SIR ARTHUR LEWIS COMMUNITY COLLEGE
DIVISION OF AGRICULTURE

ASSOCIATE DEGREE IN GENERAL AGRICULTURE   #C36
2008/2009 ACADEMIC YEAR
END OF SEMESTER 2 EXAMS

COURSE: <u>CHEMISTRY (CHM 102)</u>   DATE: 25TH MAY 2009

ANSWER ANY QUESTIONS

1.   a)   Copy and complete the following table.

Element	No. of protons	No. of electrons	No. of Neutrons	Mass No. (A)	Atomic No. (Z)
Nitrogen			7	14	
Oxygen	8		10		

[6]

   b)   Draw the electronic configurations of the following atoms Nitrogen, Oxygen, Magnesium, and Carbon.   [4]

   c)   i)   Two atoms both have 12 neutrons. The first has 11 protons and 11 electrons and the second 12 protons and 12 electrons. Are they Isotopes? Explain your answer.   [3]

           ii)   Would the chemical properties of these atoms be the same? Explain why?   [3]

   d)   The following list contains the names of some compounds and their formulae. In each case, say what elements are in the compound and say how many of each element is found in one molecule of that compound.

           I.   Ammonium Sulphate – $(NH_4) SO4$

           II. Potassium Oxide - K_2O [4]

                                                        Total 20 marks

2.   a)   Differentiate the following:

           i) Shell of an atom   [2]

           ii) Nucleus of an atom   [2]

        b)   Give a description of the following:

           i) β- Particles   [2]

           ii) γ - Rays   [2]

        c)   Study the equation below.

$$^{238}_{92}U \longrightarrow Th + {}^{4}_{2}He^{2+}$$

           i)   What type of decay is represented in the equation above?   [1]

           ii)   What is the new atomic number and mass number for the element Th in the equation above?   [2]

           iii) What changes takes place in a nucleus, which loses an α- particle?   [2]

        d)   Explain two ways in which radioactive Isotopes are used in agriculture.   [6]

        e)   What is the charge on the Helium atom?   [1]

                                                        Total 20 marks

3. a) Draw the structure of the following compounds using "dot and cross" diagrams.

   i) CO_2　　　　ii) $SiCl_4$　　　　　　iii) KCl　　　　iv) $MgCl_2$

   [8]

   b) Complete the following table with the formulae of ionic compounds that are formed between the anions and cations shown.

Cation	Anion	
	NO_3^-	CO_3^{2-}
Ca^{2+}		
Mg^{2+}		

   [4]

   c) Solid melts X at 2359°C; it does not conduct electricity when in solid form, but does conduct electricity when molten and dissolved in water. What type of bonding is most likely present in solid X? Give reasons for your answer. [4]

   d) List two other properties that X may demonstrate. [2]

   e) How can you account for such a high melting point? [2]

   Total 20 marks

4. Hydrogen Fluoride is one of the most important fluoride compounds. It can be prepared by reacting Calcium Fluoride (CaF_2) with Sulphuric Acid (H_2SO_4).

   R.A.M.

   Ca – 40　　F – 19　　H – 1　　S – 32　　O – 16

   a) Write a balance equation for this reaction. [3]

   b) Identify ONE ionic And ONE covalent compound in the reaction. [2]

   ii) State ONE difference between the properties of ionic and covalent compounds. [2]

   c) If 0.5 moles of sulphuric acid is used in the reaction calculate the mass of hydrogen sulphide produce in the reaction. [4]

   　a. Copper is chosen for almost all-electrical use.

   　　i) Using diagrams explain the structure of the metallic bonding in the metallic lattice of copper. [2]

   　　ii) List three properties of metals. [3]

   　　iii) Explain why it is possible for metallic to conduct electricity. [2]

   　　iv) How do you account for the high melting and boiling point of metals? [2]

   Total 20 marks