



**Al-Mustansiriyah University**  
**College of Science/Department of Chemistry**

**Analytical Chemistry Lab.**  
**Second Year**  
**Four Lecture Exp.2 /II Semester**

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يرجى حل الحسابات مع حل اسئلة المناقشة لكل طالب وتعتبر تقرير للطالب

وهو مهم جدا في درجه السعي وارساله لغاية الاسبوع القادم حصرا يوم الاثنين

بل النسبة شعبة A و B يكون يوم الثلاثاء مع كتابة الاسم الثلاثي للطالب بل

العربي وكذلك باقي التجارب

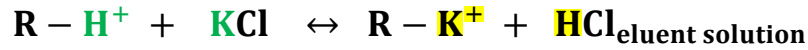
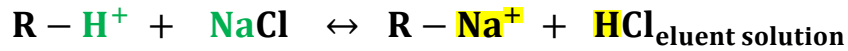
ان اختلاف التجربة الاولى عن التجربة الثانية هو النموذج المستخدم حيث

يكون في التجربة الثانية هو مزيج ملحي و الحسابات

## Experiment (2)

- Determination of the number of total equivalents of salts
- Determination the ratio of the NaCl and KCl salts using cationic exchanger

معادلات التبادل الايوني في العمود الكاتيوني المنشط هي



نلاحظ حصول تبادل في الايونات الموجبة الشحنة فقط بين الراتنج المنشط

والمحلول الملحي اما الايونات السالبة للراتنج تبقى مرتبطة بل السلسلة

البوليمرية للراتنج بينما الايونات السالبة في محلول ملحي والمتمثلة Cl

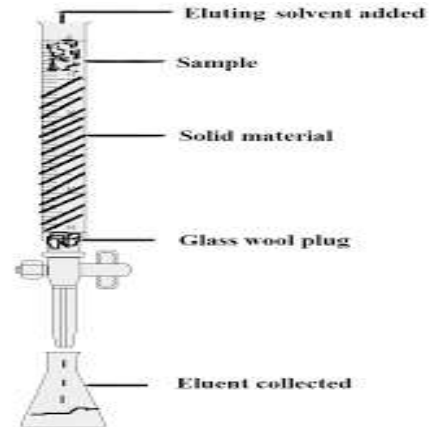
فانها تنزل من اسفل العمود

### Materials

- 1- HCl (3M)
- 2- AgNO<sub>3</sub> (0.1 M)
- 3- Mixture Saline (NaCl + KCl)
- 4- Methyl orange (M.O)
- 5- Standard base NaOH (0.1N)

## Procedure

1. **Activate** the **cationic column** by hydrochloric acid (**3M HCl**), as we know



2. Carefully **weigh (0.2 g)** from the sample contain (**NaCl & KCl**)



3. **Dissolve** the salt with a little amount of the **distilled water** in the beaker, then transfer it to the **cationic** exchanger



4. **Collect** the solution from the **bottom** of the column (eluent solution) in the **conical flask 1** and then wash the beaker with a little distilled water and transfer it to the ion exchange column.

5. Collect the first amount in **conical flask1** of washing water from the column and check it by adding of the **M.O indicator**. when a **pink color appear**, transfer to **conical flask2** Add another amount of the distilled water to the column and we take **eluent solution** it in the conical flask1, then also check it by use the M.O indicator and **repeat** this process until the **pink color disappearance** and it **changes yellow color**
6. **Titrate** the solution that **collected pink color** in the conical flask **2** with the sodium hydroxide **NaOH (0.1N)** .
7. We **find** the standard base **volume** by a **burette** Let it be (**20 ml**).

### Calculation

هنا تركيز القاعدة القياسية **NaOH(0.1N)** والحجم المستخرج من سحاحة (**20ml**)  
 1. No. of meq. of cation (**NaCl + KCl**) = No. of meq. NaOH

No. of meq. of NaCl + No.of meq. of KCl = No. of meq. of NaOH

$$N_{(\text{NaCl})} \times V_{(\text{NaCl})} + N_{(\text{KCl})} \times V_{(\text{KCl})} = N_{(\text{NaOH})} \times V_{(\text{NaOH})\text{from burette}}$$

$$\frac{\text{wt}_{\text{NaCl}}}{\text{eq. wt}_{\text{NaCl}}} + \frac{\text{wt}_{\text{KCl}}}{\text{eq. wt}_{\text{KCl}}} = \frac{N_{(\text{NaOH})} \times V_{(\text{NaOH})}}{1000}$$

$$\text{Wt of NaCl} = (X) \text{ g}$$

$$\text{Wt of KCl} = (0.2 - X)\text{g}$$

$$\frac{x}{58.5} + \frac{0.2 - x}{74.5} = \frac{N_{(\text{NaOH})} \times V_{(\text{NaOH})}}{1000}$$

$$2. \text{NaCl \%} = \frac{x}{0.2} \times 100$$

$$3. \text{KCl \%} = \frac{0.2 - x}{0.2} \times 100$$

## Discussion questions

- 1- How do we know that the column has become **neutral**?
- 2- What will happen to the column after we transfer the solution sample to it and what the type of the groups that the column will be carry?
- 3- What is the **eluent solution** that collected from the bottom of the **column cationic** if the component solution was passed through the resin

(CaCl<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>O , KOH, F)

**4-** (0.5)g of mixture saline solution (30%silver chloride and potassium nitrate ) was passed through a cationic exchanger and the collected solution from the column was calibrated against the (0.1N) sodium hydroxide base, the equivalent size of the eluent solution (10ml), **calculate**

1. The weight of AgCl and weight of KNO<sub>3</sub> in the sample?
2. The percentage of Cl in AgCl?
3. ppm for potassium nitrate in the solution (5ml)?
4. Write the equation for this question?

The atomic weight for (K = 39 , N =14 , O = 16 , Cl = 35.5 , Ag = 108 , Na = 23)