ABSTRACT

A process for recovering low-density polyethylene from flexible packaging material by treating it in an acidic environment having sulphuric acid is provided; wherein the flexible packaging material is made up of at least polyester and low-density polyethylene.

30 OCT 2013

CLAIMS

We claim,

1. A process for recovering low-density polyethylene from a flexible packaging material comprising at least polyester and low-density polyethylene, the process comprising:

treating the flexible packaging material in an acidic environment having sulphuric acid, thereby removing at least a polyester component in the packaging material; and

extracting at least the low-density polyethylene component from the acidic environment.

2. The process as claimed in claim 1, wherein a duration for which the flexible packaging material is treated is inversely proportional to a concentration of the sulphuric acid in the acidic environment.

3. The process as claimed in claim 1, wherein treating the flexible packaging material in an acidic environment having sulphuric acid is done till an endpoint is reached.

3 OCT 2013

4. The process as claimed in claim 1, wherein extracting includes washing at least the low-density polyethylene component with water to remove traces of at least the sulphuric acid.

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3 OCT 2013

FIELD OF INVENTION

[001] The invention generally relates to recycling flexible packaging material, and more particularly to a process for recovering low-density polyethylene from flexible packaging material.

BACKGROUND OF INVENTION

[002] Flexible packaging is a widely used choice of packaging as opposed to rigid and semi-rigid packaging because of its characteristics like light-weight, durability, and cost effectiveness. Changing lifestyles and the consequent dependence of consumers on processed, packaged and pre-cooked food is increasing the usage of flexible packaging.

[003] Flexible packaging materials are generally produced by lamination. The basic raw materials for flexible packaging are polyester, polyfilm, metallic film, biaxially oriented polypropylene (BOPP), polyethylene, paper and adhesive etc.

[004] Flexible packaging material is usually made of multiple layers. Multi-layer packaging is very difficult to treat and/or recycle because it contains many different polymers. Thus, instead of recycling, it ends up in the mainstream of municipal household waste and is dumped into a landfill or incinerated which could lead to pollution. Further, neither of these options adds to the sustainability or useful life of the packaging.

3 OCT 2013

[005] Therefore, it is important to develop a process for reutilizing different components of flexible packaging material.

OBJECT OF INVENTION

[006] The principal object of this invention is to provide a process for recovering low-density polyethylene (LDPE) from flexible packaging material.

[007] The object of the embodiments herein will be better appreciated and understood when considered in conjunction with the following description. It should be understood, however, that the following descriptions, while indicating preferred embodiments and numerous specific details thereof, are given by way of illustration and not of limitation. Many changes and modifications may be made within the scope of the embodiments herein without departing from the spirit thereof, and the embodiments herein include all such modifications.

30 OCT 2013

DETAILED DESCRIPTION OF INVENTION

[008] The embodiments herein and the various features and advantageous details thereof are explained more fully with reference to the non-limiting embodiments that are illustrated in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those skilled in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[009] The embodiments herein refer to a process for recovering low-density polyethylene from flexible packaging material. In an embodiment, the flexible packaging material includes at least polyester and low-density polyethylene. In an embodiment, the flexible packaging material is treated in an acidic environment having sulphuric acid to remove at least polyester and extract at least low-density polyethylene.

[0010] In an embodiment, the flexible packaging material includes packaging material for food products, agricultural products, medicinal products, pharmaceutical products and detergents.

3 OCT 2013

[0011] In an embodiment, the flexible packaging material is treated in an acidic environment having sulphuric acid. In an embodiment, the concentration of sulphuric acid is in the range of 68% to 98%. For the same quantity of flexible packaging material, the duration for which the flexible packaging material is treated is inversely proportional to the concentration of the sulphuric acid.

[0012] The sulphuric acid acts by removing the polyester component. In one embodiment, sulphuric acid removes the polyester component by burning. In another embodiment, sulphuric acid removes the polyester component by diluting. The reaction is considered to be complete when at least 90% of the polyester component is dissolved by the sulphuric acid. In one embodiment, at least 99% of the polyester component is dissolved.

[0013] A gradual change in colour is observed on mixing flexible packaging material with sulphuric acid. When no further visual colour change is noticed for a few minutes, the reaction is considered to have reached completion. This point marks the end point of the reaction.

[0014] Low-density polyethylene is extracted from the acidic environment by washing with water. In one embodiment, low-density polyethylene is extracted from the acidic environment by physical methods and washed with water to remove traces of sulphuric acid. In another

30 OCT 2013

embodiment, sulphuric acid is removed by washing with water, and low-density polyethylene is extracted.

Example 1

[0015] 30g of detergent packaging made up of polyester and low-density polyethylene is treated with 500g of 68% sulphuric acid for two minutes. The colour gradually turned to dark brown on mixing detergent packaging with sulphuric acid. No further colour change was observed for around two minutes, which indicated the end point of the reaction. The sulphuric acid burnt the polyester component and the low-density polyethylene component was retained. Low-density polyethylene was extracted from the acidic environment by a physical method and washed with water to remove traces of sulphuric acid. 6g of polyester was burnt and 24g of low-density polyethylene was extracted

Example 2

[0016] 30g of detergent packaging made up of polyester and low-density polyethylene is treated with 500g of 98% sulphuric acid for one minute. The colour gradually turned to dark brown on mixing detergent packaging with sulphuric acid. No further colour change was observed for around two minutes, which indicated the end point of the reaction. The sulphuric acid burnt the polyester component and the low-density

30 OCT 2013

polyethylene component was retained. Low-density polyethylene was extracted from the acidic environment by a physical method and washed with water to remove traces of sulphuric acid. 6g of polyester was burnt and 24g of low-density polyethylene was extracted

3 OCT 2013

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2. The process as claimed in claim 1, wherein a duration for which the flexible packaging material is treated is inversely proportional to a concentration of the sulphuric acid in the acidic environment.

3. The process as claimed in claim 1, wherein treating the flexible packaging material in an acidic environment having sulphuric acid is done till an endpoint is reached.

3 OCT 2013

4. The process as claimed in claim 1, wherein extracting includes washing at least the low-density polyethylene component with water to remove traces of at least the sulphuric acid.

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