KWANTLEN UNIVERSITY COLLEGE
CHEMISTRY 0094 S-11
EXAM No. 2
February 28, 2002

NAME: _____

All calculations must be shown to receive full credit. Solubility rules, Activity Series of Metals, and Periodic Table are included with this exam. Write your answers on this exam paper. Mark allocation is shown. Judge your time accordingly (**Maximum 75 points**)

Where does Sigmund dock his boat? Answer: In a Freudian Slip !!!

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total	
%	

Question One: (6 MARKS)

Identify each of the following compounds as **molecular** or **ionic.**

a) C_2H_5OH

b) Na_2CO_3

c) CaO

d) LiI

e) BCl_3

f) SF_6

Question Two: (2 MARKS)

Which of the compounds in question one would you expect to have high melting points? Low melting points? **Explain briefly**.

Question Three: (6½ MARKS)

Complete the following table. You may refer to the periodic table provided.

Nuclear Symbol	Number of Protons	Number of Electrons	Number of Neutrons	Atomic Number	Mass Number
$^{59}_{27}Co^{2+}$					
	16	18	14		
		35		35	81

Question Four: (4½ MARKS)

A certain element consists of three isotopes. Given below are the mass and natural abundance of each isotope.

Isotope	**Mass (amu)**	**% Abundance**
#1	23.9850	78.99
#2	24.9858	10.00
#3	25.9826	11.01

a) Calculate the atomic weight of the element.

b) Identify the element by symbol and name -

Question Five: (8 MARKS)

Write the chemical formula for each of the following compounds:

a) chromium(III) sulfide

b) zinc chlorate

c) potassium acetate

d) diphosphorus pentoxide

e) tin(IV) oxide

f) calcium nitride

g) ammonium nitrate

h) magnesium cyanide

Question Six: (8 MARKS)

Give the proper (IUPAC) names for each of the following compounds:

a) CaI_2

b) $Fe_2(CrO_4)_3$

c) PCl_5

d) $Be(OH)_2$

e) $NaHCO_3$

f) Li_3P

g) $NiSO_4$

h) $K_2Cr_2O_7$

Question Seven: (4 MARKS)

Give the proper (IUPAC) name for each of the following acids: (**i.e. name as acids**)

a) H_2S

b) $HClO_4$

c) HNO_3

d) H_3PO_4

Question Eight: (4 MARKS)

Write the formulas for the following acids.

a) bromous acid

b) hydrocyanic acid

c) acetic acid

d) carbonic acid

Question Nine: (4 MARKS)

Balance each of the following equations:

a) ____ PH_3 (g) + ____ O_2 (g) ----> ____ P_4O_{10} (s) + ____ H_2O (l)

b) ____ K_3PO_4 (aq) + ____ $Ca(NO_3)_2$ (aq) ----> ____ KNO_3 (aq) + ____ $Ca_3(PO_4)_2$ (s)

Question Ten: (8 MARKS)

Write the complete ionic and net ionic equation for the following reactions:

a) $3Na_2S\ (aq) + 2Al(NO_3)_3\ (aq) \rightarrow Al_2S_3(s) + 6NaNO_3(aq)$

b) $Fe(OH)_3(s) + 3\ HCl(aq) \rightarrow FeCl_3(aq) + 3\ H_2O(l)$

Question Eleven: (20 MARKS) For each of the following predict whether or not a reaction will occur. **<u>If reaction does not take place write N.R.</u> (NO REACTION!)** and briefly explain why there is no reaction. **<u>If a reaction will occur</u>** then,

1) complete and balance the molecular equation showing the physical states of all products.
2) classify the reaction as (i) a decomposition, (ii) a combination, (iii) a single replacement, (iv) a double replacement, or (v) a combustion reaction. (**2 MARKS EACH**)

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a) $Ba\ (s) + H_2O\ (l) \rightarrow$

b) $AgNO_3\ (aq) + AlCl_3\ (aq) \rightarrow$

Question Eleven: (Continued)

c) $Mg\ (s) + Br_2\ (l)$ ---->

d) $C_3H_6O_2(l) + O_2\ (g)$ ---->

e) $Cu\ (s) + CdSO_4\ (aq)$ ---->

f) $Cl_2(g) + CaBr_2(aq)$ ---->

g) $KOH(aq) + H_2SO_4(aq)$ ---->

Question Eleven: (Continued)

h) $NH_4NO_3(aq) + K_2SO_4(aq) \text{ ----->}$

i) $Ag(s) + HCl(aq) \text{ ----->}$

j) $Mg(OH)_2\ (aq) + HCl\ (aq) \text{ ----->}$

SOLUBILITY RULES

ION	RULES
Group IA NH_4^+	1. All compounds in which the cation is a group IA element or NH_4^+ are *soluble*.
NO_3^-	2. All nitrates are *soluble*.
Cl^-, Br^-, I^-	3. All chlorides, bromides and iodides are *soluble*, except those of Ag^+, Pb^{2+}, and Hg_2^{2+}.
SO_4^{2-}	4. All sulphates are *soluble* except $CaSO_4$, $SrSO_4$, $BaSO_4$, $PbSO_4$, and Ag_2SO_4.
S^{2-}	5. All sulphides are *insoluble* except those of Group IA or IIA elements or NH_4^+
	6. All other compounds are *insoluble*.

ACTIVITY SERIES OF THE METALS

Li K Ba Ca Na Mg Al Zn Fe Cd Ni Sb Pb (H) Cu Hg Ag Au

Most Reactive ***Least Reactive***