

## INFORMATION, SCRAP, AND COVER PAGE

**\*\*\* KEEP YOUR WORK AND YOUR ANSWERS COVERED \*\*\***

This page contains information which may or may not be needed. This page can also be used for scrap paper or for cover paper. THIS PAGE WILL NOT BE COLLECTED. TEAR THIS PAGE OFF THE EXAM.

Avogadro's Number  $6.022 \times 10^{23}$

Electromagnetic Radiation  $c = \lambda\nu = 3.00 \times 10^8 \text{ m/s}$

$$h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s}$$

$$E = h\nu = hc/\lambda$$

Electron Energy  $E = -2.18 \times 10^{-18} \text{ J} \left( \frac{Z^2}{n^2} \right)$

Transition Energy  $\Delta E = -2.18 \times 10^{-18} \text{ J} \left( \frac{1}{n_{\text{final}}^2} - \frac{1}{n_{\text{initial}}^2} \right)$

Chem 201-04

EXAM IV

November 6, 2017

PRINT NAME \_\_\_\_\_

SIGN NAME \_\_\_\_\_

CIRCLE your recitation section in the list below.

A: W 3:00 HM 217	B: F 10:00 LF 102
C: F 8:00 LF 130	D: M 8:00 LF 130
E: M 9:00 LF 130	F: T 3:00 HM 221
G: W 8:00 LF 130	H: Th 12:00 NS 317

SCORED GRADE: \_\_\_\_\_

All answers should be with the correct significant figures.

The Periodic Table and Information Page will not be collected. They may be used as scratch paper or as cover paper. Do not turn them in.

Be certain your answers are clear. If an answer is not clear, it can be considered wrong.

Problems marked with \*\* in the margin are from the assigned homework. These total 26 points.

Place your name in the space provided at the top of each question page. This helps to identify the pages if they are accidentally separated during grading and processing.

Work promptly. Use your time effectively.

last name: \_\_\_\_\_

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

\_\_\_\_\_ A 350 nm photon is in the infrared region of EM radiation.

\_\_\_\_\_ Following an excitation of an electron, an atom ends with less energy than before the excitation.

\_\_\_\_\_ In a chemiluminescent reaction, a product is made in an excited state and then relaxes, emitting a photon.

\_\_\_\_\_ The  $n = 4$  shell has  $s$ ,  $p$ ,  $d$  subshells (only).

\_\_\_\_\_ Spin exclusion only occurs between electrons of different spins.

\_\_\_\_\_ A selenium atom has 18 core electrons and 6 valence electrons.

\_\_\_\_\_ H and He have no core electrons.

\_\_\_\_\_  $\text{Sc}^{3+}$  and  $\text{Cl}^-$  are isoelectronic.

2. (4 pts) Rank MgO, KF and CaO in the order of increasing ionic bond strength.

weakest \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ strongest

last name: \_\_\_\_\_

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3. (2 pts) What is the maximum number of valence electrons for any Main Group element? \_\_\_\_\_

(2 pts) What element has the highest  $IE_2$  in the s-block? \_\_\_\_\_

(2 pts) What element in Period 2 has the greatest electron affinity? \_\_\_\_\_

(2 pts) What is the maximum possible number of unpaired electrons in any monatomic ion? \_\_\_\_\_

\*\* 4. (10 pts) Which quantum number gives the shape of an orbital? \_\_\_\_\_

What element has a configuration which ends in  $5p^5$ ? \_\_\_\_\_

What elements in Period 4 form a  $3+$  cation with four unpaired electrons? \_\_\_\_\_

\*\* 5. (6 pts) Using box notation, show the configuration of the valence electrons for Br.

last name: \_\_\_\_\_

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4  
↓

6. (4 pts) What elements in Period 5 have three unpaired electrons in their neutral atoms? \_\_\_\_\_

- \*\* 7. (5 pts) Circle the wavelength (in nm) of the photon which is emitted when a hydrogen atom undergoes the relaxation  $n = 6 \rightarrow n = 3$ .

727	763	811	877	948	980.
1030	1090	1120	1150	1240	1270

8. (9 pts) Using noble gas abbreviation, give the configuration of each of the following.

Pb<sup>2+</sup> [   ]

Bk [   ]

- \*\* 9. (5 pts) Circle all of the following which are diamagnetic.

Cu<sup>2+</sup>      P      In<sup>3+</sup>      V<sup>3+</sup>      Zn<sup>2+</sup>      He