

**KISII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**SPECIAL EXAMINATION**  
**FIRST YEAR EXAMINATION FOR THE AWARD OF**  
**THE DEGREE IN EDUCATION SCIENCE**  
**SECOND SEMESTER 2021/2022**  
**(JULY, 2022)**

**CHEM 120: PHYSICAL CHEMISTRY II**

**STREAM: Y1 S2**

**TIME: 2 HOURS**

**DAY: WEDNESDAY, 3.00 PM – 5.00 PM**

**DATE: 27/07/2022**

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**INSTRUCTIONS:**

- 1. Do not write anything on this question paper.***
- 2. Answer ALL Questions in section A and any TWO Questions in***

**SECTION B**

- (a) Using relevant equations explain what is Hydrolysis? (4 marks)

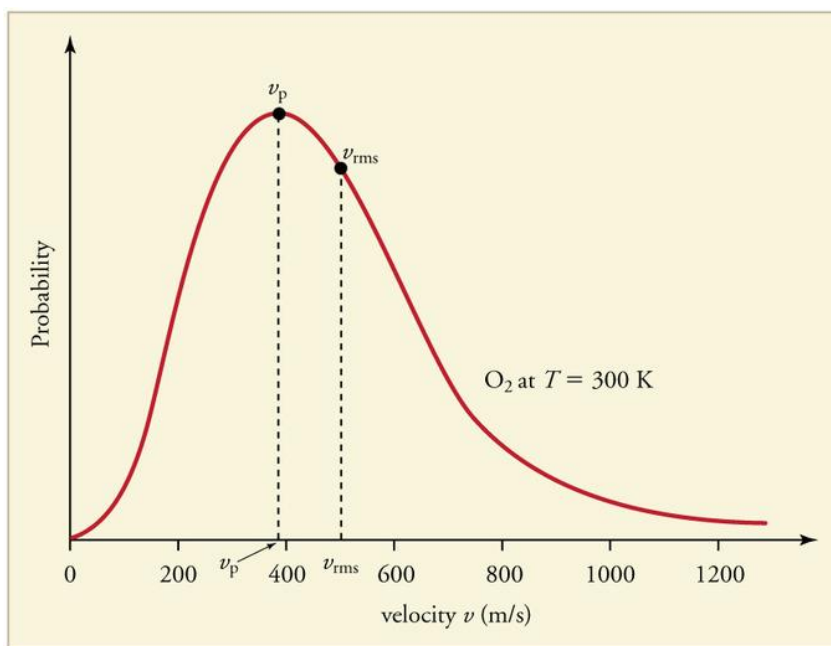
(b) Explain why NaCl solution is neutral ? (4 marks)
2. Salts may be classified into various types according to their hydrolytic behavior. Using relevant examples explain each of the case. (6 marks)
- 3(a) What will happen to the pressure of a system where the volume is decreased at constant temperature? (3 marks)

b) (i) Explain what will happen to the pressure of a system where the temperature is increased and the volume remains constant? (3 marks)

(ii) Using the kinetic molecular theory, explain how an increase in the number of moles of gas at constant volume and temperature affects the pressure. (4 marks)

4(a) Explain the Maxwell Boltzmann distribution equation (3 marks)

(b) Figure below shows the Maxwell-Boltzmann distribution of speeds for a certain gas at a certain temperature, such as nitrogen at 298 K.



Explain how the Maxwell-Boltzmann distribution is affected by temperature (5 marks)

5. Using the Maxwell-Boltzmann function, calculate the fraction of argon gas molecules with a speed of 305 m/s at 500 K. (5 marks)

6. State the limitations of Raoult's law (8 marks)

7. "Raoult's law is valid only in the case of ideal solutions" Explain (5 marks)

## **SECTION B**

8. (a) Calculate the degree of hydrolysis of sodium acetate. Dissociation constant of acetic acid is  $1.80 \times 10^{-5}$ . Ionic product of water is  $1 \times 10^{-14}$ . (5 marks)

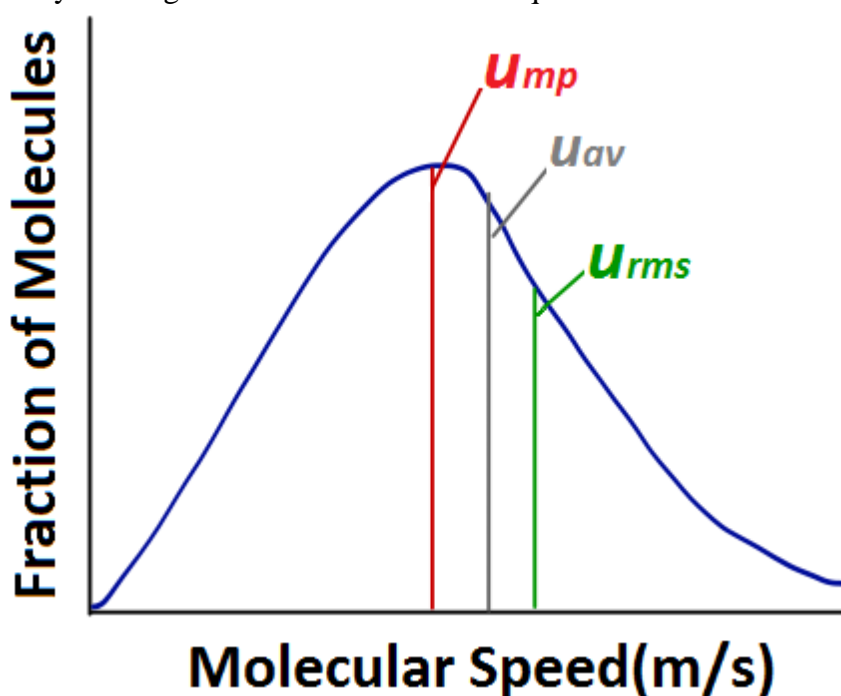
(b) Define the terms: (5 marks)

- (i) Anionic Hydrolysis
- (ii) Cationic Hydrolysis
- (iii) Hydrolysis constant
- (iv) Degree of Hydrolysis

9. Explain the on which the kinetic molecular theory of gases model is based.

(10 marks)

10. Study the diagram below and answer the questions that follow



Explain the following terms as used in the diagram above

- i)  $U_{mp}$
- ii)  $U_{av}$
- iii)  $U_{rms}$

(4 marks)

(3 marks)

(3 marks)