METHODOLOGY

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

INFORMATION SOURCES

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

STUDY GOAL AND OBJECTIVES

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

REPORT OBJECTIVES

◆ To establish a comprehensive, factual, annually updated and cost-effective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.

◆ To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.

◆ To complement the organizations’ internal competitor information gathering efforts with strategic analysis, data interpretation and insight.

◆ To suggest for concerned investors in line with the current development of this industry as well as the development tendency.

◆ To help company to succeed in a competitive market, and
### Abstract

High barrier materials can block the penetration of small molecular gas (such as O2, CO2, N2, water vapor), aroma and other organic solvent vapor prominently. By virtue of better barrier performance, polyvinylidene chloride (PVDC), ethylene / vinyl alcohol copolymer (EVOH) and polyethylene naphthalate (PEN) are mainly used to produce thin films and containers, and utilized in such fields with higher requirements on barrier properties as food, medicine, military products, cosmetics, pesticides, precision instruments and high-grade fine chemicals; additionally, they are also suitable for the production of vacuum insulation panel materials.

In the world, only a small number of companies are capable of producing PVDC, EVOH and PEN which require high-quality raw materials and strict process control, so that the current PVDC, EVOH and PEN markets are dominated by a few oligopolists.

PVDC raw materials exist in the forms of PVDC resins and latexes. Global PVDC resin producers embrace Dow Chemical (USA.), Solvay (Belgium), Kureha (Japan) and Asahi Kasei (Japan). The global PVDC resin capacity reached 228Kt/a in 2013, and will hit 242Kt/a in 2014. New capacity is mainly contributed by Chinese PVDC manufacturers (but the capacity is not fully released).

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<table>
<thead>
<tr>
<th>Code</th>
<th>Classification</th>
<th>Monomers</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Solvent soluble resin</td>
<td>VDC and VC</td>
<td>used as adhesion primers, heat-sealing lacquers and print-ink binder on various substrates</td>
</tr>
<tr>
<td>B</td>
<td>Conventional extrusion resin</td>
<td>VDC and VC</td>
<td>used for processing casing film, self-adhesive plastic wrap, composite film and food bag</td>
</tr>
<tr>
<td>C</td>
<td>Multi-layer co-extruded resin</td>
<td>VDC and MA</td>
<td>used for packaging food, medicine, military products, beverages and cosmetics (with retention of aroma and taste 1 time higher than ordinary PVDC-VC resin)</td>
</tr>
<tr>
<td>D</td>
<td>Fiber resin</td>
<td>VDC and AN</td>
<td>used for making wig, netting twine, flame retardant fabrics, artificial turf, etc.</td>
</tr>
</tbody>
</table>

Notes:
- VC: vinyl chloride
- VDC: vinylidene chloride
- MA: methyl acrylate
- AN: acrylonitrile
- Solvay and Asahi Kasei also manufacture PVDC latex.

Source: Global and China High Barrier Material (PVDC, EVOH, PEN) Industry Report, 2014-2017 by ResearchInChina
As of 2014, there has been only two PVDC resin production enterprises in China, namely Zhejiang Juhua and Nantong SKT. Both companies produce PVDC resins used in casing films. In recent years, Juhua has increased investment in PVDC, so that the capacity jumped from 3Kt/a in 2009 to 28Kt/a in 2013 and will further rise to 33Kt/a in 2014. Nantong SKT primarily supplies PVDC resins to Henan Shuanghui (i.e., Shineway Group) for the purpose of casing film production. By the end of 2014, Nantong SKT will add the capacity of 3.6Kt/a PVDC resins, so the total capacity will reach 13.6Kt/a.

Chinese PVDC resin market presents two characteristics
(1) Limited varieties of PVDC resin products with insufficient output and high import dependence (the import dependence ratio of PVDC resin processing equipment is also high). In 2013, China's apparent consumption of PVDC resin amounted to 53.6Kt/a, and the ratio of import dependence was 48.5%, compared with the over 50% before 2013.
(2) PVDC resin application will continue to extend, and the consumption will maintain rapid growth. In 2014, China’s PVDC resin consumption fields are mainly reflected in casing films. As China releases the capacity of plastic wrap PVDC resins and multilayer extrusion PVDC resins as well as enhances the localization rate of PVDC film processing equipment, the future PVDC consumption fields will be enlarged, and the consumption will climb rapidly.

