

Determination of transport Number:

طرق تعيين اعداد النقل

1-Hittorfs Method

2-Moving boundary method

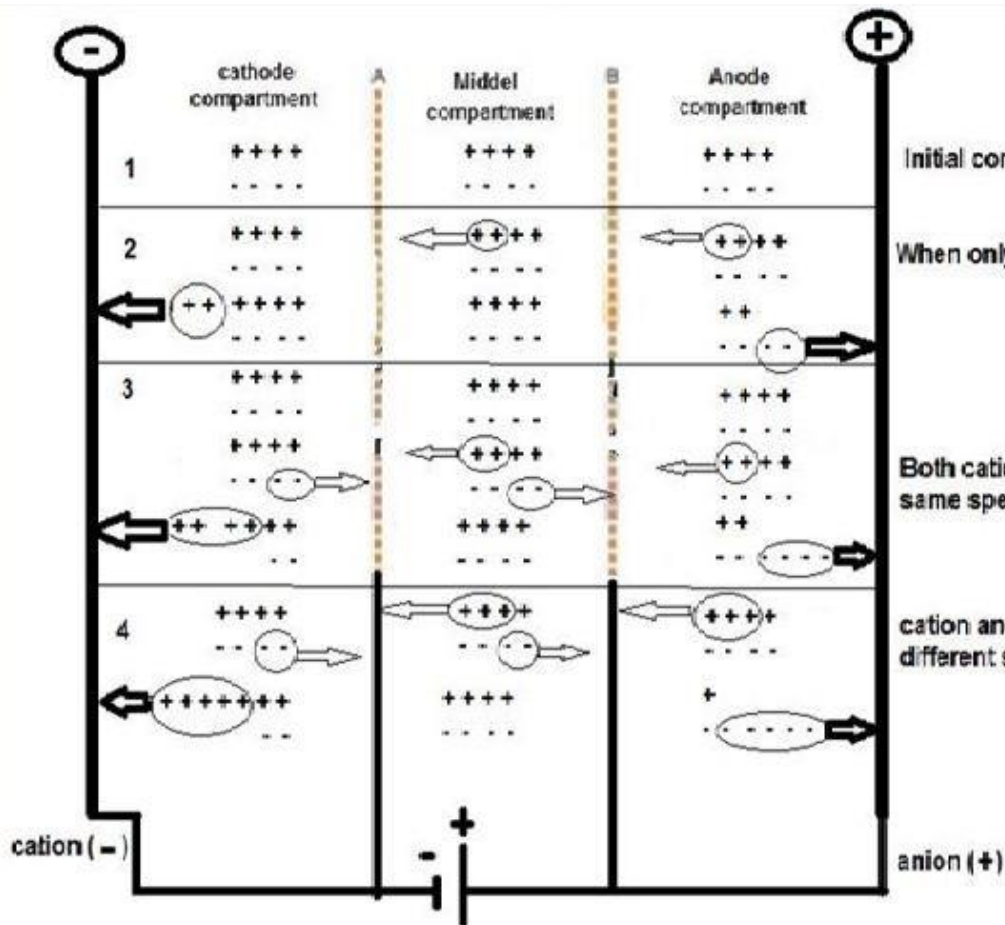
طريقة الحد الفاصل المتحرك

3-Measurement of Electromotive force

قياس القوة الدافعة الكهربائية



Mechanism of ionic Transport



No.	Total charge	cation	anion	$u_+ + u_-$
1	0	4	4	4+4=8
2	2	5	4	5+4=9
3	8	5	3	5+3=8
4	10	5	2	5+2=7

Both cation and anion with same speed

cation and anion with different speed

الكسر المولي

$$u_+ + u_- = 3 + 2 = 5$$

مثال : اخر تجربة

$$5 \Rightarrow 3$$

$$1 \Rightarrow t_+$$

الشحنات الموجبة التي انتقلت للقطب المعاكس

$$t_+ = \frac{3}{5}$$

$$t_+ = 0.6$$

$$t_- = 0.4$$

The limiting law of Debye – Huckel

is related to the average interaction of the cation and anion with their respective ionic surroundings

$$\begin{aligned}\log \gamma_{\pm} &= -A / z_+ z_- / \sqrt{\mu} \\ &= -0.519 / z_+ z_- / \sqrt{\mu}\end{aligned}$$

where :

γ_{\pm} : Mean activity coefficient متوسط معامل الفعالية

$$\mu = \frac{1}{2} \sum_i c_i z_i^2$$

μ Ionic Strength القوة الايونية

C : Concentration شحنه الايون z
The valancy if each ion present

Example : Calculate the mean activity coefficient for K_2SO_4 (0.2M). Assuming Debye Huckel limiting law to apply?

