# UNIVERSITY OF ESWATINI

## Final Examination – 2020

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**TITLE OF PAPER:** Separation Methods in Chemistry

**COURSE NUMBER:** CHE 606

**TIME ALLOWED:** Three Hours

**INSTRUCTIONS:**

**Answer any four (4) questions of the six (6) questions and every question holds 25 marks. NB: all questions are to be answered in a separate answer sheet.**

**Question A**

1. Explain in detail, all the critical parameters in normal phase and reverse phase liquid column chromatography when used as a tool in separation of mixtures in chemistry. (25)

**Question B**

1. Discuss Gas chromatography (GC) and HPLC by comparing their similarity and differences as methods of separating mixtures in chemistry.(10)
2. What are the key requirements for the uses of stationery phase in separation techniques in analytical in Chemistry? (10)
3. What are the basic physical and chemical principles of separation techniques in chemistry?(5)

**Question C**

1. Describe the principles of ion exchange chromatography (IEC) and what factors affect IEC? (10)
2. What are the common materials used for ion exchange chromatography? (5)
3. Indicate some of the limitations of the Ion Exchange Chromatography.(5)
4. How does temperature and pH affect the efficiency of IEC? (5)

**Question D**

1. HPLC uses both isocratic as well as gradient solvent systems. What is the difference between the two solvent systems and when is each applied? (10)
2. Thin Layer Chromatography (TLC) is a chromatography method which is usually applied in synthesis or natural products chemistry. Explain why these methods are universally used in synthesis or natural products chemistry. (10)
3. What does $R_f$ value indicate in the use of TLC Chromatography? (5)

**Question E**

1 What are the most commonly used detectors in chromatography? Explain. (9)

2 Which detection methods are typically used in chromatography, and why? (10)

3 Which detection methods are the most sensitive in chromatography, and explain why may or may not be commonly used? (6)

**Question F**

1. Reverse phase silica is typically used in day to day applications that use chromatography, explain why it is commonly used? (5)
2. What are the limitations of normal phase silica chromatography and is reverse phase silica chromatography a suitable replacement for normal phase chromatography? (7)
3. What do you understand by chiral chromatography? And how can that be used in separation of mixtures? (6)
4. What are the conditions that a stationary phase should meet so that it will be used in separation techniques? (7)