**milk drink**

**1-Sequence of layers of the bottle  :**

**•** 2 layers of HDPE

**•** Aluminium layer

**•** EVA « ethylene-vinyl acetate »

**•** Paperboard

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**1.1. Paperboard :** is eco-friendly as it is based on wood .

**1.2. Polymers : :**

In order to preserve the product and to enhance the storage life , we have used 2 layers of HDPE . Our paperboard is laminated externally and internally with these 2 layers

* **Lamination of paperboard with polymers has the following advantages  :**

• Provide protection to the food against hazardous environmental effects like sunshine, moisture, air, dust and oxygen.

• These layers give extra strength and stiffness to the packaging.

* **Factors that are behind the polymer selection  :**

• Moisture in the atmosphere.

• Oxygen.

• Preservation and safety of the product.

• Barrier properties.

• Cost.

We have chosen HDPE layers over the PP (polypropylene) , the two most used plastics for milk drinks , because :

**• HDPE’s Chemical resistance is superior as well as resistance to oil and grease.**

**• HDPE has 90% crystallinity which increases its stiffness.**

**• The HDPE film offers excellent moisture protection and significantly decreases**

**gas permeability.**

**• It has also good heat sealing properties so no adhesives are required**

**1.3. EVA « ethylene-vinyl acetate » :**

It has excellent sticking or gluing properties, it is used between the aluminium and the inner layer for better tightening. EVA is a copolymer, EVA film is tough and tacky so we have used it with HDPE as a tie-layer

**1.4. ALUMINIUM :**

Aluminium foil acts as a complete barrier to light and oxygen (which cause fats to oxidize or become rancid), odors and flavors, moisture, and bacteria. Aluminium foils are a good choice for dairy products; they also help in preservation of dairy products for some time without refrigeration.

**1.5. Remarques :**

* The packaging materials proposed for this product aims to minimize losses and wastages of the product caused by its transportation or because of the environmental hazards
* This product is not a recyclable product because of the complexity of the recycling of multilayer packaging compared to monolayer packaging

**2- The Bottle cap :**

We have chosen high density polyethylene (HDPE) because of its strength and its excellent properties .

**3. Label & package design :**

**3.1. Label design**

**3.2. package design**

**4) Lamination technique used in the manufacture of the packaging :**

**4.1. What is lamination :**

**Laminating** is the process through which two or more flexible packaging webs are joined together using a bonding agent. The substrates making up the webs may consist of films, papers or aluminum foils. The multi-layer composite structure can be produced either through a process using adhesives or by extrusion.

**4.2. Advantages of lamination technique :**

**Lamination of paperboard with polymers serves following purposes :**

**•** Provide protection to the food and to the paperboard against hazardous environmental

effects like sunshine, moisture, air, dust, oxygen.

**•** These layers give extra strength and stiffness to the packaging.

