CHEM 192 • Exam #3 • Fall 2012 • 100 points Name: Key - Yes (1)

See the Exam Reference Page for important information and notes.

1. C (4) Which of the following does not usually exist as a diatomic element?

A) oxygen
B) iodine
C) carbon
D) fluorine
E) hydrogen

2. A (4) Which of the following elements is an alkaline earth metal?

A) Ra B) Au C) Gd
D) Bi E) Cs

3. D (4) Which of the following symbols represents a species with 12 protons, 11 neutrons, and 10 electrons?

A) $^{22}_{10}Ne^{2-}$ B) $^{23}_{11}Na^{2+}$ C) $^{23}_{12}Mg^{2-}$
D) $^{23}_{12}Mg^{2+}$ E) $^{21}_{11}Na^{2-}$

4. C (4) Choose the pair in which the components have the same charge.

A) a proton and a hydrogen atom
B) a hydrogen atom and an electron
C) a neutron and a hydrogen atom
D) an electron and a neutron

5. E (4) Which of the following elements is most similar to chlorine?

A) H
B) He
C) Na
D) Hg
E) Br

6. A (4) A certain isotope X^{2+} contains 37 electrons and 73 neutrons. What is the mass number for this element?

A) 112 B) 108 C) 39
D) 110 E) 35

7. (36) Provide the formulas of the following species:

v.1

A) dinitrogen tetraoxide N_2O_4

B) sulfurous acid H_2SO_3

C) sodium phosphide Na_3P

D) manganese (IV) oxide MnO_2

E) gallium sulfide Ga_2S_3

F) hydroiodic acid HI

G) potassium hydrogen sulfate $KHSO_4$

H) elemental chlorine Cl_2

I) magnesium iodide MgI_2

J) calcium hydroxide $Ca(OH)_2$

K) nickel (II) nitrate $Ni(NO_3)_2$

L) potassium oxide K_2O

8. (21) Provide the names of the following species:

A) $Fe_2(SO_3)_3$ iron (III) sulfite

B) SO_3 sulfur trioxide

C) $Ba(NO_3)_2$ barium nitrate

D) PbO_2 lead (IV) oxide

E) PO_2 phosphorus dioxide

F) HCN hydrocyanic acid

G) $(NH_4)_2CO_3$ ammonium carbonate

(v.1)

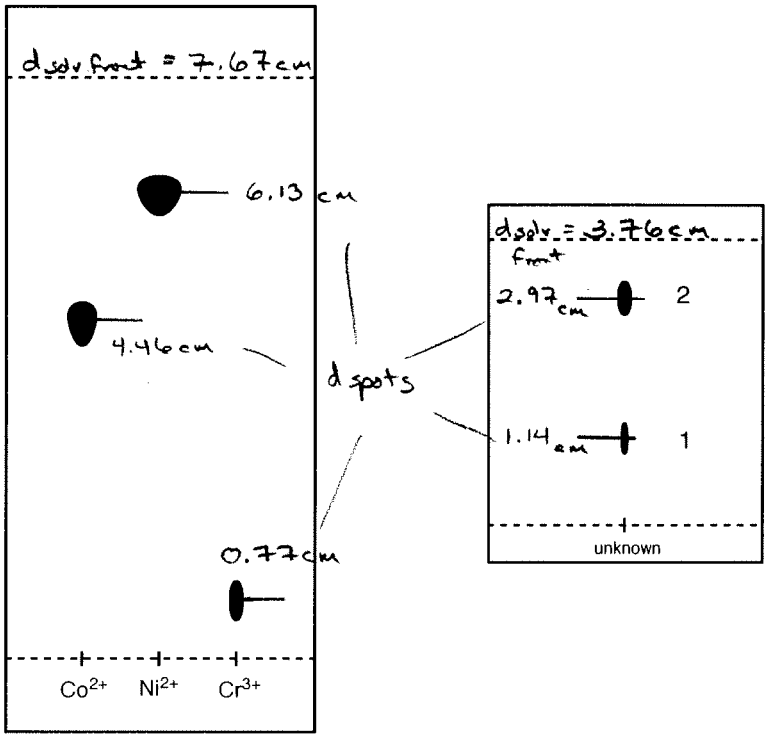
9. (15) Complete the following table:

Species	# protons	# electrons
Se^{2-}	34	36
As^{5+}	33	28
Ba	56	56
Pb^{4+}	82	78
P^{3-}	15	18

10. (15) Consider the paper chromatograms below. The chromatogram on the left is a set of solutions containing the ions indicated. The chromatogram on the right has an unknown mixture.

A. Calculate the R_f values and record them in the table. Clearly identify the part of the spot you are using for measuring. Measure to the full precision of your ruler. Pay close attention to significant figures, and SHOW WORK!

Spot	R_f	
Co^{2+}	$\frac{4.46}{7.67} = 0.581$	3sf
Ni^{2+}	$\frac{6.13}{7.67} = 0.799$	
Cr^{3+}	$\frac{0.77}{7.67} = 0.10$	2sf
Unk 1	$\frac{1.14}{3.76} = 0.303$	3sf
Unk 2	$\frac{2.97}{3.76} = 0.790$	



$R_f = \frac{d_{spot}}{d_{solv\ front}}$

B. What are the identities of spot 1 and spot 2 in the unknown? If you cannot assign the identity of a spot, *please explain why.*

Unknown 2 could be Ni^{2+} based on similar R_f values.

Unknown 1 is likely <u>not</u> Co^{2+}, Ni^{2+}, or Cr^{3+}, based on no similar R_f values.