TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DES 16S AND DFQA 16S

ACH 2105: FUNDAMENTALS OF CHEMISTRY

END OF SEMESTER EXAMINATION

SERIES:DECEMBER2016

TIME:2HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

a) Explain why alkenes are the only hydrocarbons able to form stereoisomers (4 marks)

b) Given the half–cell equation $O_{2(g)} + 2H^{+}_{(aq)} + 2e^{-} \Longrightarrow H_2O_{2(aq)}$

(i) Construct the fully balanced redox ionic equation for the oxidation of hydrogen peroxide by potassium manganate (VII) (4marks)

c) List FOUR factors that influence ionization energy (4marks)

d) Discus using examples the different between nuclear fusion and nuclear fission (4marks)

e) State why alkenes are the only hydrocarbons able to form stereoisomers (5marks)

f) Nitrogen gas combine with hydrogen gas to form ammonia according to the equation below explain how changes in temperature, pressure and concentration affect equilibrium constant (9 marks)

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) \quad \Delta H\ -1024 KJmol^{-1}$

Question TWO

a) 2.00 dm^3 of concentrated hydrochloric acid (10.0 M) was spilt onto a laboratory floor. It can be neutralized with limestone powder. [atomic masses: Ca = 40, C = 12, O = 16)

(i) Give the equation for the reaction between limestone and hydrochloric acid. (2marks)

(ii) How many moles of hydrochloric acid was spilt? (2marks)

(iii) How many moles of calcium carbonate will neutralize the acid? (2marks)

(iv) What minimum mass of limestone powder is needed to neutralize the acid? (2marks)

b) If 1000 dm^3 of sulphuric acid, of concentration 2.00 mol dm^{-3}, leaked from a tank, calculate the minimum mass of magnesium oxide required to neutralize it (5marks)

c) State Heisenberg's uncertainty principle (2mark)

Question THREE

a) a buffer solution containing 0.10 mol dm^{-3} of ethanoic acid and 0.20 mol dm^{-3} of sodium ethanoate calculate its pH given K_a for ethanoic acid is 1.74×10^{-5} mol dm^{-3}. (7marks)

b) Chlorination of methane is a chain reaction give equation for

i) the chain initiation step (2 marks)

ii) two equation for chain propagating steps (2 marks)

iii) three equation for chain terminating step (3 marks)

iv) formation of the least chlorinated methane (1 marks)

Question FOUR

a) The pH of 0.01 mol dm-3 of ethanoic acid *(acetic acid),* CH_3COOH is 3.40 at 25 °C. What is the dissociation constant of ethanoic acid at this temperature? (6marks)

b) Draw and name isomeric structural of a compound with molecule formulae. C_5H_{10} (6marks)

c) State any THREE applications of radioactivity. (3marks)

d) Differentiate between Wavelength and wave number (2marks)

Question FIVE

Describe the periodic trend of the following giving reason in each case

i) Ionization energy (3 marks)

ii) Electronegativity (3 marks)

iii) melting point (3 marks)

iv) Atomic radius (3 marks)

v) Reactivity (3marks)