MATTER & MINERALS

CHEMISTRY HOMEWORK – WEEK 9 – FALL

Chapter 7

H $1s^1$

He $1s^2$

Li $1s^2\ 2s^1$

Be $1s^2\ 2s^2$

B $1s^2\ 2s^2\ 2p^1$

C $1s^2\ 2s^2\ 2p^2$

N $1s^2\ 2s^2\ 2p^3$

O $1s^2\ 2s^2\ 2p^4$

F $1s^2\ 2s^2\ 2p^5$

Ne $1s^2\ 2s^2\ 2p^6$

Na $1s^2\ 2s^2\ 2p^6\ 3s^1$

Mg $1s^2\ 2s^2\ 2p^6\ 3s^2$

Al $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$

Si $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

P $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

S $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$

Cl $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

Ar $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

K $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$

Ca $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$

Sc $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^1$

Ti $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^2$

V $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^3$

* Cr $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$

Mn $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^5$

Fe $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$

Co $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^7$

Ni $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^8$

* Cu $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^{10}$

Zn $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$

Ga $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^1$

Ge $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^2$

As $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^3$

Se $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^4$

Br $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^5$

Kr $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6$

61. $n = 1, 2, 3, 4, \ldots$

$l = 0, 1, 2, 3, \ldots (n-1)$

$m_l = -l, -l+1, \ldots 0, \ldots +l$

62. 1p, 3f, 2d

63. (a) correct

(b) incorrect $n=1,\ l=0,\ m_l=0$

(c) correct

(d) incorrect $n=1,\ l=0,\ m_l=0$

65. ψ^2 represents the electron density at a particular point in an atomic orbital (also known as the probability of finding an $\bar{e}$ at a given point).

70. (a) n cannot be equal to zero!

(b) one electron

(c) $n=3$

	m_l	# orbitals	# of $\bar{e}$
$l=0$	0	1	2
1	−1 0 +1	3	6
2	−2, −1, 0, +1, +2	5	10

total # of $\bar{e}$ = 18

18 $\bar{e}$ can have $n=3$

(d) $n=2$ $l=2$ there is no such orbital!

(e) $n=1,\ l=0,\ m_l=0$ two electrons

79. B $1s^2\ 2s^2\ 2p^1$

1s: ↑↓ 2s: ↑↓ 2p: ↑ _ _

1s	1s	2s	2s	2p
$n = 1$	$n = 1$	$n = 2$	$n = 2$	$n = 2$
$l = 0$	$l = 0$	$l = 0$	$l = 0$	$l = 1$
$m_l = 0$	$m_l = 0$	$m_l = 0$	$m_l = 0$	$m_l = -1$
$m_s = +1/2$	$m_s = -1/2$	$m_s = +1/2$	$m_s = -1/2$	$m_s = 1/2$

for this you can also have $m_l = 1$, or 0; $m_s = -1/2$

N $1s^2\ 2s^2\ 2p^3$

1s: ↑↓ 2s: ↑↓ 2p: ↑ ↑ ↑

1s	1s	2s	2s	2p	2p	2p
$n = 1$	$n = 1$	$n = 2$	$n = 2$	$n = 2$	$n = 2$	$n = 2$
$l = 0$	$l = 0$	$l = 0$	$l = 0$	$l = 1$	$l = 1$	$l = 1$
$m_l = 0$	$m_l = 0$	$m_l = 0$	$m_l = 0$	$m_l = -1$	$m_l = 0$	$m_l = +1$
$m_s = +1/2$	$m_s = -1/2$	$m_s = 1/2$	$m_s = -1/2$	$m_s = 1/2$	$m_s = 1/2$	$m_s = 1/2$

You can either write $m_s = 1/2$ OR $m_s = -1/2$ for all 3 of them.

82. (a) excited state
Ground state would be $1s^2\ 2s^2\ 2p^1$

(b) ground state

(c) excited state. Ground state is $1s^2\ 2s^2\ 2p^5$

(d) excited state. Ground state is $[Ar]\ 4s^2\ 3d^6$

→

	Orbital diagram	# of unpaired e^-
(a)	1s: ↑↓ 2s: ↑↓ 3p: ↑ _ _	1
(b)	1s: ↑↓ 2s: ↑↓ 2p: ↑↓ ↑↓ ↑↓	0
(c)	1s: ↑↓ 2s: ↑↓ 2p: ↑↓ ↑ ↑ 3s: ↑	3
(d)	[Ar] 4s: ↑↓ 3d: ↑ ↑ ↑ ↑ ↑ 4p: ↑ _ _	6