The summary of the operation of Lithium-ion batteries

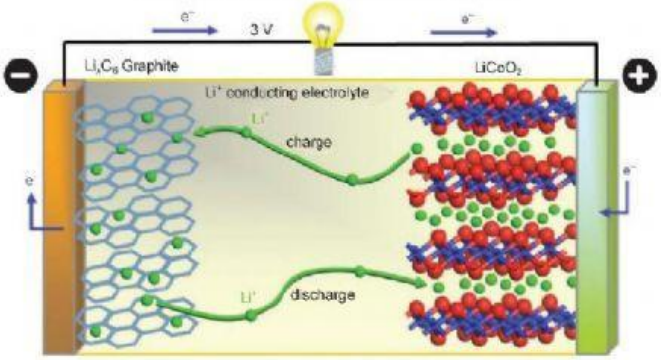
PART 1—*Fill in the gaps with the missing words. (Watch the video to help you.)*

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) _____.

Diagrammatic view of a lithium-ion cell (1)



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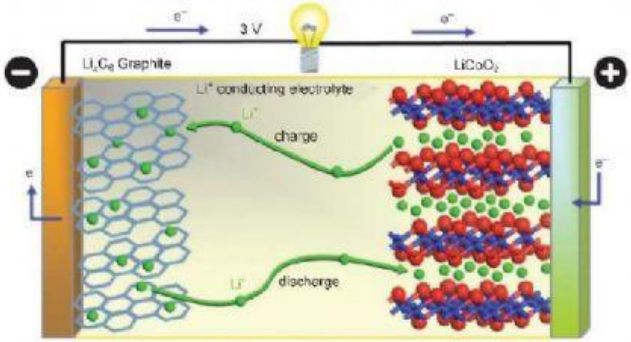
PART 2—*Write in the missing parts of the words. (Watch the video to help you.)*

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.

Diagrammatic view of a lithium-ion cell (1)



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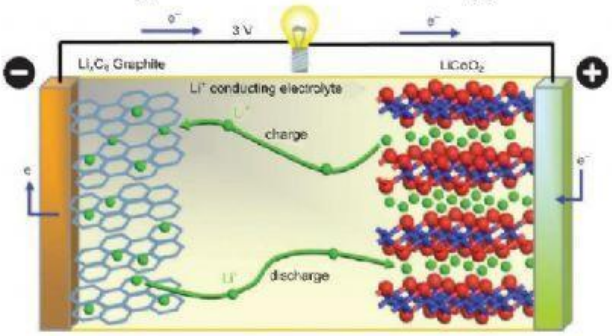
PART 3—*Write in the missing words from the word bank. (Watch the video to help you.)*

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) _____.

Diagrammatic view of a lithium-ion cell (1)



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