EVOH is suitable for the production of packaging films, gasoline tank, composite bottles and co-extruded plastic sheets. In 2014, the global EVOH resin capacity is recorded at 142Kt, and the market is monopolized by Kuraray (Japan), Nippon Gohsei (Japan) and ChangChun PetroChemical (Taiwan). Due to robust market demand, the former two giants keep expanding capacity. In January 2014, Kuraray’s subsidiary in the United States (Kuraray America, Inc.) raised the EVOH resin capacity by 12Kt/a, so that Kuraray’s global capacity ascended to 81Kt/a. In early 2015, the subsidiary of Nippon Gohsei in the United States (NOLTEX L.L.C.) will obtain the new EVOH resin capacity of 15Kt/a, then the global capacity of Nippon Gohsei is to hit 66Kt/a.
On a global basis, the overwhelming majority of PEN resins gets used to produce PEN films and injection molding products; besides, about 10% of PEN resins are adopted for the production of PEN fibers. Currently, the PEN market is occupied by the joint ventures set up by Teijin (Japan) and DuPont (USA), and SKC (South Korea).

The report highlights the following:
- Overview of high barrier materials (including definition, classification, industry chain, related policies, prospects, etc.);
- Global and Chinese PVDC, EVOH, PEN market (embracing definition, classification, production technology, processing technology, capacity, output, sales volume, import, export, applications and development prospects, etc.);
- Profile, revenue, revenue structure, R & D investment, PVDC, EVOH and PEN business, and business in China of global and Chinese PVDC, EVOH and PEN producers (comprising PVDC companies such as USA Dow and Belgium Solvay, EVOH enterprises such as Japan Kuraray and Nippon Gohsei, as well as PEN manufacturers such as Japan Teijin and USA DuPont).
1. Overview of High Barrier Materials
   1.1 Definition
   1.2 Classification
   1.3 Industry Chain
   1.4 Policy
   1.5 Prospect

2. Polyvinylidene Chloride (PVDC)
   2.1 Definition and Classification
     2.1.1 Definition
     2.1.2 Classification
   2.2 Production Process
   2.3 Global Supply & Demand Analysis and Forecast
     2.3.1 Global Capacity
     2.3.2 Global Supply & Demand Analysis
   2.4 China’s Supply & Demand Analysis and Forecast
     2.4.1 China’s Capacity
     2.4.2 China’s Supply and Demand Analysis
   2.5 Import & Export Analysis
     2.5.1 Export Analysis
     2.5.2 Import Analysis
   2.6 Application and Prospect
     2.6.1 PVDC Casing Film
     2.6.2 PVDC Coating Film
     2.6.3 PVDC Plastic Wrap
     2.6.4 PVDC Shrink Film
     2.6.5 PVDC Coextruded Stretch Film

3. Major Global and Chinese PVDC Manufacturers
   3.1 Dow Chemical
     3.1.1 Profile
     3.1.2 Operation
     3.1.3 Revenue Structure
     3.1.4 The Performance Plastics Segment
     3.1.5 R&D Costs
     3.1.6 Production Bases and Capacity of PVDC
     3.1.7 PVDC Resins (SARAN)
     3.1.8 PVDC Films (SARANEX)
   3.2 Solvay
     3.2.1 Profile
     3.2.2 Operation
     3.2.3 Revenue Structure
     3.2.4 Gross Margin
     3.2.5 R&D Costs
     3.2.6 Specialty Polymers
   3.3 Kureha
     3.3.1 Profile
     3.3.2 Operation
     3.3.3 Revenue Structure
     3.3.4 R & D Costs
     3.3.5 Production Bases and Capacity of PVDC
   3.4 Asahi Kasei
     3.4.1 Profile
     3.4.2 Operation
     3.4.3 Revenue Structure
     3.4.4 R & D Costs
     3.4.5 Production Bases and Capacity of PVDC
     3.4.6 PVDC Products
     3.4.7 Business in China
   3.5 Zhejiang Juhua
     3.5.1 Profile
     3.5.2 Operation
     3.5.3 Revenue Structure
     3.5.4 Gross Margin
     3.5.5 R&D Costs
     3.5.6 Operating Costs
   3.6 Henan Shuanghui Investment & Development Co., Ltd.
     3.6.1 Profile
     3.6.2 Operation
     3.6.3 PVDC Business
4 Ethylene Vinyl Alcohol Copolymer (EVOH)
4.1 Definition and Properties
4.2 Production Process
4.3 Global Supply and Demand Analysis
4.3.1 Global Capacity
4.3.2 Global Supply and Demand
4.4 China's Supply and Demand Analysis
4.4.1 Status Quo
4.4.2 EVOH Supply and Demand in China
4.5 Application and Prospect
4.5.1 EVOH Barrier Packaging Films and Co-extruded Plastic Sheets
4.5.2 EVOH Multilayer Fuel Tanks
4.5.3 EVOH Multilayer Composite Bottles
4.5.4 Textile Materials
4.5.5 Medical Materials
4.5.6 Vacuum Insulation Panels

