

Chem 1063 J-Term 2007. Exam 1

Name Key

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(1)(4 points) Define the following

(a) the Pauli Exclusion Principle

No 2 electrons in the same atom can have the same 4 quantum #'s.

(b) the Aufbau principle

Electrons fill orbitals from lowest energy to high. energy

(2)(4 points) List and name the four quantum numbers for an electron.

n - principal

l - angular momentum

m_l - magnetic

m_s - spin

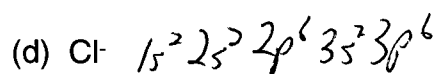
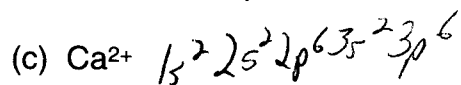
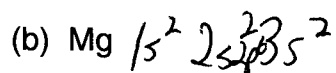
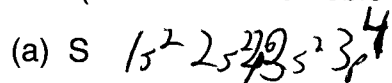
(3)(3 points) List the possible quantum numbers for the following orbitals

(a) 4p $n=4$ $l=1$ $m_l = -1, 0, \text{ or } 1$ $m_s = +\frac{1}{2} \text{ or } -\frac{1}{2}$

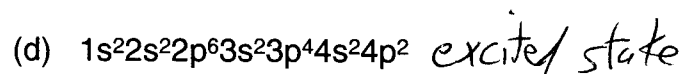
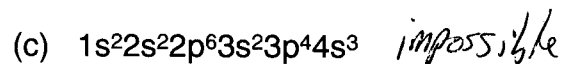
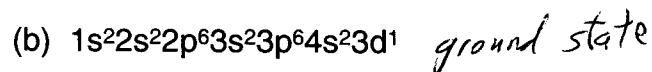
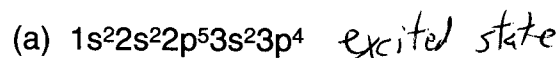
(b) 3p $n=3$ $l=1$ $m_l = -1, 0, \text{ or } 1$ $m_s = +\frac{1}{2} \text{ or } -\frac{1}{2}$

(c) 5d $n=5$ $l=2$ $m_l = -2, -1, 0, 1, \text{ or } 2$ $m_s = +\frac{1}{2} \text{ or } -\frac{1}{2}$

(4)(4 points) Write out the ground state electron configuration for the following atoms or ions (do not use the noble gas shortcut)

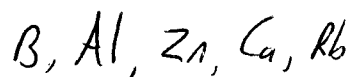


(5)(4 points) Label each of the following as a ground state, an excited state, or an impossible electron configuration



(6)(2 points) Place the following elements in order from smallest to largest atomic radii.

Zn, Ca, Rb, Al, B



(7)(2 points) Which of the following should have the largest first ionization energy?

O, Mg, S, Tc, or Na



(9)(2 points) Place the following in order from smallest to largest radius.

Li^+ , He, Be^{2+} , Li^+ , He

(10) (2 points) Place the following in order of increasing electronegativity

Cl, Rb, Ge

Rb, Ge, Cl



(11) (2 points) What are the possible values of l and m_l for the following orbital?



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

Extra Credit(4 points) Can an electron ever be trapped motionless in one spot? Explain why or why not

No, then x & v would both be known exactly & violate the Heisenberg Uncertainty Principle.