THE COLLEGE OF THE BAHAMAS

EXAMINATION

SEMESTER 01-2006

FACULTY OF PURE AND APPLIED SCIENCES

SCHOOL OF SCIENCES AND TECHNOLOGY

X NASSAU
FREEPORT
EXUMA
ELEUTHERA

DATE AND TIME OF EXAMINATION: Wednesday, April 19, 2006 at 7 pm
DURATION: 2 ½ HOURS

COURSE NUMBER: CHEM 115

COURSE TITLE: INTRODUCTORY CHEMISTRY

STUDENT NAME:

STUDENT NUMBER:

LECTURER'S NAME

INSTRUCTIONS TO CANDIDATES: This paper has 7 pages and 35 questions. Please follow instructions given.

SECTION A: Multiple Choice

1. Element X is in group 2 period 3 of the periodic table .what is its electronic configuration?

a) 2,8,3
b) 2,3,3
c) 2,8,8,3
d) 2,8,2

2. Element M of group II forms a bond with element N of group V. The formula of this compound is:

a) M_3N_2
b) M_2N_3
c) MN
d) MN_2

3. Which of the following atoms has the largest atomic radius?
a) Na
b) Mg
c) Li
d) K

4. Which statement is correct?

a) High ionization is characteristic of metals
b) Valency is a type of bonding
c) Atomic size decreases from left to right across the periodic table
d) Metallic properties decreases down each group of the periodic table

5. Which element reacts most readily with HCl acid?

a) Iron
b) Calcium
c) Copper
d) Zinc

6. Which compound will not decompose on heating?

a) Sodium carbonate
b) Copper Nitrate
c) Magnesium hydroxide
d) Silver oxide

7. In electrolysis the cathode is:

a) the electrode where reduction occurs
b) positive
c) dissolved during the process of electrolysis
d) always made of carbon

8. Which of the following describes an oxidizing agent?

a) A proton acceptor
b) Proton donor
c) An oxygen donor
d) An electron acceptor

9. Which one of the following gases will turn blue litmus paper red?

a) Oxygen
b) Ammonia
c) Carbon dioxide
d) Hydrogen

10. Which one of the following metals will react when placed in a solution of iron II nitrate?

a) Silver
b) Iron
c) Copper
d) Magnesium

11. Element X is in group VI of the periodic table .the chloride of element X is most likely to be:

a) ionic
b) basic
c) acidic
d) covalent

12. How many moles of copper ions are in 2 moles of copper II sulphate?

a) 2 moles
b) 4 moles
c) 6×10^{23} moles
d) 12×10^{23} moles

13. How many molecules are in $2.24dm^3$ of CO_2 gas at S.T.P.?

a) 2 moles
b) 4 moles
c) 0.6×10^{23} moles
d) 12×10^{23} moles

14. 4 moles of carbon tetrachloride (CCl_4) contains:

a) 24g. Carbon
b) 2g. Carbon
c) 48g. Carbon
d) 4g. Carbon

15. A catalyst increases the rate of a chemical reaction by.

a) Increasing the kinetic energy of the reactant molecules.
b) Decreasing the energy of activation for the reaction.
c) Increasing the activation energy.
d) Decreasing the kinetic energy of reactant molecules.

16. A system in dynamic equilibrium is a reversible system in which:

a) Reactants and products are equal.
b) Rate of the forward reaction equal rate of the backward reaction.
c) Both reactions stops at equilibrium
d) Products are more than reactants.

17. Which one of the following metals least affected when heated in air?

a) K
b) Ag.
c) Fe
d) Mg.

18. Which oxide of the following elements dissolves in water to give the strongest base?

a) Ca
b) Mg
c) Na
d) Al

19. A weak electrolyte

a) Contains no ions
b) Contains covalent molecules only
c) Contains mobile electrons
d) Contains few ions and many molecules

20. Which statement is not correct about electrolysis?

a) Decomposition occurs in the process
b) Electricity is produced in the process
c) Electrons flow from the anode through the wires to the cathode.
d) Cat ions are discharged at the negative electrode.

True or False

Write **True** or **False** at the end of each statement.

21. One mole of any substance contains the same number of atoms in each molecule._____

22. At S.T.P one mole of any gas occupy the same volume._____

23. 100 cm^3 of 2M NaOH contains more NaOH than 200 cm^3 0f 0.5M solution NaOH.

_____

24. In electrolysis the anode is the negative electrode._____

25. In electrolysis the concentration of the ions affect discharge._____

26. An endothermic reaction is accompanied by a decrease in temperature._____

27. Increasing the temperature increases the rate of all chemical reactions_____

28. Reactivity for metals means the same as reactivity for non- metals_____

29. Reactive elements form stable compounds._____

30. In a chemical reaction an oxidizing agent is oxidized._____

SECTION B: SHORT ANSWER QUESTIONS

Answer ALL OF THE FOLLOWING QUESTIONS in the space provided on your question paper. Indicate clearly how you arrive at your answers.