5. Major Global and Chinese EVOH Producers
5.1 Kuraray
5.1.1 Profile
5.1.2 Operation
5.1.3 Revenue Structure
5.1.4 R & D Costs
5.1.5 Major Overseas Subsidiaries of Kuraray
5.1.6 Production Bases and Capacity of EVOH
5.1.7 EVOH Products
5.1.8 Business in China

5.2 Nippon Gohsei
5.2.1 Profile
5.2.2 Operation
5.2.3 Revenue Structure
5.2.4 Production Bases and Capacity of EVOH
5.2.5 EVOH Products
5.2.6 Business in China

5.3 Taiwan ChangChun PetroChemical

5.1.7 EVOH Products
5.1.8 Business in China
5.2 Nippon Gohsei
5.2.1 Profile
5.2.2 Operation
5.2.3 Revenue Structure
5.2.4 Production Bases and Capacity of EVOH
5.2.5 EVOH Products
5.2.6 Business in China
5.3 Taiwan ChangChun PetroChemical

6. Polyethylene Naphthalate (PEN)
6.1 Definition and Properties
6.2 Production Process
6.2.1 PEN Resin
6.2.2 PEN Film
6.3 Status Quo of Global and Chinese PEN Resin Production
6.3.1 Global Market
6.3.2 China Market
6.4 Application and Prospect
6.4.1 PEN Film
6.4.2 Packaging Containers
6.4.3 PEN Fiber
6.4.4 PEN/PET Blends and Copolymers

6.3.1 Global Market
6.3.2 China Market
6.4 Application and Prospect
6.4.1 PEN Film
6.4.2 Packaging Containers
6.4.3 PEN Fiber
6.4.4 PEN/PET Blends and Copolymers

7. Major Global and Chinese PEN Producers
7.1 Teijin
7.1.1 Profile
7.1.2 Operation
7.1.3 Revenue Structure
7.1.4 R & D Costs
7.1.5 Production Bases and Capacity of PEN
7.1.6 PEN Products
7.1.7 Business in China
7.2 DuPont
7.2.1 Profile
7.2.2 Operation
7.2.3 Revenue Structure
7.2.4 R & D Costs
7.2.5 PEN Business
7.3 SKC
7.3.1 Profile
7.3.2 Operation
7.3.3 Revenue Structure
7.3.4 PEN Business
Selected Charts

- Permeability Comparison between Medium and High Barrier Materials
- Oxygen Transmission Rate (OTR) of Medium and High Barrier Materials Versus Relative Humidity
- High Barrier Material Industry Chain
- Molecular Structure and Related Features of PVDC
- Global Consumption of PVDC Resin, 2010-2017E
- Global Consumption of PVDC Resin by Region, 2013
- Capacity of PVDC Resin in China, 2009-2017E
- Output of PVDC Resin in China, 2009-2017E
- Apparent Consumption of PVDC Resin in China, 2009-2017E
- Import Dependence Ratio of PVDC Resin in China, 2009-2017E
- Export Volume and Value of PVDC in China, 2010-2014
- Import Volume and Value of PVDC in China, 2009-2014
- Revenue and YoY Growth of Dow, 2009-2014
- Net Income and YoY Growth of Dow, 2009-2014
- Net Profit Margin of Dow, 2009-2014
- Revenue Structure of Dow by Segment, 2011-2014
- Revenue Structure of Dow by Region, 2009-2014
- Revenue Structure of Dow’s Performance Plastics Segment by Business, 2011-2013
- Revenue Structure of Dow’s Performance Plastics Segment by Region, 2013
- Dow’s R&D Costs, YoY Growth and % of Revenue, 2009-2013
- Production Process of Dow’s PVDC Resin (SARAN)
- Number of Employees in Solvay by Region, 2009-2013
- Main Business of Solvay by Operating Segments, 2013
- Profile of Solvay by Region, 2013
- Revenue and YoY Growth of Solvay, 2009-2014
Selected Charts

