KENYA POLYTECHNIC UNIVERSITY COLLEGE

SCHOOL OF HEALTH SCIENCES AND TECHNOLOGY

DEPARTMENT OF COMMUNITY AND PUBLIC HEALTH

DIPLOMA IN COMMUNITY AND PUBLIC HEALTH

END OF STAGE 1 EXAMINATIONS

NOVEMBER 2011

CHEMISTRY

TIME 2 HOURS

Instructions to candidates
This paper consists of two sections A and B
Section A is compulsory – Answer **ALL** questions in this section
Answer any **THREE** questions from section B

This paper consists of 4 printed pages

SECTION A – Compulsory
Answer ALL questions in this section

1. Define the following terms used in chemistry
   i) A theory
   ii) A hypothesis (2mks)

2. Differentiate between empirical formulae and molecular formulae (2mks)

3. a) Define Isotopy of elements (1mk)

   b) Complete the equation below
   $^{14}_{7}N$…… $^{14}_{6}C + X$ (1mks)

   c) Which particle is represented by the letter X above? (1mks)

4. a) Show the electron configuration of helium and potassium (He=2 K=19) (4mks)

   b) How many electrons are found in the (D) energy quanta (1mks)

5. a) What type of bonding system exist between hydrogen and chlorine (1mk)

   b) Explain why water is a polar solvent (4mks)

6. In the equation below, identify the reactant that acts as an acid and explain how you arrived at the choice $NH_4^+{}_{(aq)} + H_2O_{(L)}$……> $NH_{3(g)} + H_3O^+{}_{(aq)}$ (4mks)

7. You have been provided with de-ionized water and 1M sulphuric acid. Briefly indicate how you will prepare a 0.1M of the acid (4mks)

8) An element X with an atomic number of 13 reacts with another element with an atomic number of 17 to form a compound. Give the molecular formulae of the compound formed. (4mks)

9. a) Explain valency (2mk)

   b) Give TWO properties of i) electrovalency and ii) dative bonding systems (4mks)

10. a) Define the following
   i) Oxidation
   ii) Reduction (2mks)

   b) Explain why Zinc (30) has a valency of two. (3mks)

SECTION B – Answer any THREE questions from this section

11) Discuss the following properties of elements in a periodic table
   a) Atomic radius
   b) Screening effect
   c) Electro negativity
   d) Ionization energy (20mks)

12. a) Define a transition element (1mks)
   b) Explain any THREE characteristics of transition elements (9mks)
   c) Explain why i) Nickel (28) and Iron (26) are easily transformed to magnets
   i) Copper (29) has variable valences (10mks)

13. a) A compound has an empirical formulae C_3H_6O and a relative mass of 116. Derive its molecular formulae. (H=1, C=12, O=16) (6mks)

   b) Calculate the percentage composition of carbon by mass in the compound (6mks)

   c) 20mls of 0.1M sulphuric acid was neutralized by 30 mls of sodium hydroxide to form sodium sulphate and water
   i) Write a balanced chemical equation of the above reaction (4mks)
   ii) What is the Molar concentration of the sodium hydroxide? (4mks)

14a). Answer questions that follow using the information in the grid below. The letters are not the actual symbols of the elements.

													Q				
O															R	S	
T																U	
V																Z	

i) Which elements will require the least amount of energy to remove one of its outermost electrons? (3 mks)
ii) Select the most non –reactive non metal (1mk)
iii) Which of the elements has the greatest tendency to form covalent bond? (1 mks)
iv) What name is given to the family of elements to which elements O, T and V belong (1 mks)
v) Explain why the atomic radius of S is smaller than that of R. (4mks)

b) 14. b) State whether the following are physical or chemical changes:-
   i) Distillation of a mixture of alcohol and water

ii) Combination of oxygen and hydrogen to give water
iii) Refining of crude oil to give pure oil
iv) Combinination of oxygen and sulphur to give sulphur dioxide (4mks)

c) Explain the following terms
   i) Osmotic pressure (2mks)
   ii) Semi-permeable membrane (2mks)
   iii) Reverse osmosis. (2mks)