The Influence Of Unreasonable Recycling Of Lead-Acid

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How Was The Lead Battery Made?

Most people who use lead-acid batteries only know the basics concerning this battery, which contains an acid that creates an electrical current through chemical reactions. But in reality, these batteries are made out of a strip of lead used to make battery grids that conduct an electric current and provide a surface for the active material. The grids are applied with a paste that contains lead oxide, water, and sulfuric acid. The sulfuric acid is in powder form, and it is used to produce plates with a negative charge. The plates are cured at a warm temperature, allowing for crystallization, which binds the grids to the powdered acid. The plates are arranged alternately with separators in between them, which prevents short-circuiting but allows current to pass through them, giving a two-volt battery cell per two alternative plates. The plates are heat-sealed permanently with a top cover that has terminal posts forming a lead acid battery (Basu et al., 1991).

Heavy Metal Presents In A Lead-Acid Battery

Battery acids contain lead as the major element in their composition, which is recognized as an environmental pollutant. Lead acid batteries have been found to contain cadmium concentrations as well as iron concentrations. The batteries may also contain zinc, copper, and antimony traces. These metals have great effects on life, even if the health effects may not seem life-threatening. Antimony as a metal does not affect the life or the environment. However, dust particles of antimony trioxide are considered to be one cause of cancer when inhaled. Exposure to copper, on the other hand, can cause a metal fever, which is a flu-like disease.

It is, however, an essential trace element for human health as it is formed in the environment either naturally or as a compound as a result of a copper reaction to other elements in nature. Zinc is a naturally occurring metal that is also essential to human health because it is a trace element. When the body absorbs zinc, side effects like loss of appetite, slow wound healing, and skin soars can be experienced. It can also cause mental fever when a person is exposed. Cadmium does not exist naturally as a pure metal but is carcinogenic when inhaled and accumulates in the liver and kidneys, which may pose a threat in later life.

Types Of Batteries

There are two major kinds of batteries which are primary batteries, which can be disposed of and are not rechargeable, and secondary batteries, which are chargeable. Primary batteries can be further divided into alkaline batteries, mercury batteries, and zinc carbon batteries. The batteries have different applications but are not rechargeable. Alkaline batteries use potassium hydroxide as their electrolyte. Zinc-carbon batteries use a carbon rod that is surrounded by carbon powder and manganese dioxide. Mercury batteries contain mercuric oxide and manganese dioxide but have a low output voltage. Primary batteries are used in household appliances like flashlights, clocks, and radios. Secondary batteries are composed of lead-acid batteries and lithium/silver oxide batteries. Lead acid batteries have been used in the automobile industry. Lithium and silver oxide batteries are long-lasting batteries used in instruments like calculators and wristwatches rain (Mitchell & Popham, 2008).

Recycle Rate

Approximately 85% of the total consumption of lead is for the production of lead-acid batteries. Also, the demand for lead-acid batteries is expected to increase due to the increasing demand for vehicles. The high consumption rate has called for an effective way to recycle lead as an element. The Battery Council International (BCI) presented a study that showed lead batteries had a recycling rate of 99.3%. This was evidenced by the fact that new lead batteries contained reused lead as part of their components (Davidson et al., 2016). Further studies have shown that every part of a lead acid battery is recyclable and can be used to manufacture new batteries. This reduces the waste volume that would have exhausted the lead landfills and reduced the rate of lead mining consequently.

Toxic Level

The toxic level of lead can be felt throughout the ecosystem. Lead acid batteries contain other metals which can be pollutants to the environment. This pollutant can be traced in the atmosphere, human bodies, soil, and even in water bodies. When these elements are found in bodies, they usually cause harm to the nervous system and brain. The pollutants found in soil can cause damage to plants, leading to vegetation death. Water bodies are the largest part of the earth’s ecosystem. When these pollutants sneak into water bodies, adverse effects can be felt. These pollutants can result in the death of marine/aquatic life and can also be taken into the bodies of other animals living on land through consumption of the contaminated water. The pollutants in the air have been known to cause acid rain, which corrodes structures and kills vegetation. The ozone layer is also depleted by the pollutants, increasing the greenhouse effect (WHO, 2017).

Human Body Impact

Lead-acid batteries are an efficient and affordable power source; however, they pose health and environmental effects due to their composition. They contain lead, a highly toxic metal, and sulfuric acid a corrosive electrolyte solution. Lead can cause kidney and brain damage in humans. Sulfuric acid results in acid rain when mixed with water, thus endangering animal and plant life, while sulfates in the atmosphere can cause harm to the public. When Lead is inhaled, it will be distributed throughout the body and stored in teeth and bones. The lead will accumulate over time and will be released into the blood, making exposure to lead to be considered dangerous. The toxic effects of lead have major health effects on young children whose brain and nervous systems are still developing. It also has a significant effect on hearing and learning ability in children, whereas pregnant women with high lead levels in their blood can suffer the effects of miscarriage, premature birth, or fetus malformations.