- Net Income and YoY Growth of Solvay, 2009-2014
- Net Profit Margin of Solvay, 2009-2014
- Net Sales Structure of Solvay's Advanced Materials Segment by Business and Region, 2013
- Solvay's R&D Costs, YoY Growth and % of Revenue, 2009-2013
- Revenue and YoY Growth of Solvay's Specialty Polymers Business, 2009-2013
- Main Products of Solvay Specialty Polymers
- Combination of Barrier Properties (Diofan? Aqueous High Barrier Polymer Dispersions)
- Major Products and Services of Kureha by Segment
- Revenue and YoY Growth of Kureha, FY2009-FY2013
- Net Income and YoY Growth of Kureha, FY2009-FY2013
- Net Profit Margin of Kureha, FY2009-FY2013
- Revenue Structure of Kureha by Segment, FY2010-FY2013
- Net Sales and Operating Income of Kureha's Specialty Plastics, FY2009-FY2013
- Revenue Structure of Kureha by Region, FY2009-FY2013
- Kureha's R&D Costs, YoY Growth and % of Revenue, FY2009-FY2013
- Kureha's R&D Costs by Segment, FY2009-FY2013
- Revenue and YoY Growth of Asahi Kasei, FY2009-FY2013
- Net Income and YoY Growth of Asahi Kasei, FY2009-FY2013
- Net Profit Margin of Asahi Kasei, FY2009-FY2013
- Revenue Structure of Asahi Kasei by Segment, FY2009-FY2013
- Revenue Structure of Asahi Kasei by Region, FY2010-FY2013
- Asahi Kasei's R&D Costs, YoY Growth and % of Revenue, FY2009-FY2013
- R&D Costs of Asahi Kasei by Segment, FY2012-FY2013
- Revenue and YoY Growth of Juhua, 2009-2014
- Net Income and YoY Growth of Juhua, 2009-2014
Selected Charts

- Net Profit Margin of Juhua, 2009-2014
- Revenue Structure of Juhua by Product, 2009-2014
- Revenue Structure of Juhua by Region, 2009-2014
- Juhua’s R&D Costs, YoY Growth and % of Total Revenue, 2009-2014
- Juhua’s Operating Costs of Food Packaging Materials, 2012-2013
- Revenue and YoY Growth of Shuanghui, 2009-2014
- Net Income and YoY Growth of Shuanghui, 2009-2014
- Net profit margin of Shuanghui, 2009-2014
- Global Capacity of EVOH Resin and YoY Growth, 2009-2017E
- Global Capacity of EVOH Resin by Country, as of 2014
- Global Output of EVOH Resin and YoY Growth, 2009-2017E
- Global Consumption of EVOH Resin and YoY Growth, 2009-2017E
- Consumption of EVOH Resin and YoY Growth in China, 2009-2017E
- Structure of Typical EVOH Co-extrusion Multilayer
- Structure of Typical EVOH Multilayer Fuel Tank
- Revenue and YoY Growth of Kuraray, FY2009-FY2013
- Net Income and YoY Growth of Kuraray, FY2009-FY2013
- Net Profit Margin of Kuraray, FY2009-FY2013
- Revenue Structure of Kuraray by Segment, FY2012-FY2013
- Revenue Structure of Kuraray by Region, FY2009-FY2013
- Kuraray’s R & D Costs, YoY Growth and % of Revenue, FY2009-FY2013
- Major Overseas Subsidiaries of Kuraray
- Kuraray’s EVOH Capacity by Product and Production Base, as of 2014
- Kuraray’s Production Process of EVOH Resin
- Range of Kuraray’s EVOH Resin Grades
Selected Charts