Faraday's laws of electrolysis, in Chemistry

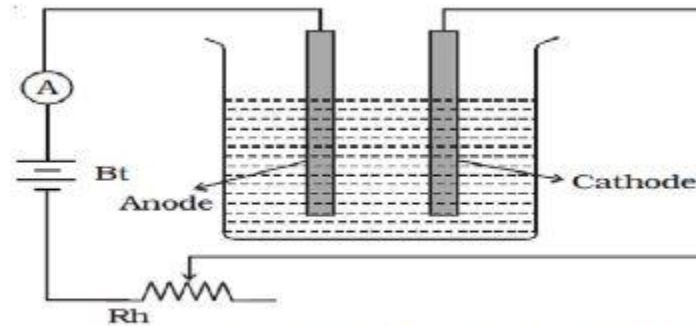
first described by the English scientist [Michael Faraday](#) in 1833.

Faraday's First Law of Electrolysis

- *"The mass of a substance deposited or liberated at any electrode is directly proportional to the amount of charge passed"*

قانون فراداي الاول ينص على : كمية المادة المترسبة او المتحرره تتناسب طرديا مع كمية الكهرباء المارة في المحلول

Faraday's first law



Verification of Faraday's first law

$$m \propto Q$$

$$m = Z \cdot Q$$

Q : Quantity of electricity

m : mass of substance

Z : electro-chemical equivalent of the substance.

$$Q = I \cdot t$$

I : the intensity in amperes and

t : the time in seconds.

Faraday's second law of electrolysis

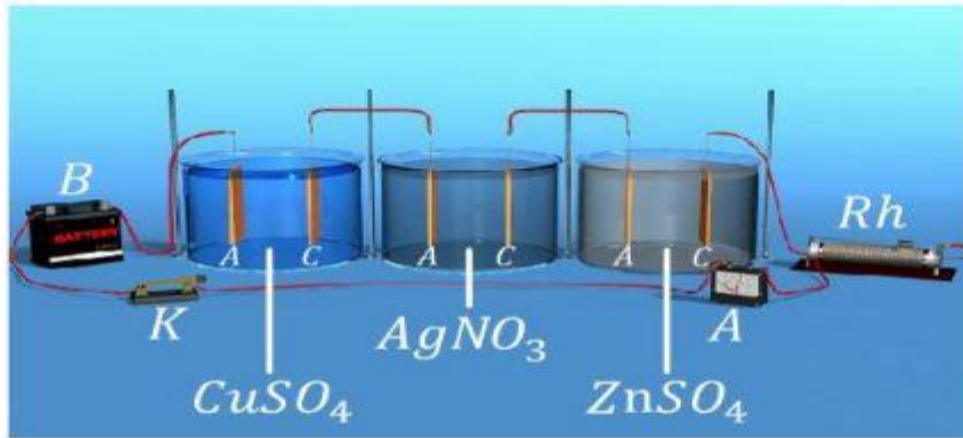
كمية المادة المترسبة او المتحرره عند امرار نفس الكمية من الكهرباء تتناسب مع اوزانها المكافئة

Faraday's Second Law of Electrolysis

- *"The mass of a substance deposited or liberated at any electrode on passing a certain amount of charge is directly proportional to its chemical equivalent weight".*

Faraday's second law of electrolysis

FARADAY'S SECOND LAW



$$\frac{M_1}{M_2} = \frac{E_1}{E_2}$$

M_1 and M_2 are the masses deposited or liberated

E_1 and E_2 are their chemical equivalents