Environmental Impact

The recycling of lead is a major source of environmental pollution because, in most cases, it is done without precautions to control lead emissions. In most cases, the unregulated form of recycling is carried out by individuals, often in their backyards. Even established, industrial-scale recycling facilities can, however, cause significant environmental contamination and human exposure to lead in countries without adequate standards or when regulatory controls are inadequately enforced. Batteries can contain toxic heavy metals, which are hazardous to the environment, if they are not properly disposed of. This has led to the world community insisting on recycling batteries to curb the toxic side effects batteries pose to the environment. The batteries that are non-rechargeable deplete the natural resources as new elements need to be mined to create new batteries. Batteries also emit fumes, which increase the greenhouse effect and pollute the atmosphere. These fumes undergo reactions producing new toxic chemicals that lead to the accumulation of acidic substances in the air that can be deposited by rain (Mitchell & Popham, 2008).

Process Of Recycling

When recycling lead-acid batteries, various steps are carried out, and almost every part of the lead-acid battery can be recycled (WHO, 2017). There are informal recycling and formal recycling of lead-acid batteries. Informal recycling is usually inefficient due to lead losses, and the final product is not usually pure. The lead acid battery requires being broken into pieces and placed into a vat where the heavy metals are separated from the plastic parts of the battery. The plastic part contains polypropylene, which is melted down to make small plastic pellets that can be used in the manufacture of a battery. At the bottom of the vat, lead and heavy metals are formed, and the lead is taken and melted to remove the other heavy metals, which are impurities. Molten lead is poured into

ingot molds which cool and sent to battery manufacturers to be used in the production of new batteries. Sulfuric acid is also recycled by converting it to sodium sulfate, which is used in the textile industry as a detergent.

Where The Public Can Get Access To Recycle Them

The public has been enlightened on how to use and dispose of lead batteries. Governments have introduced different programs that engage the public and enlighten them on the proper methods of disposing of this battery. The disposed old and obsolete batteries are normally collected in battery parks that are marked by the government. These battery packs are normally spread throughout communities leading to easier access to the public. Government agencies or contracted business partners will then collect the batteries and take them to the recycling plants to be recycled. The public can also be requested by the government to visit the recycling plants where they can dispose of their old and obsolete batteries and get new recycled replacements in return at a more affordable price. The public also has informal means through which they can domestically recycle lead-acid batteries. This poses a lower risk compared to industrial recycling, which causes the emission of harmful fumes.

Where Recycled Batteries Go

Lead acid batteries are the most recycled products known to humans after newspapers. The batteries pose a health hazard if disposed of carelessly to the environment. This fact results in the need for their recycling. The parts used in making lead batteries can be taken back to the manufacturers to make new lead batteries. Once dismantled, the plastic casings can be melted and restructured to form new products in the textile and PVC industry. The recycled lead can be alloyed with tin and used to make metallic cans, which are used in the soft drink and beer industry. Lead can be recycled and made into bullets which can be used for hunting and in many other kinds of ammunition. The recycling of lead is made possible by its many properties, like a low melting point, high density, and resistance to corrosion. This makes it applicable in many industries, like making protective sheets for underwater cables or roofing material in the construction industry.

Other Kinds Of Materials Need To Pay Attention To

Lead acid batteries contain sulfuric acid, which might spill and react with metals in the environment. In cases of spillage, it is necessary to measure the sulfuric dioxide amounts in the environment if any. This will reduce the risk of pollutant fumes escaping into the atmosphere and causing greenhouse effects. Hydrogen sulfide is also a dangerous gas that can be released by the overcharging or decomposition of these lead-acid batteries. Hydrogen sulfide is easily detectable because it releases an odor that smells like rotten eggs and can cause severe implications for life and the environment.

Lead-acid batteries are also known to emit hydrogen fumes, which are highly flammable and can be ignited by a spark, causing an explosion. This requires the batteries to be charged in a properly ventilated room to prevent any explosions resulting from hydrogen emissions (WHO, 2017).

Future Technology And Concerns

For over a hundred years, people have used lead-acid batteries as a storage system for renewable energy. Their size and design have been refined by engineers to increase the lead-acid battery quality and lifespan. The battery faces more advantages over other types of batteries with its high recyclable percentage rate. The industry is trying to make an automated manufacturing branch that will produce this battery at advanced levels, delivering more power and, therefore, increasing its reliability. The advancement in this industry has seen computerized quality control methods that enable the testing of the batteries without the risk of contamination to the engineers. Batteries are now assembled by robots, which further reduces the risk to human life on the assembly line. Studies in this industry have been carried out to see how this battery can be maintained for it to have a lifespan of over 25 years. This will improve the efficiency of the battery and reduce environmental threats if a battery lasts more than 25 years. This means that there will be lower disposal of lead batteries in landfills. Continuous studies are being made to ascertain that the lead-acid battery structures are protective and pose zero threat to the ecosystem and human life. Lead acid batteries have an ideal temperature of 25^0 C. The world is not known to have temperatures at the optimum of 25^0 C, and this can cut the battery life of the battery by more than half. However, structures have been built to shield the battery from extreme weather.

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