



4. (8 points) What is the sodium ion concentration when 100.0mL of 0.250M sodium nitrate is added to 50.0mL of 0.15M sodium carbonate?
5. (15 points) A 1.705g sample containing iron(III)oxide reacted with excess nitric acid to make iron(III)nitrate and water. When the reaction was completed 3.551g of iron(III)nitrate was collected.
- What is the balanced chemical reaction?
  - What is the percent purity of the iron(III)oxide sample? (What is the percent of iron(III)oxide in that sample?)
  - What mass of water was generated in this reaction?



**Section 3:** Answer two of the following three questions. Be absolutely clear about which questions you are answering. Draw an 'X' through the question that you do not want graded.

9. (10 points) Predict the products, and write the balanced molecular and net ionic equations for both of the following combinations.

a. Ammonium sulfate + lead (II) nitrate →

b. Calcium nitrate + sodium carbonate →

10. (10 points) In the reactions below, determine the elements that are being oxidized and reduced, and the species that are the oxidizing agents and reducing agents.

a.  $\text{Mg}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}$

b.  $\text{O}_{2(g)} + \text{H}_2\text{O}_{(l)} + \text{Pb}_{(s)} \rightarrow \text{Pb}(\text{OH})_{2(s)}$

11. (10 points) The density of copper is 8.96g/mL. Give the density in pounds per ft<sup>3</sup>.

NOTE: 1 kg = 2.2046 pounds and 1 in = 2.54cm. Both of these conversions are exact.

**Constants and Givens**

---

$$T_K = T_C + 273.15$$

$$T_C = \frac{5}{9}(T_F - 32)$$

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

**Solubility Rules**

Ions	Statement	Exceptions
$\text{Li}^+, \text{Na}^+, \text{K}^+, \text{NH}_4^+$	Group 1A and ammonium compounds are soluble	N/A
$\text{NO}_3^-$	Nitrates are soluble	N/A
$\text{Cl}^-, \text{Br}^-, \text{I}^-$	Most chlorides, bromides, and iodides are soluble	$\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}_2^{2+}$
$\text{SO}_4^{2-}$	Most sulfates are soluble	$\text{Ca}^{2+}, \text{Sr}^{2+}, \text{Ba}^{2+}, \text{Ag}^+, \text{Pb}^{2+}, \text{Hg}_2^{2+}$
$\text{S}^{2-}, \text{CO}_3^{2-}, \text{CrO}_4^{2-}, \text{PO}_4^{3-}$	Only slightly insoluble or insoluble	Group 1 Cations