abruptly from neon to sodium.

2. Calculate the shortest wavelength in the continuous x-ray spectrum emitted from a metal target being struck by 30 keV electrons.

3. Complete the following table showing the quantum numbers and the number of nodes and nodal planes for some atomic orbitals.

Orbital	n	l	number of nodes	number of planar nodes	number of spherical nodes
1s	1	0	0	0	
2*s*	2	0	1	0	
2p					
3*s*					
3*p*					

Derive relationships between the quantum numbers and (a) the number of nodes, (b) the number of nodal planes and (c) the number of spherical nodes.

4. Write out the electron configurations for the following elements in the two formats shown for aluminium.

e.g. Al $[Ne]3s^2 3p^1$ [Ne] ↑↓ ↑

(a) O

(b) Ga

(c) Fr