

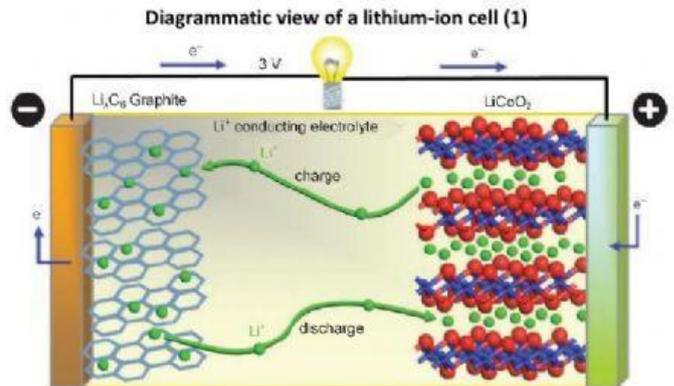
The summary of the operation of Lithium-ion batteries

PART 1—Fill in the gaps with the missing words. (Watch the video to help you.)

combustion	circuit	electron	charged	metal
flow	lithium	generates	asynchronous	graphite

Induction motors ( 1 \_\_\_\_\_ motors) are likely to replace IC (2 internal \_\_\_\_\_) engines in the future as they are more superior in almost every aspect of engineering. The newly constructed Tesla cars have such motors and run on (3) \_\_\_\_\_-ion powered batteries. Lithium has the highest electrochemical potential of all metals since it tends to lose its only (4) \_\_\_\_\_ from its outer shell very easily. However, as a (5) \_\_\_\_\_ oxide, lithium is much more stable.

Whenever the lithium-ion loses its electron, they will (6) \_\_\_\_\_ through two different paths. This flow towards the metal oxide structure and back (7) \_\_\_\_\_ electricity. The electrons lost flow through an external (8) \_\_\_\_\_, lithium-ion cells filter through an electrolyte. A(n) (9) \_\_\_\_\_ layer stores the lithium-ions that arrive there. Once all the lithium atoms reach the graphite sheet, the cell is fully (10) \_\_\_\_\_.



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PART 2—Write in the missing parts of the words. (Watch the video to help you.)

series	circuits	rise	battery	insulating
foils	cylinder			

The (11) \_\_\_\_\_ of the internal temperature may dry up the liquid electrolyte. This may lead to short (12) \_\_\_\_\_ or even cause further damage. Therefore, a(n) (13) \_\_\_\_\_ layer (the separator) is placed between the electrodes to prevent such accidents.

In a practical cell, the graphite and metal oxide are coated onto copper and aluminium (14) \_\_\_\_\_, which act as current collectors. These layers are wound onto a(n) (15) \_\_\_\_\_ around a central steel core. In a Tesla (16) \_\_\_\_\_ pack, 16 modules are connected in (17) \_\_\_\_\_, each of which consists of many cells.



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PART 3—Write in the missing words from the word bank. (Watch the video to help you.)

giant	demand	discharged	interface	temperature
silicon	molecules	density	degradation	cycle

The BMS (battery management system) is responsible for regulating (18) \_\_\_\_\_, charge, voltage protection and cell balancing, enabling cells to be charged or (19) \_\_\_\_\_ at the same level. In Tesla battery systems small multiple cells are deployed which can deal with cooling issues and high power (20) \_\_\_\_\_ situations much more effectively than single (21) \_\_\_\_\_ cells.

The SEI (solid electrolyte (22) \_\_\_\_\_) layer is formed at the first charging of the cell when lithium-ions filter through the electrolyte and are covered by solvent (23) \_\_\_\_\_. The SEI protects the electrolyte from direct contact with the electrons, which may otherwise cause its premature (24) \_\_\_\_\_. The charge-discharge (25) \_\_\_\_\_ is hoped to be tripled soon by replacing the storage medium graphite with (26) \_\_\_\_\_. When that happens, the life-span of lithium-ion batteries may reach 25 years thanks to a much higher energy (27) \_\_\_\_\_.



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