THE OPEN UNIVERSITY OF SRI LANKA

Foundation Programme in Science/Continuing Education Programme **2008/2009**

PSF 1303/PSE 1303 – CHEMISTRY – LEVEL I

HOME ASSIGNMENT I Answer Guide

1 (a)

(i) Na - $1s^2,2s^2,2p^6,3s^1$ (ii) Mg^{2+} - $1s^2,2s^2,2p^6$ (iii) Cl - $1s^2,2s^2,2p^6,3s^2,3p^6$

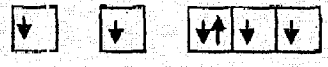
(iv) S^{2-} - $1s^2,2s^2,2p^5,3s^2,3p^6$ (v) Zn - $1s^2,2s^2,2p^6,3s^2,3p^6,3d^{10},4s^2$ (vi) Ni^{2+} - $1s^2,2s^2,2p^6,3s^2,3p^6,3d^8$

(b) (i) 4s,$4p_x$, $4p_y$,4pz, and five 4d orbitals, Seven 4f orbitals

(ii) Can't it will only be in one of them

(iii) No for the hydrogen atom all orbitals with the same principle quantum numbers have the same energy [they are degenerate]

(c) O - $1s^2$, $2s^2$, $2p^4$



Energy required to remove an electron from completely filled or half filled electron configuration is more than that of other configurations. Once that atom has changed into a + ve ion there is a stronger attraction between the nucleous and the electron that are left [This shown by measurement of the radii of the ions which are always smaller than their parent atoms] Hence it is more difficult to remove an electron and the ionization energy increases

(d) Induce has the largest number of electrons the most shielding and the greatest polarizability

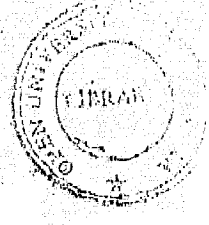
(e) Not marked

(f) Relative atomic mass = 90.92 x 20/100 + 0.26 x 21/100 + 8.82 x 22 /100 = 20.179

2 (a)

Atoms	Na	S	O
	29.1	40.5	30.4
	23	32	16
	1.265	1.265	1.90
	1.265	1.265	1.265
	1	1	1.5
	2	2	3

Emperical formula is $Na_2S_2O_3$



(b) (i) $4Al + 3O_2 \longrightarrow 2Al_2O_3$

(ii) $P_4 + 5O_2 \longrightarrow P_4O_{10}$

(iii) $Si + O_2 \longrightarrow SiO_2$

(c) $AlCl_3 + 3H_2O \longrightarrow Al(OH)_{3(S)} + 3\,HCl_{(aq)}$

$PCl_5 + 3H_2O \longrightarrow H_3PO_{4(aq)} + 3HCl_{(aq)}$

$SiCl_4 + 4H_2O \longrightarrow SiO_2 + 2H_2O + 4HCl_{(aq)}$

(d) $2HNO_3 + Na_2CO_3 \longrightarrow 2\,NaNO_3 + CO_2 + H_2O$

Molar mass of Na_2CO_3 = 23 x 2 + 12 + 16 x 3 = 106 g mol^{-1}

Mass of Na_2CO_3 = 10.6 g

Number of moles Na_2CO_3 = 10.6/106 = 0.1 mol