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THERMOFORMING

Heater technologies, new materials are extending process flexibility

Metallocene catalysts reshape polyolefins

Compression molding pushes process technology

Chemical recycling looks at commercial production

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GLOBAL REPORT

EDITED BY JACK K. ROGERS

ELECTRON STERILIZING DOES MEDICAL PARTS

Thermoplastic resins exposed to electron beam (E-beam) sterilization exhibit physical and cosmetic changes similar to those caused by exposure to gamma radiation, according to a study by Dow Plastics, Midland, MI, USA. E-beam sterilization is said to be faster than gamma radiation and requires fewer safety precautions than a toxic gas like ethylene oxide (EtO). The findings are of particular interest to medical equipment OEMs and processors that supply them.

In a study of eight thermoplastics, the same physical and cosmetic changes were seen when the materials were exposed at similar dosages of E-Beam or gamma radiation. The only exception was in the case of thermoplastic polyurethane (TPU) which showed a greater color change when exposed to gamma than after exposure to E-beam.

All of the thermoplastics tested exhibited some degree of discoloration after either form of sterilization. But within eight weeks after sterilization, five of the resins – general purpose polystyrene, (GPPS); high-impact polystyrene, (HIPS); styrene-acrylonitrile, (SAN); acrylonitrile-butadiene-styrene, (ABS); and high-density polyethylene, (HDPE);– returned to their natural colors. However, in the case of thermoplastic polyurethane, (TPU); rigid thermoplastics urethane, (RTPU); and polycarbononate (PC) the color change was permanent.

The study also found that three of the materials – ABS, HDPE, and TPU – suffered reductions in their physical properties from exposure to either E-beam or gamma radiation. ABS lost 20-30% of its impact strength. HDPE experienced an 18-28% reduction in tensile modulus. The tensile and flexural modulus of TPU were reduced by 50%.

"Plastic devices sterilized by E-beam exhibit property changes comparable to those observed after gamma sterilization," says a Dow engineer.

MORE CONSOLIDATION SEEN AFTER NESTE, STATOIL MERGER

Finnish major Neste, Espoo, and Norway's Statoil, Stavanger, have agreed to merge their petrochemical and polyolefin businesses into an equally owned company, which will be the largest polyolefin producer in Europe and the fifth-largest in the world.

Neste says the merger is part of a much needed restructuring of the European petrochemicals industry due to overcapacity and weak demand. Numerous swaps and joint ventures between European resin producers have taken place in recent months, especially in polypropylene, and further European consolidation upstream seems imminent. The Association of Petrochemicals Producers in Europe (APPE), Brussels, Belgium, has been in close contact with the European Commission about restructuring plans, but has not yet released a blueprint for the shakeout.

Pressure on European resin suppliers is coming from the Middle East, according to Richard Killpack, business manager for lower olefins at Shell International Chemical, London. In an interview with McGraw-Hill's *Chemical Engineering*, he says, "With new plants based on ethane feedstocks, producers in the Gulf can absorb a $50/tonne EC import duty, pay freight, and still land high-density polyethylene in Europe cheaper than we can get it out the factory gate."

Neste will receive a substantial cash payment because it is contributing a larger part of the deal's assets. The venture will employ more that 6000 persons and have annual revenues of $2.5 billion. The as-yet-unnamed company will boast a capacity of 1.5 million tonnes/yr for polyethylene and 640,000 tonnes for polypropylene. "The new company will also be involved in plastics processing through its EuroParts AB subsidiary and Rosenlew Oy affiliate," Neste says.

AKZO & HARCROS JOIN ADDITIVES GROUPS, TOO

Current restructuring is not limited to resin makers – European additives suppliers are also looking to mergers as a competitive hedge. Akzo Chemicals International BV (Amersfoort, Netherlands) and the Harcross Chemicals Group (London) announced that they have joined their polymer additives groups in a 50/50 joint venture. The new unit, called Akcros, becomes Europe's largest supplier of barrium, cadmium, and lead stabilizers for polyvinyl chloride, with a 1992 turnover of $320 million combined between the two groups.

The Akcros announcement follows the February acquisition of German supplier Schering AG by supplier U.S.-based Witco. It coincides with the French government's announcement that it will sell its shares in additives major Rhône-Poulenc and Elf Acquitane, the parent company of Elf Atochem, another major European supplier of PVC stabilizers and other additives.

