THE COLLEGE OF THE BAHAMAS
SCHOOL OF SCIENCES & TECHNOLOGY
CHEMISTRY 071: COLLEGE PREP CHEMISTRY FINAL
FINAL EXAMINATION **SEMESTER 01-2005**
TIME: 2 HOURS

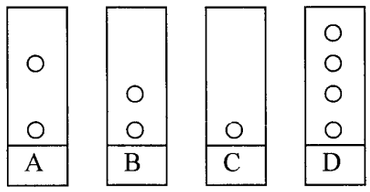
Section A: Multiple Choice Questions

Select the single best alternative in each of the following cases .Indicate your answer by marking the appropriate letter on the answer sheet according to the instructions on the sheet. There is one mark for each question in this section.

1) Which of the following is not a heterogeneous mixture?
   a) Sulphur and sand
   b) Peas and rice
   c) Oil and water
   d) Alcohol and water

2) The gases He, H_2 and O_2 are all classified as:
   a) Compounds
   b) Atoms
   c) Elements
   d) Mixtures

Questions 3-5 refer to the diagram below, which represents chromatograms of some dyes.



3) Which chromatogram contains a pure substance?

4) Which chromatogram contains substances that are present in each of the other chromatograms?

5) Which Chromatogram has a substance that is most soluble in the mobile phase.

6) Answer questions 6 -8 using the elements of period 2 of the Periodic Table of Elements below.

Group 1	2	3	4	5	6	7	8
Li^3	Be^4	B^5	C^6	N^7	O^8	F^9	Ne^{10}

All of the elements above :
   a) have the same number of protons
   b) have the same valency
   c) have the same number of electron shells
   d) have the same number of electrons in the outer shell

7) The element F
   a) Has the smallest atomic radius of these elements
   b) Is a metal
   c) Is not very reactive
   d) Forms ionic compounds with itself

8) Which set of elements from the group of elements above are all non-metals?
   a) Li, B, C
   b) N, O, Ne
   c) B, C, F
   d) O, Be, C

9) CO_2 gas may be identified by it's ability to
   a) Turn red litmus blue
   b) Turn lime water milky
   c) Relight a glowing splint
   d) Turn cobalt paper pink

10) If a neutral atom has a mass number of 34 and an atomic number of sixteen, how many electrons are in the outer shell?
   a) 2
   b) 4
   c) 6
   d) 0

11) A double covalent bond between two atoms includes:
   a) Two electrons
   b) Three electrons
   c) Four electrons
   d) Four pairs of electrons

12) Which acid releases two protons in water?
   a) H_2SO_4
   b) HCl
   c) HNO_3
   d) H_3PO_4

13) A base is a substance that :
   a) Contains only a few basic atoms
   b) Turns blue litmus paper red
   c) Accept protons
   d) Gives off hydrogen atoms

14) 100^oC is the same as:
   a) 273K
   b) 373K
   c) 173K
   d) 0K

15) Copper (I) oxide is written Cu_2O because
   a) There is one oxygen in the formula
   b) Copper has a valency of one in this compound
   c) Copper has 1 atom in the outer shell
   d) Copper is in group 1 of the periodic table

16) Element M is in group 3 and period 2.What is the electronic configuration of this element.
   a) 2,3
   b) 2,8,3
   c) 3,2
   d) 2,8,2

17) Which of the following properties most likely indicates an ionically bonded compound?
   a) Colourless substance
   b) High boiling point
   c) Insoluble in water
   d) Non conducting aqueous solution

18) Two atoms have an identical number of protons but different number of neutrons
Which statement about these atoms is **not correct?**
   a) They are atoms of the same element
   b) They have the same number of neutrons
   c) They have the same number of electrons
   d) They have the same atomic number.

19) A condenser is a piece of apparatus used to:
   a) Dry substances out
   b) Turn liquids into solids
   c) Evaporate liquids
   d) Turn a gas into a liquid

20) mm Hg. Is a unit of:
   a) Force
   b) Mass
   c) Pressure
   d) Volume

21) Which one of the following statements describes a difference between an atom and a molecule?
   a) Atoms are larger than molecules.
   b) Molecules and atoms are made up of different types of particles.
   c) Atoms are able to move about, whereas molecules cannot.
   d) A molecule can exist on its own, whereas an atom may not be able to.

