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A lead acid battery, also known as a lead storage battery is the oldest kind of rechargeable battery. The battery is common as an energy storing device. The lead acid battery was invented in the year 1859 by Gaston Plante, who was a French physicist. There are still many applications that make use of lead-acid batteries. These find wide usage in vehicles where the battery can provide high current for winding power. Even though the lead-acid batteries are highly reliable, these have a minimal life. These are also heavy to ship and composed of many toxic materials that require some unique methods of removal at the end of their life. The response time is good, and the power density of this kind of battery is moderate. Depending on the technology of power conversion, the lead-acid batteries can accept or supply energy almost instantaneously. Lead-acid batteries get affected by the temperature, and this is why they need maintenance to maximize their life expectancy. The above explanation lets you understand the basics about what is a lead acid battery.

What is a Sealed Lead Acid Battery? The sealed lead acid battery is a 12-volt motorcycle battery and has six cells and is made up of a plastic case. Each cell contains a set of positive and negative plates that are immersed in a solution of dilute sulphuric acid, which is known as the electrolyte. Every cell has around 2.1 volts when it is fully charged. The six cells are connected to provide a fully charged 12.6-volt battery. So how is it possible to stick the lead plates into the sulphuric acid and produce electricity? The battery makes use of an electrochemical reaction that converts the chemical energy into electrical energy. Each of the cells has plates that resemble a small square tennis racket. These are made with lead calcium or lead antimony. A paste that is referred to as active material is bonded to the plates. Sponge lead is used for the negative plates, and lead dioxide is used for the positive plates. When there is an electrical load that is placed across the terminals of the battery, then it is in the active material that the chemical reaction with the sulphuric acid takes place. Know the Chemical Reaction Behind Discharging

When the battery is in the discharged state, then the positive, as well as the negative plate, becomes lead (II) sulphate (PbSO₄). The electrolyte loses the dissolved sulphuric acid, and this is now mostly water. The discharge process gets driven by the electron conduction that occurs from the negative plate back to the cell in the positive plate. This happens in the external circuit. Here is the Negative plate reaction: $Pb(s) + HSO_4^-(aq) \rightarrow PbSO_4(s) + H^+(aq) + 2e^-$ Here is the Positive plate reaction: $PbO_2(s) + HSO_4^-(aq) + 3H^+(aq) + 2e^- \rightarrow PbSO_4(s) + 2H_2O(l)$ The overall reaction occurs before combining the positive and negative reactions: $Pb(s) + PbO_2(s) + 2H^+(aq) + 2HSO_4^-(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

Understand the Charging of the Lead Acid Battery Chemical energy is stored in the lead acid battery, which is converted into electrical energy when required. The energy conversion from chemical to electrical is known as lead acid battery charging. When the electric power gets changed to chemical energy, then this is discharging. The sulphuric acid that is present in the lead acid battery decomposes, and this is why it has to be replaced. If the battery spends a lot of time in its discharged state, then this causes a buildup of the chemical, which is not easy to remove. The lead acid batteries are usually charged using an external source of current. During the process of charging, because of chemical changes, the current passes into the battery. Any lead acid battery may use two kinds of charging methods. These are constant voltage charging or constant current charging. Know the Chemical Reaction for Recharging

The lead acid battery can also be recharged. When the battery is in the charged state, then every cell contains the negative plate of the element Pb or lead and the positive plate of PbO₂ or lead(IV) oxide. The electrolyte contains approximately 4.2M of H₂SO₄ or sulfuric acid. In the recharging process, the electrons are forcibly removed from the positive plate, and they are introduced forcibly in the negative plate. This is done by the source of charging. Here are the chemical reactions that occur in the respective plates.

Negative plate reaction: $PbSO_4(s) + H^+(aq) + 2e^- \rightarrow Pb(s) + HSO_4^-(aq)$

Positive plate reaction: $PbSO_4(s) + 2H_2O(l) \rightarrow PbO_2(s) + HSO_4^-(aq) + 3H^+(aq) + 2e^-$

The overall reaction when the negative and the positive plate reactions are combined is: $2PbSO_4(s) + 2H_2O(l) \rightarrow Pb(s) + PbO_2(s) + 2H^+(aq) + 2HSO_4^-(aq)$

This is the reverse of the discharge reaction. It is important to note that if the battery is overcharged, then this will lead to the formation of oxygen gas and hydrogen gas, which are the byproducts. These gases cause a loss of the reactants because of these escapes from the battery. Rechargeable battery type often used in cars

Lead-acid battery 12v Lead acid car battery Specific energy 35-40 Wh/kg [1] Energy density 80-90 Wh/L [1] Specific power 180 W/kg [2] Charge/discharge efficiency 50%-95% [3] Energy/consumer-price 7 (std) to 18 (fld) Wh/US\$ [4] Self-discharge rate 3%-20%/month [5] Cycle durability

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