



SNS COLLEGE OF TECHNOLOGY
COIMBATORE

SUPER CAPACITORS



DEFINITION

- Super capacitors stores renewable energy with high energy density and high power capacity.
- Super capacitors are also known as ultra capacitors.
- It can have capacitance values from a few milli farads to 10 farads in a very small size.
- More amount of electrical energy can be stored between the conducting plates.
- Liquid or wet electrolyte can be used between the conducting plates.
- It is a electrochemical device but no chemical reactions are involved for storing electrical energy.

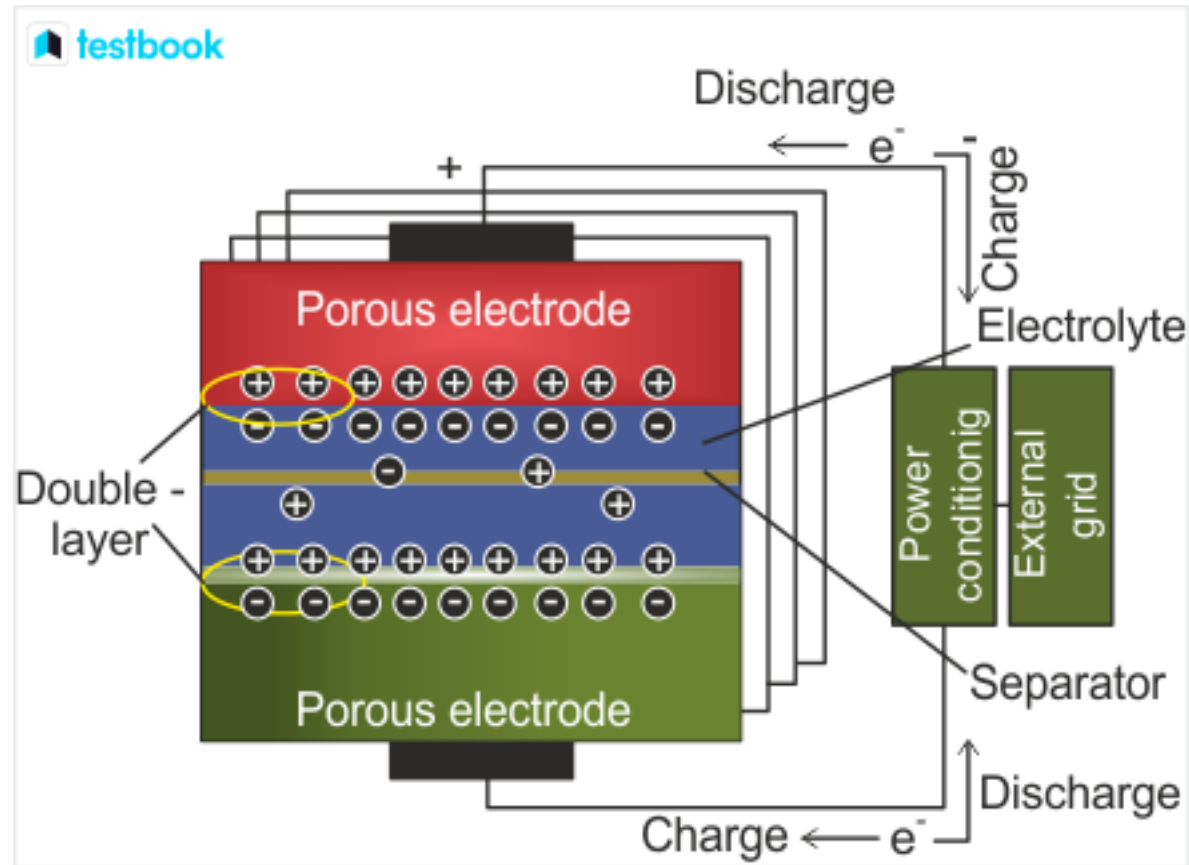


CONSTRUCTION

- Capacitance of a capacitor increases with increase in area of the conducting plates.
- Capacitance also increases with decrease in distance between the plates.
- To construct a super capacitor the area of the conducting plates should be increased and the distance between the two plates should be decreased.
- Conducting plates are made up of metal coated with porous substance such as powdered activated charcoal.



DIAGRAM OF SUPER CAPACITOR





- Both these plates are soaked in a electrolyte and separated by a very thin insulator.
- This separator is used to provide the insulation to the electrode in order to prevent a short circuit.
- The electrolyte contains positively charged ion and negatively charged ion.
- When we apply voltage across the plate one of the plates get positively charged ion and other plates get negatively charged ion due to the electrostatic attraction. Negatively charged ion attracted by the positively charged electrode and positively charged ion is attracted by the negatively charged electrode.
- This ion form a very thin layer around the plates. So the thin layer of positively charged ion formed around the negatively charged plates.
- Thin layer of negatively charged ion formed around the positively charged plates.



This results in the formation of electrostatic double layer with the series circuit of two capacitors C1 and C2.

- $C_{\text{total}} = \frac{C_1 * C_2}{C_1 + C_2}$

- Such a super capacitor can store large amount of charge and these capacitance will be very high, so they are called as electrostatic double layer capacitor(EDLC).

ADVANTAGES:

- High efficiency
- High energy and power density
- High performance with higher charging rates.
- Super capacitors have longer cycling time as compared to battery.
- Super capacitors have high specific power ,low resistance which enable them to produce high load current



DISADVANTAGES :

- It have high self discharge rates
- It have low voltage limits which demand serial connection to produce high voltage.
- Super capacitor have the highest dielectric absorption of any types of capacitors.

USES :

- It is used in the hybrid buses in the field of transportation
- It is used in the memory devices in laptops ,smart phones ,LED flash units
- It is being used in the field of industry, medicine ,transportations , music etc



THANK YOU

R. Srilekha AP/Chem/SNSCT