SEMESTER 1 ACADEMIC YEAR 2020/2021

UNIVERSITY OF ESWATINI
FACULTY OF AGRICULTURE

RESIT EXAMINATION

PROGRAMMES:

B.Sc. AGRON: YEAR I
B.Sc. ABE: YEAR 1
B.Sc. AGRIC. ECON. & AGBMNGT: YEAR I
B.Sc. ANI. SCI. (DAIRY OPTION): YEAR I
B.Sc. AGRIC. EXT.: YEAR I
B.Sc. AGRIC. ED.: YEAR I
B.Sc. ANI. SCI.: YEAR I
B.Sc. CONS. SCI.: YEAR I
B.Sc. CONS. SCI. ED.: YEAR I
B.Sc. FSNT: YEAR I
B.Sc. HORT.: YEAR I
B.Sc. TADM: YEAR I

COURSE CODE AND TITLE: CPR103: CHEMISTRY
TIME ALLOWED: TWO [2] HOURS

INSTRUCTIONS:

1. ANSWER 4 QUESTIONS IN TOTAL; QUESTION 1 (WHICH IS COMPULSORY) AND ANY OTHER 3 OF YOUR CHOICE
2. DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED

NOTE THAT THIS PAPER CONTAINS FIVE (5) PAGES INCLUDING THIS COVER PAGE

QUESTION 1 (COMPULSORY) **[Total marks = 25]**

Write down in your answer sheet the letter bearing the correct answer for each of the following questions

1.1. At what temperature and pressure does the freezing point of liquid water occurs?
A. It occurs at a pressure of 0.1 atm and at a temperature of 100°C.
B. It occurs at a pressure of 1 atm pressure and at a temperature of 100°C.
C. It occurs at a pressure of 1 atm pressure and at a temperature of 0°C.
D. It occurs at a pressure of 1 atm pressure and at a temperature of 1°C.

1.2. Which of the following statements correctly defines condensation?
A. It is the conversion of a solid into a gas at constant temperature.
B. It is the conversion of a liquid into a gas at constant temperature.
C. It is the conversion of a gas into a liquid at constant temperature.
D. It is the conversion of a solid into a gas at constant temperature.

13. According to your understanding, what are valence electrons?
A. These are any electrons of an atom.
B. These are electrons in the mid principal energy level (or shell) of an atom that are involved in bonding.
C. These are electrons in the innermost principal energy level (or shell) of an atom that are not involved in bonding.
D. These are electrons in the outermost principal energy level (or shell) of an atom that are involved in bonding.

1.4. What is a covalent bond?
A. It is a bond formed when valence electrons are shared between atoms or a force holding atoms together as a result of shared valence electrons.
B. It is a bond formed when there is a complete transfer of valence electrons between atoms or a force holding atoms together as a result of transfer of valence electrons.
C. It is a bond formed when there is a complete transfer of electrons in the lowest energy level/shell between atoms.
D. It is similar to the ionic bond.

1.5. A deliquescent compound is defined correctly by one of the following statements, which one?
A. It is a compound that absorbs enough water from another compound to form a solution.
B. It is a compound that absorbs enough water from a molecule to form a solution.
C. It is a compound that does not absorb water.
D. It is a compound that absorbs enough water from the atmosphere to form a solution.

1.6. What are alkynes?
A. They are compounds that contain a carbon-carbon double bonds, C=C
B. They are compounds that contain a carbon-carbon triple bonds, C≡C
C. They are compounds that contain a carbon-carbon single bonds, C-C

D. They are compounds with no carbon-carbon bonds.

1.7. What are monomers?

A. They are the building blocks of proteins.

B. Monomer is another name for a polymer.

C. A monomer is an alcohol.

D. They are molecules with low molecular weights that are joined (polymerised) to form a polymer.

1.8. What are esters?

A. Esters are volatile organic compounds which are derivatives of organic acids.

B. Esters are volatile organic compounds which are derivatives of proteins.

C. Esters are volatile organic compounds which are derivatives of alcohols.

D. Esters are inorganic compounds which are derivatives of organic acids.

1.9. What are cycloalkanes?

A. They are unsaturated hydrocarbons with the carbon atoms joined in rings by single covalent bonds.

B. They are hydrocarbons with the carbon atoms joined by single covalent bonds.

C. They are saturated hydrocarbons with the carbon atoms joined in rings by single covalent bonds.

D. They are unsaturated hydrocarbons with the carbon atoms joined in rings by double covalent bonds.

1.10. Which of the following statements defines alkenes?

A. Alkenes are compounds that contain a carbon-carbon double bond, C=C

B. Alkenes are compounds that contain a carbon-carbon single bond, C-C

C. Alkenes are compounds that contain a carbon-carbon triple bond, C≡C

D. Alkenes are compounds that contain no carbon-carbon bonds.

QUESTION 2 [Total marks = 25]

2.1. Determine if a solution with 0.01 *M* Na_2SO_4 and 0.03 *M* $CaSO_4$ is saturated with respect to $CaSO_4$. Note: $[Ca^{2+}][SO_4^{2-}]$ = Solubility product (K_{sp}) = 2.4×10^{-5} [10 marks]

2.2. Calculate the formula mass of Ammonium Sulphate (NH_4SO_4) given the following information: N = 14 amu; S = 32 amu; O = 16 amu; H = 1 amu

[10 marks]

2.3C. Determine the molecular formula of an alkene that contains fourteen (14) hydrogen atoms.

[5 marks]

QUESTION 3 **[Total marks = 25]**

3.1. What pressure could 1.8 mol of Helium gas exert in a vessel of volume 2 dm^3 at 22°C if it behaved as a perfect gas? [10 marks]

3.2. Calculate the percent (%) elemental composition of Manganese Sulphate ($MnSO_4$) given the following information: Mn = 55 amu; S = 32 amu; O = 16 amu. [10 marks]

3.3. Calculate the % by volume of Sulphate when 2 L of a solution was made by adding 85 ml of sulphuric acid to water [5 marks]

QUESTION 4 **[Total marks = 25]**

4.1. Write down the structural formula for each of the following compounds: [10 marks]

i. Propyn
ii. Ethylcyclohexane
iii. 4-ethyl-2-methyloctane
iv. Pentane

4.2. How would you treat someone poisoned by carbon monoxide (CO)? [10 marks]

4.3. Calculate the equivalent mass of Lithium (Li). Where: Li = 24.312 amu. [5 marks]

QUESTION 5 **[Total marks = 25]**

5.1. Briefly describe the four factors that affect the rate of a chemical reaction [20 marks]

5.2. Convert 0.25 N sulphuric acid to Molarity (M) [5 marks]

EXTRA INFORMATION

1. Equation of a perfect gas: $pV = nRT$
2. Gas constant (R) = 8.31447 x 10^{-2} L bar K^{-1} mol^{-1}
3. Avogadro's constant: 6.02214 X 10^{23} mol^{-1}
4. Density of water: 1 g/cm^3
5. pH = log $1/[H^+]$ = - log $[H^+]$
6. mA + nB pC + qD
7. K = $([C]^p [D]^q)/ ([A]^m[B]^n)$
8. X = p/K
9. F = $k(C_1 \times C_2)/r^2$
10. $\Delta G = \Delta H - T\Delta S$
11. $C_1V_1=C_2V_2$
12. K = Temperature (°C) + 273.15