GS-III: Nobel Prize in Chemistry: for Lithium ion battery.

News

This year’s Nobel Prize in Chemistry recognizes the rechargeable lithium-ion batteries that power most of the portable devices that we use, such as mobile phones and more recently the e-vehicles. The prize has been given jointly to Stanley Whittingham, John B Goodenough and Akira Yoshino.

Li-Ion battery:

- Lithium-ion battery is the most dominant battery system finding applications for variety of societal needs including handy consumer electronics goods such as mobile phones, laptops, cameras and many other portable consumer gadgets apart from industrial applications and aerospace.
- Most of the current domestic demand is met by batteries imported from China, South Korea and Taiwan.
- The Li ion cell production initiative is part of Central Government’s plan to achieve 100% EVs in the country by 2030.

Working:

- Batteries convert chemical energy into electricity.
- A battery comprises two electrodes, a positive cathode and a negative anode, which is separated by a liquid chemical, called electrolyte, which is capable of carrying charged particles.
- The two electrodes are connected through an electrical circuit.
- When the circuit is on, electrons travel from the negative anode towards the positive cathode, thus generating electric current, while positively charged ions move through the electrolyte.

Advantages of Li-Ion Batteries:

Low maintenance: One major lithium ion battery advantage is that they do not require and maintenance to ensure their performance. Ni-Cad cells required a periodic discharge to ensure that they did not exhibit the memory effect. As this does not affect lithium ion cells, this process or other similar maintenance procedures are not required.

High energy density: The high energy density is one of the chief advantages of lithium ion battery technology. With electronic equipment such as mobile phones needing to operate longer between charges while still consuming more power, there is always a need to batteries with a much higher energy density. In addition to this, there are many power applications from power tools to electric vehicles. The much higher power density offered by lithium ion batteries is a distinct advantage. Electric vehicles also need a battery technology that has a high energy density.

How it is different from conventional batteries?
• Single-use batteries stop working once a balance is established between the electrical charges.
• In rechargeable batteries, an external power supply reverses the flow of electric charges, so that the battery can be used again.