1) How many moles are in the following: (10 Marks)

a) 100g. of water.

b) 224 dm^3 of H_2 gas at S.T.P.

c) Sodium Chloride in 4dm^3 of 0.25M NaCl.

d) What is the molarity of a solution of Sodium carbonate (Na_2CO_3), prepared by dissolving 10.6g. of the solute in 1dm^3 of solution.

e) How many moles of sodium are in solution (d) above?

2) Write balanced chemical equation for the reactions(6 Marks)

a) Copper II nitrate when heated produces copper II oxide, nitrogen dioxide and oxygen.

b) Decomposition of Zinc Carbonate.

c) Iron metal reacting with Copper II Sulphate

3)

a) The question concerns various aspects of electrolysis. (10 Marks)

i) List two uses of electrolysis. (2 Marks)

ii)

b) When aqueous NaCl is electrolyzed what substance is liberated

i) At the cathode (1 Mark)

ii) At the anode (1 Mark)

c) For the electrolysis of copper II sulfate solution using cooper electrodes .write the equation to show what happens at the

i) Cathode ($1_{1/2}$ Marks)

ii) Anode ($1_{1/2}$ Marks)

d) Describe what would happen if graphite electrodes were used in (c) above.

4)

a) Draw a fully labeled energy diagram for an exothermic reaction.(4 Marks)

b) Sketch on the diagram what would happen if a catalyst was used. (1 marks)

c) State LeChatelier's principle. (2 Marks)

d) Consider the reaction $[Co(H_2O)_6]^{2+} + 4Cl^- \rightleftarrows (CoCl_4)^{2-} + 6H_2O$

Pink Blue

Given that the forward reaction is endothermic, what color change would occur if heat was applied to this system at equilibrium? _____ (1 Mark)

e) Explain your answer using LeChatelier's principle. (2 Marks)

5) Use the equation below and answer the questions. (9 Marks)

$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$

(RMM $Mg(OH)_2$ =58 2HCl=36.5)

203g. of $Mg(OH)_2$ reacts with 164g. HCl

Calculate:

a) The number of moles $Mg(OH)_2$ present in 203g magnesium hydroxide.(2 Marks)

b) The number of moles HCl present in 164g of HCl .(2 Marks)

c) How many moles of $MgCl_2$ can be produced using 203g $Mg(OH)_2$ and 164g? HCl? (2 Marks)

d) Which reagent is the limiting reagent? (1 Mark)

e) Explain.(2 Marks)

PERIODIC TABLE OF THE ELEMENTS

I	II											III	IV	V	VI	VII	0
1 H hydrogen 1·0																	2 He helium 4·0
3 Li lithium 6·9	4 Be beryllium 9·0											5 B boron 10·8	6 C carbon 12·0	7 N nitrogen 14·0	8 O oxygen 16·0	9 F fluorine 19·0	10 Ne neon 20·2
11 Na sodium 23·0	12 Mg magnesium 24·3											13 Al aluminium 27·0	14 Si silicon 28·1	15 P phosphorus 31·0	16 S sulfur 32·1	17 Cl chlorine 35·5	18 Ar argon 39·9
19 K potassium 39·1	20 Ca calcium 40·1	21 Sc scandium 45·0	22 Ti titanium 47·9	23 V vanadium 50·9	24 Cr chromium 52·0	25 Mn manganese 54·9	26 Fe iron 55·8	27 Co cobalt 58·9	28 Ni nickel 58·7	29 Cu copper 63·5	30 Zn zinc 65·4	31 Ga galium 69·7	32 Ge germanium 72·6	33 As arsenic 74·9	34 Se selenium 79·0	35 Br bromine 79·9	36 Kr krypton 83·8
37 Rb rubidium 85·5	38 Sr srontium 87·6	39 Y yttrium 88·9	40 Zr zirconium 91·2	41 Nb niobium 92·9	42 Mo molybdenum 95·9	43 Tc technetium 98·9	44 Ru ruthenium 101·1	45 Rh rhodium 102·9	46 Pd paladium 106·4	47 Ag silver 107·9	48 Cd cadmium 112·4	49 In indium 114·8	50 Sn tin 118·7	51 Sb antimony 121·8	52 Te tellurium 127·6	53 I iodine 126·9	54 Xe xenon 131·3
55 Cs cesium 132·9	56 Ba barium 137·3	57 La lanthanum 138·9	72 Hf hafnium 178·5	73 Ta tantalum 180·9	74 W tungsten 183·85	75 Re rhenium 186·2	76 Os osmium 190·2	77 Ir iridium 192·2	78 Pt platinum 195·1	79 Au gold 197·0	80 Hg mercury 200·6	81 Tl thallium 204·4	82 Pb lead 207·2	83 Bi bismuth 209·0	84 Po pollonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89 Ac actinium															

58 Ce cerium	59 Pr praseodymium	60 Nd neodymium	61 Pm promethium	62 Sm samarium	63 Eu europium	64 Gd gadolinium	65 Tb terbium	66 Dy dysprosium	67 Ho holmium	68 Er erbium	69 Tm thulium	70 Yb ytterbium	71 Lu lutetium
90 Th thorium	91 Pa protoactinium	92 U uranium	93 Np neptunium	94 Pu plutonium	95 Am americium	06 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium