High Purity Alumina from Aluminium Waste

THE INNOVATION

Alumina is the raw material used in the production of many different types of ceramic materials, catalyst supports and refractories. Generally, there are two types of alumina, the lower grade alumina and the technical grade alumina. Lower grade alumina is of low purity and is produced as a starting material for making aluminium metal. Technical grade alumina is a high purity ceramic alumina and is used in high technology applications. Basically, there are two types of commercial technical alumina, which are gamma and alpha alumina.

Aluminium dross is a waste produced during the aluminium smelting process and it is in the form of a solid material floating on the aluminium melt. There are two types of aluminium dross waste that can be differentiated by their white and black colours. The global aluminium industry produces nearly five million tonnes of this waste each year. In Malaysia, aluminium dross is classified as a scheduled waste and its storage, transportation and disposal activities must be carried out by a licensed contractor. Recycling this scheduled waste into a value added material will be a welcoming move to industrialists as well as safeguarding the environment.

The present study relates to a methodology to produce high purity gamma and alpha alumina by recycling both white and black alumina dross waste. The alumina obtained is comparable with that of commercially available alumina.

SNAPSHOT

A method to produce high purity gamma and alpha alumina from aluminium dross waste, which are suitable for use in technology applications such as ceramics, structural, coating, filtration, electronic components and other applications requiring alumina of low impurity contents.

THE OPPORTUNITY

- There is a high demand for high-tech ceramic materials with properties better than most metals. Alumina is one of the high-tech ceramic materials that are widely used.
- Alumina in the alpha crystal form ranks next to silicon carbide and diamond in terms of hardness and is used as cutting tools, polishing and bullet-proof materials. Alpha alumina on the other hand is stable even at very high temperature and is used as thermal barriers, insulator abrasives; in electronics, structural, coating; as synthetic sapphires and as translucent bodies.
- Gamma alumina has a very large surface area and porosity used as an absorbing material especially for the oil and gas industry; as support for catalytic materials as well as in filtration application.

COMPETITIVE ADVANTAGES

- The conventional method of producing commercial alumina is from the mineral bauxite using the Bayer process. Whereas the present methodology produces alumina from aluminium dross waste, industrial metal and drinking can wastes make the production cost five times cheaper than the conventional method.
- The current alumina is a green and environmental safeguarding product.
- Commercial technical grade alpha alumina contains a minimum 90% of alpha alumina and a maximum 10% of gamma alumina. The current alpha alumina contains 100% alpha alumina.
- Malaysia currently imports all its alumina, as such it can cut down costs by producing the alumina at its own plants.
- Alumina has many potential applications in industries and high-tech sectors.

INTELLECTUAL PROPERTY

The process for producing high purity alumina from aluminium dross waste has been protected by a Malaysia patent and its granted.

WHAT'S NEXT?

The inventors would like to speak to companies interested in licensing the technology.

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