

****KEEP YOUR WORK AND ANSWERS COVERED.****

1. (24 pts) Indicate whether each statement is true (T) or false (F). Be certain T or F is clearly indicated.

T The electron in an H atom is at higher energy than the electron in a He⁺ cation.

T Higher intensity colors are associated with higher probabilities of absorption.

T Molecules in an excited state can often do a reaction which is not possible in the ground state.

T A *p*-subshell has three orbitals at 90° to each other.

F In $n = 3$, the energies of the subshells are $s > p > d$.

F Uranium is a *d*-block metal.

T All Group 12 atoms are diamagnetic.

F Cu²⁺ is bigger than Cu⁺.

** 2. (3 pts) How many orbitals are in the $n = 3$ shell? 9

(3 pts) Which quantum number gives the orientation of an orbital? m_l

(3 pts) What element forms a 3+ cation whose configuration ends in $3d^6$? Co

3. (6 pts) How many unpaired electrons are in each of the following?

Cr³⁺ 3 Ba²⁺ 0 S 2

4. (2 pts) How many elements in Period 3 have only full subshells? 2

(2 pts) How many elements in the entire Periodic Table have ten core electrons? 8

(2 pts) What is the maximum number of valence electrons for any Main Group element? 8

5. (6 pts) Consider the following elements.

Sr Sb Br Kr Ca

Which one has the largest atoms?

Sr

How many have paramagnetic atoms?

2

How many can form a 2+ cation with a full subshell configuration?

2

- ** 6. (4 pts) Of the following, circle those which have a full subshell configuration.

Y²⁺Mn²⁺Cd²⁺Ca²⁺CaCu²⁺

7. (10 pts) Using noble gas abbreviation, give the configuration of each of the following.

Br⁻ [Kr]Sn²⁺ [Kr] 5s² 4d¹⁰Pm [Xe] 6s² 4f⁵

- ** 8. (4 pts) Of the following, circle the one with the greatest lattice energy.

CaS

MgO

NaCl

KBr

KCl

- ** 9. (3 pts) What is the shell value (
- n*
-) for the valence electrons in Bi?

6

(3 pts) What element has the strongest hold on its electrons?

He