Comparison of batteries

Business, Industries

Lead Acid Cell vs. Button Cell Lead acid cells were invented in 1859 by the French Physicist Gaston Plante, and are the oldest types of rechargeable batteries. These types of batteries typically weigh at 5kg, but can range from half a kilogram to over 30 kilograms on the consumer market. Though their chemistry means a very low energy-to-weight and energy-to-volume ratio in comparison to other modern batteries, their ability to supply high surge currents means that the cells maintain a large power-to-weight ratio.

This makes them highly desirable for use in large appliances such as motor vehicles, which require the high current provided by this type of battery. In comparison, Button cells are much smaller than lead acid cells. Button cells are shaped as small, squat cylinders usually 5 to 22mm in diameter and between 1 to 6mm in height and weigh little over several grams. The voltage and current produced by these batteries are small and steady, and these properties make them very suitable for powering small portable electronic devices such as wrist watches, pocket calculators, hearing aids, and sometimes pacemakers.

These batteries are usually not rechargeable, and last a long time, though lifep depends on chemical composition and use. Chemistry Lead acid calls use a chemical reaction in order to produce a voltage between the output terminals. The battery contains two plates, and the discharge process is driven by the conduction of electrons from the negative plate back into the cell at the positive plate. All lead acid sells use Lead Sulfate in their reactions. These chemicals were originally contained as a liquid, but a technique has now been developed in which a gel electrolyte is used, preventing leakage.

Negative plate reaction: Pb(s) + HSO? 4(aq) > PbSO4(s) + H+(aq) + 2e- Positive plate reaction: PbO2(s) + HSO? 4(aq) + 3H+(aq) + 2e- > PbSO4(s) + 2H2O(l) Overall reaction: Pb(s) + PbO2(s) + 2H2SO4(aq) > 2PbSO4(s) + 2H2O(l) Button cells are single cells, and are Primary cells, being not rechargeable. Button cells have both an Anode and Cathode separated by a separator contained within a metal “ can”. Common anode materials are zinc or lithium, and there are a range of cathode materials, including manganese dioxide, silver oxide, and cupric oxide.

Of notable mention is the mercuric oxide button cell, which was banned due to the toxicity and environmental hazard of mercury. Reaction between silver oxide (cathode) and zinc (anode): Zn + Ag2O ZnO + 2Ag These batteries are dry batteries, and are created with the ideal of a long lifetime. As such, they rarely leak if ever, and boast a steady electricity production over a long period of time. Both Lead acid cells and button cells rely on chemical reactions for the production of their energy.

However, where a lead-acid cell would typically use an anode and cathode within a liquid or gel medium, button cells use solid anode and cathodes which react with each other through a separator. This reflects their uses; where the chemistry of a lead acid battery allows it to produce large amounts of electricity in surges as needed to start appliances such as motor vehicles, the chemistry of Button cells allows for a slow and steady release of small amounts of charge. Cost and Practicality As was reflected upon under the chemistry subtitle, the batteries have been designed, and retain their designs, to specifically fit their uses.

Though the size of the lead acid batteries does not allow for the powering of small portable devices such as watches, it maintains its usefulness in larger appliances and uses such as motor vehicles, which require a large amount of electrical energy to start up, but does not require a steady flow of energy. This is reflected in the property of these batteries being able to release large surges of energy. As these are designed for long use and provide large power, the cost for these are quite high, ranging from $100 to $300 each.

In comparison, the button cell battery is used for very small applications such as wrist watches and hearing aids. This is reflected in their small, convenience, and ability to provide a long lasting, steady flow of energy. However, this means that they are unable to supply large amounts of energy at a time, and are therefore unfit for use in industry and larger appliances such as motor vehicles. The cost of these batteries is much cheaper than that of the large, lead acid batteries, rarely coming up to above a few dollars.
Impact on Society

Batteries have had a large impact on society since their invention. In particular, lead acid batteries were among the first to be invented. These batteries have had a major impact on society; They have allowed for the powering of motor vehicles, which have become a major component in the lives of many living in developed cities. Though an older model of battery, these batteries continue to hold significant impact on society even today. In comparison, button cells power small, handheld portable appliances such as watches and hearing aids.

This is asignificant difference from the impact of lead acid batteries. However, both batteries have impacted the life of many in developed

societies, generally making life easier, and more convenient for all. Environmental impact Lead acid batteries are extremely hazardous to theenvironment. Lead is a hazardous metal, and poisonous to both environments and animals, and humans are not excepted. Though the use of lead in batteries is usually very controlled, the production of it is not; of three plants in Australia, two have required strict non-residential zones of 2-3 km.

This implies that though all safety precautions are being taken, there is still a danger of contamination and danger to the environment. In comparison, button cells are much safer. Though non rechargeable, their recyclability means the mining of the metals used in batteries is reduced to a minimum. However, the environmental impact of these materials is determined by the actual materials used. This was reflected upon in the past, when mercuric oxide batteries were banned for the toxicity and environmental damage caused by mercury. References ttp://www. powerstream. com/Size_SLA. htm http://hyperphysics. phy-astr. gsu. edu/hbase/electric/leadacid. html http://en. wikipedia. org/wiki/Lead %E2%80%93acid_battery#Electrochemistry http://en. wikipedia. org/wiki/Silver-oxide_battery http://batteryuniversity. com/learn/article/types_of_battery_cells http://science. howstuffworks. com/electric-battery-info1. htm http://electrochem. cwru. edu/encycl/art-b02-batt-nonr. htm http://en. wikipedia. org/wiki/Button_cell#Properties_of_different_types http://www. lead. org. au/lanv3n2/lanv3n2-5. html