- Kuraray's Processing of EVOH Film
- Products List and Segments of NIPPON GOHSEI
- Revenue and YoY Growth of Nippon Gohsei, FY2009-FY2013
- Net Income and YoY Growth of Nippon Gohsei, FY2009-FY2013
- Net Profit Margin of Nippon Gohsei, FY2009-FY2013
- Nippon Gohsei's Standard Grades of EVOH Resin
- Nippon Gohsei's Special Grade of EVOH Resin
- Applications for EVOH Resin (SoarnoL) of Nippon Gohsei
- Overseas Subsidiaries of Nippon Gohsei
- Production Process of PEN Resin
- Production Process of PEN Film
- Business Domains and Growth Drivers of Teijin
- Revenue and YoY Growth of Teijin, FY2009-FY2013
- Net Income and YoY Growth of Teijin, FY2009-FY2013
- Net Profit Margin of Teijin, FY2009-FY2013
- Revenue Structure of Teijin by Region, FY2009-FY2013
- Teijin's R & D Costs, YoY Growth and % of Revenue, FY2009-FY2013
- Global Network of DuPont Teijin Films
- Asia Pacific Network of Teijin DuPont Films
- Comparison between Teonex and PET Film
- Revenue and YoY Growth of DuPont, 2009-2014
- Net Income and YoY Growth of DuPont, 2009-2014
- Net Profit Margin of DuPont, 2009-2014
- Revenue Structure of DuPont by Segment, 2009-2014
Selected Charts

- DuPont's R & D Costs, YoY Growth and % of Revenue of DuPont, 2009-2014
- Equity Structure of SKC, as of 2013
- Revenue and YoY Growth of SKC, 2010-2013
- Net Income and YoY Growth of SKC, 2010-2013
- Net Profit Margin of SKC, 2010-2013
- Revenue and Operating Income of SKC by Business, 2003-2013
- Key Performance Indicators of PVDC
- Classification and Applications of PVDC
- Major Global PVDC Resin Producers and Their Capacity, 2012-2014
- Major PVDC Resin and Latex Producers and Their Capacity in China, 2013-2014
- Export Volume and Value of PVDC in China by Source Province and Municipality, 2013-2014
- Import Volume and Value of PVDC in China by Destination Province/Municipality, 2013-2014
- Chinese Casing Film Production Enterprises and Their Capacity, 2014
- Major Chinese PVDC Coating Film Production Enterprises and Their Capacity, 2014
- Major Products and Applications/Market of Dow's Performance Plastics Segment
- Dow's Range of SARANEX Coextruded Barrier Films Products
- Net Sales Structure of Solvay by Segment, 2012-2014
- Revenue Structure of Solvay by Region and Country, 2009-2013
- Gross Margin of Solvay by Segment, 2009-2013
- Solvay's Range of DIOFAN High Barrier Polymer Products
- Solvay's Range of Ixan Barrier Polymer Resin Products
- Application of Ixan? Soluble Barrier Polymer Powders
- Subsidiaries of Kureha in China
Selected Charts

- Gross Margin of Juhua by Product, 2009-2014
- Gross Margin of Juhua by Region, 2009-2014
- PVDC Capacity, Output, Sales Volume and Average Price of Juhua, 2009-2014
- Revenue and Net Income of Shuanghui’s Subsidiaries Engaged in PVDC casing film, 2012-2013
- Properties of EVOH Resin
- Global EVOH Resin Producers and Their Capacity, as of 2014
- Global Consumption of EVOH Resin by Region and Application Area, 2013 Vs. 2011
- Consumption of EVOH Resin by Application Area in China, 2013 Vs. 2011
- Advantages and Disadvantages of Several Types of Fuel Tanks
- Kuraray’s Types and Applications of EVOH Films
- Branches of Kuraray in China
- Sales Revenue and Operating Income of Nippon Gohsei by Segment, FY2009-FY2013
- Nippon Gohsei’s Production Bases and Capacity of EVOH Resin, as of 2014
- Properties of PEN
- Revenue Structure of Teijin by Segment, FY2009-FY2013
- Revenue Structure of DuPont by Region, 2010-2013
- SKC Business Division and Capacity of Main Products by Region, as of 2013
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