**[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwi_zJTC7qPiAhWMUlAKHbFaA1gQjRx6BAgBEAU&url=http://su.edu.krd/&psig=AOvVaw3bWzAOPI8phY1bmYPcgrMO&ust=1558227118778110)Salahaddin University-Erbil Subject: Analytical Chemistry College of Science Exam duration: 1hr.**

**Department of Geology Date: 17 / 04 / 2023**

**1st Stage Practical examination**

***Q1/ A) Define The following:* (15 mark)**

1-End point 2-Titration 3-Primary standard substance

***B) Name the following equipment:* (14 mark)**



**1 2 3 4**

***Q2/ Answer the following:* (30 mark)**

A- HCl is not Standard substance? Why?

B- What are different types of titrations?

C- What are important requirements for a primary standard material?

***Q3/ A)*** Prepare 250ml of 2M HNO3 from the traditional solution. The information on the bottle: 69%(w/w) HNO3 , specific gravity 1.42 g/ml, formula weight 63 g/mole.

**(21 mark)**

***B)*** 10 ml of **HCl** solution was titrated with 0.15 M standard **Na2CO3**, at the end point the average volume of **Na2CO3** was 9 ml, calculate the molarity of **HCl** solution?

**(20 mark)**

**Good Luck**

**Lecturers**

**Ph.D. Hijran S. Jabbar**

**M.Sc. Sara H. Assaf**