22) Which statement best describes a substance that is partially ionized in solution and turns blue litmus paper pink.
   a) It has a pH of 1
   b) It has a high concentration of OH^- ions
   c) It has a pH between 4 and 6.9
   d) It has a high pH

Select from the alternatives below to answer questions 23-25.

A. proticity	B. atomicity	C. covalency	D. valency

23) Describes the number of atoms in the molecule. _____

24) Refers to the number of hydrogen ions that an acid will donate in a reaction.

_____

25) Describes the number of electrons a metal will lose as it reacts.

_____

26) In chemistry a salt is a substance that:
   a) Decomposes when heated
   b) Is formed when an acid reacts with a base
   c) Makes food taste sweet
   d) Forms white crystals

27) Which group of substances are all ionic compounds?
   a) NaCl, CH_4, MgO
   b) LiF, $CaCl_2$, Na_2O
   c) NH_3 ,CH_4 , H_2
   d) KI ,CCl_4 ,O_2

28) Oxidation may be described as:
   a) The removal of protons from an atom
   b) The removal of electrons from an atom
   c) The addition of electrons to an atom
   d) The removal of oxygen from a compound

Answer questions 29-30 by selecting the law that is being described in each statement below.

A. Boyles law	B. Charles Law	C. combined gas law	D. Newton's Law

29) For a fixed mass of gas at constant pressure the volume increases as the temperature , in K, increases._____

30) When temperature is held constant the volume of a fixed mass of gas varies inversely as the pressure changed._____

Section B

Answer all of the following questions

1) a) Write the chemical formula for each of the following substances. (4 Marks)

i. Iron (II) Carbonate

_____

ii. Ammonium Chloride

_____

iii. Potassium hydrogen carbonate

_____

iv. Magnesium sulphate

_____

b) Write the names of the following (4 marks)

i. Cu_2O

_____

ii. $(NH_4)_2\ SO_4$

_____

iii. $AlCl_3$

_____

iv. CaS

_____

c) Write balanced chemical equations with symbols of the states for each of the following: (6 marks)

i. $Al + O_2 \longrightarrow Al_2\ O_3$

_____

ii. $AgNO_3$ and NaCl $\longrightarrow$ AgCl and $NaNO_3$

_____

iii. $Pb(NO_3)_2 \xrightarrow{\text{Heated}} PbO + NO_2 + O_2$

_____

iv. Combustion of magnesium.

_____

2) Fill in the following table (7 Marks)

Symbol of Atom or ion	Name of Element	Mass Number	Number of Protons	Number of Neutrons	Number of electrons	Electronic Config'n
$^{34}_{16}S^{-2}$						
		2	1			0
	Sodium	23	11			

3) State the main differences between the following pairs of terms : (14 Marks)

a)

Mixtures	Compounds

b)

Ionic Compounds	Covalent compounds

c)

Acids	Bases

d)

Metals	Non-Metals

4) A sample of hydrogen gas occupied a volume 3dm^{3}at 10°C and 2 atmospheres pressure .The gas was transferred to a smaller container and the temperature lowered to 5°C and the pressure lowered to 1 atmosphere pressure.

a) **List the following:** (marks 2 ½)

Initial temperature_____ Initial pressure_____

Initial volume_____ Final pressure_____

Final temperature_____

b) Show working and calculate the final volume of the gas.

_____

_____

_____

_____ (2 Marks)

c) What would be the volume of this gas at STP?

_____

_____

_____

_____

(2 Marks)

5) A porcelain boat was first weighed empty . Its mass was found to be 3.1246g. It was then filled with a certain oxide of iron and re-weighed. Now the mass was 4.3245g.The boat was placed in a combustion tube and heated in a stream of hydrogen. After cooling the mass was found to be 3.9929g.

a) What is the mass of:

i. iron oxide _____
ii. iron _____
iii. oxygen _____ (3 Marks)

b) Calculate the percentage of iron and the percentage of oxygen in the iron –oxide.

_____

_____

_____

_____

_____

(3 Marks)

END OF EXAMINATION