Answer the following questions in Zumdahl:

Chapter 1: # 24, 30, 32, 34, 36, 40, 48, 64, 78, 92, 98, 116, 120, all AP multiple choice questions (with explanations)

Chapter 2: # 19, 23, 31, 36, 62, 72, 82, 88, 93, 118, all AP multiple choice questions (with explanations)

Chapter 3: # 48, 52-62 (even), 72, 78, 84, 90, 126, 140, 148, 172, AP multiple choice questions 3-5, 7-15 (with explanations)

Practice Free Response:

1) An experiment is performed to determine the empirical formula of a copper iodide formed by direct combination of elements. A clean strip of copper metal is weighed accurately. It is suspended in a test tube containing iodine vapor generated by heating solid iodine. A white compound forms on the strip of copper, coating it uniformly. The strip with the adhering compound is weighed. Finally, the compound is washed completely from the surface of the metal and the clean strip is dried and reweighed.

Mass of clean copper strip	1.2789 grams
Mass of copper strip and compound	1.2874 grams
Mass of copper strip after washing	1.2748 grams

a) State how you would use the data above to determine each of the following (calculations not required).

   i. The number of moles of iodine that reacted.

   ii. The number of moles of copper that reacted.

b) Explain how you would determine the empirical formula for the copper iodide.

c) Explain how each of the following would affect the empirical formula that could be calculated.

   i. Some unreacted iodine condensed on the strip.

   ii. A small amount of the white compound flaked off before weighing.

2) A student is given the task of determining the I^- content of tablets that contain KI and an inert, water-soluble sugar as a filler. A tablet is dissolved in 50.0 mL of distilled water, and an excess of 0.20 M Pb(NO$_3$)$_2$ (*aq*) is added to the solution. A yellow precipitate forms, which is then filtered, washed, and dried. The data from the experiment are shown in the table below.

Mass of KI tablet	0.425 g
Mass of thoroughly dried filter paper	1.462 g
Mass of filter paper + precipitate after first drying	1.775 g
Mass of filter paper + precipitate after second drying	1.699 g
Mass of filter paper + precipitate after third drying	1.698 g

a) Write a balanced equation for the chemical reaction that occurs when the precipitate forms.

b) Explain the purpose of drying and weighing the filter paper with the precipitate three times.

c) In the filtrate solution, is $[K^+]$ greater, less than, or equal to $[NO_3^-]$? Justify your answer.

d) Calculate the number of moles of precipitate that is produced in the experiment.

e) Calculate the mass percent of I^- in the tablet.

f) In another trial, the student dissolves a tablet in 55.0 mL of water instead of 50.0 mL of water. Predict whether the experimentally determined mass percent of I^- will be greater, less than, or equal to the amount calculated in part (e). Justify your answer.

3) Designate each reaction as either single replacement or double replacement. Predict the products including the physical states of each. If there is no reaction simply write NR. Balance each reaction.

a) __ Ag (s) + __ $Cu(NO_3)_2$ (aq) →

b) __ Ni (s) + __ $MgBr_2$ (aq) →

c) __ RbI (aq) + __ $AgNO_3$ (aq) →

d) __ $Ca(NO_3)_2$ (aq) + __ $Al(OH)_3$ (s) →

e) __ K (s) + __ $Al(NO_3)_3$ (aq) →

f) __ Mg (s) + __ $AgNO_3$ (aq) →

g) __ Na_3PO_4 (aq) + __ $MnCl_2$ (aq) →

h) __ $AgNO_3$ (aq) + __ Na_2S (aq) →

i) __ Ca (s) + __ $CuBr_2$ (aq) →

j) __ Li (s) + __ $AuCl_3$ (aq) →

k) __ Li_2CrO_4 (aq) + __ $BaCl_2$ (aq) →

l) __ Fe (s) + __ $Sn(NO_3)_4$ (aq) →

m) __ K_2S (aq) + __ $CoCl_2$ (aq) →

n) __ H_2S (g) + __ $FeBr_3$ (aq) →

o) __ Mg (s) + __ FeF_3 (aq) →