

Name Key (print) Name 10A (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) Avogadro's number = 6.022×10^{23}

NA = not attempted, BA = bad attempt, NW = no work

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 44 pts total) *NE = no explain group 7A*

- 1) How many valence electrons do the halogens possess? 1) B
 A) 6 B) 7 C) 2 D) 5 E) 1
- 2) Ions differ in the number of 2) A
A) electrons.
 B) neutrons.
 C) protons.
 D) electrons and protons.
 E) neutrons and protons.
- 3) How many H⁺ ions can the acid, H₂SO₄, donate per molecule? 3) A
A) 2 B) 3 C) 0 D) 1
- 4) Identify the compound with covalent bonds. 4) E
 A) KBr B) Li C) NaCl D) Kr E) CH₄
- 5) Which of the following solutions will have the highest concentration of chloride ions? 5) D
 A) 0.10 M LiCl
 B) 0.10 M MgCl₂
 C) 0.05 M CaCl₂
D) 0.10 M AlCl₃
 E) All of these solutions have the same concentration of chloride ions.
- 6) How many significant figures are in 0.00523980 mL? 6) D
 A) 7 B) 5 C) 3 D) 6 E) 4
- 7) Identify a cation. 7) A
A) An atom that has lost an electron.
 B) An atom that has lost a proton and a neutron.
 C) An atom that has gained an electron.
 D) An atom that has gained a neutron.
- 8) Determine the oxidation state of P in PO₃³⁻. 8) B
 A) -3 B) +3 C) +6 D) +2 E) 0

P - 6 = -3
P + 3(-2) = -3
P = -3 + 6 = +3

Part II: Short Answers (46 pts) Show work on all questions for partial and full credit even on questions which do not specify.

1. 1000 millimeter means one meters (5 pts)
2. Significant Figures: Show work for determining correct number of significant figures in the following calculations. (5 pts)

7.9 + 100.287 + 2.11 = to correct sig fig 110.3

3. (a) Give the name of the element **Na** (2 pts) Sodium

(b) Give the symbol for the element **sulfur** (2 pts) S

4. For the element **Se** answer the following (2 pts each blank, 16 pts total)

a) How many protons 34 b) How many electrons for the neutral atom 34

c) Give the symbol in the format ${}^A_Z X$ for the same element ${}^{79}_{34} Se$ (2 pt) -1/2 pt

d) What group is the element in 6A e) What period is the element in 4

f) What is the likely charge on the element -2 (2 pts) Explain or show work. (2 pts)

$$6 - 8 = -2$$

g) Is the element a [(metal) or nonmetal] (2 pt)

5. If you have a compound made up of the elements **Mg and N** (8 pts total)

a) What are the charges on the ions made from those elements (show work or explain) (4 pts)

Mg - group 2 +2

N group 5 - 8 = -3

Mg⁺² N⁻³
attempt
-2

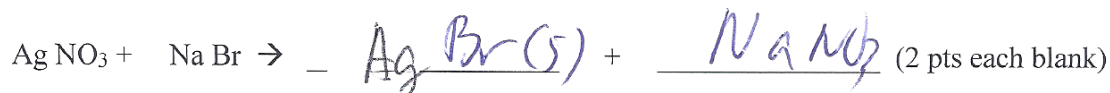
b) Write the formula for the compound made from those elements. Showing work on how you arrived at the formula. (4 pts)



or $(Mg)^{+2} + (N)^{-3} = zero$

↑ 3 ↑ 2

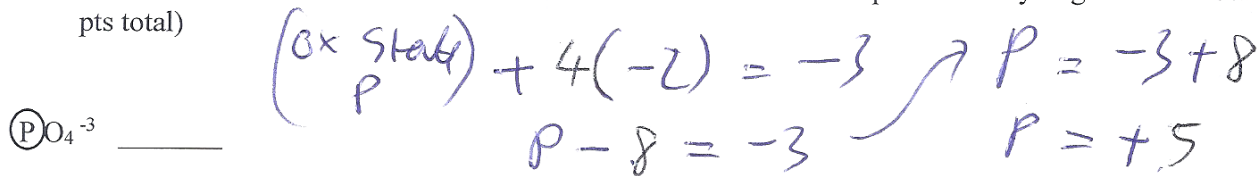
6. a. Write out the **balanced** molecular equation for the reaction below by filling in the blanks. (6 pts total)



- b. Are any of the products insoluble in water? If so which product? (2 pts)

$\text{AgBr}(s)$ is insoluble

7. Give the oxidation states of the circled element. Show work or explain where you got the number (5 pts total)

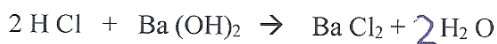


Part III: Long Answers (30 pts) Show work on all questions for partial and full credit even on questions which do not specify.

1. If you have 37.8 grams of the element Na (sodium), how many atoms of Na do you have? (Avogadro's # = 6.022×10^{23}) (15 pts)

$1 \text{ mol Na} = 22.99 \text{ g Na} = 6.022 \times 10^{23} \text{ atoms Na}$
 $37.8 \text{ g Na} \times \frac{1 \text{ mol Na}}{22.99 \text{ g Na}} \times \frac{6.022 \times 10^{23} \text{ atoms Na}}{1 \text{ mol Na}} = 9.90 \times 10^{23}$

2. Calculate the theoretical yield of the BaCl_2 in grams from the following reaction if you started with 2.35 mL of a 0.1 M solution of the HCl (assume complete reaction) (FW $\text{BaCl}_2 = 208.33 \text{ g/mol}$) (M = moles/liter) (15 pts)



\uparrow
 2.35 mL
 of 0.1 M

\nwarrow FW = 208.33 g

0.0245 g
 $\rightarrow \text{BaCl}_2$

$2.35 \text{ mL HCl} \times \frac{0.1 \text{ mol HCl}}{1000 \text{ mL HCl}} \times \frac{1 \text{ mol BaCl}_2}{2 \text{ mol HCl}} \times \frac{208.33 \text{ g BaCl}_2}{1 \text{ mol BaCl}_2} =$