Says Bernard McAlhone, managing director of Akcros, "Far Eastern and American competitors threaten to achieve the critical mass which would give them significant competitive advantages in the organics market. Both Akzo and Harcros were medium-sized players in PVC additives, and therefore potentially vulnerable in the long-term."

The new joint venture will be headquartered in Eccles, near Manchester, England, and maintain joint facilities throughout Eruope, as well as in Asia and the U.S. All production, R&D, marketing, and sales operations of the formerly seperate companies will be merged. In North America, Harcros additives will be made available for the first time through Akzo's operation in New Brunswick, NJ, USA.

FILLER CUTS ACID FUMES FROM BURNED PVC

A mineral filler is claimed to reduce hydrochloric acid emissions considerably when polyvinyl chloride is incinerated.

Calfa Chemical Co., Yokohama, Japan, has introduced Calfa filler, a porous mineral containing silicon, sodium, potassium, calcium, and aluminum that acts to absorb chlorine. Compounding at 1% filler loading with PVC results in a 40% decrease in acid emissions upon incineration, while compounding at a 4% level cuts emissions by over 60% and up to 75% in some cases, says the company.

Officials claim that Calfa will add little, if any, cost increase to overall compound costs, even though Calfa is priced at 700-800 yen/kg. (about $6.60/kg) The reason is that Calfa also acts as a heat stabilizer in the processing step. With a 1% loading, the heat stabilizer level can be cut by a similar amount. Heat stabilizers cost around the same, and are used in 5 to 7% loadings, leaving ample room for partial replacement with the new filler, says Calfa Chemical.

Under wraps for nearly a year, Calfa Chemical actually started sample shipping the filler to European chemical companies, including Atochem and Solvay, in August of last year. Reaction has been favorable, and Calfa is in the final stages of negotiations with Solvay to supply the Belgian company with masterbatches of the filler.

VDMA SAYS MACHINE SECTOR WOES PERSIST

The plastics group of the German Union of Machine Builders (VDMA) reports that its members have experienced a 6% drop overall in orders for the first five months of 1993 compared to last year. This coincides with an 11% drop in revenue for German plastics machine builders during that period. Chief reason for the reduction in sales is a 21% drop in domestic machine orders, according to the association (exports actually increased 4% from January to May).

VDMA members from the extrusion and blow molding sectors reported less overcapacity, and even growth in some sectors. Wilhelm Dahlhoff, CEO of the Krupp Group (parent company to blow molding system builders Krupp Kautex and Corpoplast), says, "We have built too many of our own components in the past. In the future, you will see us subcontracting more components to smaller manufacturers that can better control costs. We will have to reduce our own capacities accordingly."

In 1992, German injection press sales fell by 15.5%, extruder sales fell by 3.6%, and blow molding press sales rose by 2.6%.

Leading members of the association concede that plastics machine building capacity in Germany is at least 10 to 20% too high to give members with broad profitability.

"I think that we're typical for the injection sector, and we willl need to cut costs by at least 30% to have done our job," says Wolfgang von Schroeter, president of injection press builder Mannesmann Demag.

Despite their difficulties, VDMA members expect a turnaround by the end of 1994. They note increased exports to China, South America, and the U.S.

BUSINESS BRIEFS

Amoco Chemical Co. says it will be the first company to make commercial quantities of NDC (dimethyl-2,6-naphthalenedicarboxylate), the feedstock for PEN (polyethylene naphthalate) and PBN (polybutylene naphthalate), high-performance analogs of polyethylene terephthalate and polybutylene terephthalate. A 450,000-tonne/yr plant in Decatur, AL, USA, will begin production during the first half of 1995. PEN fills a gap in the property spectrum between PET and high-performance resins such as polyphenylene sulfide and polyimides.

Hermann Berstorff, Hannover, Germany, has started a 51-49 joint venture with Inventa, Madras, India, which controls the smaller percentage of stock. Subrata Mukherjee, manager of Inventa's industrial electronics division, says the company will assemble Berstorff extrusion equipment and add Inventa downstream systems to provide turnkey plants. Products planned for sale include foam and compounding lines, and systems to produce polymer lumber.

Genpak, Glens Falls, NY, USA, and Reedy Intl., Keyport, NJ, USA, have been granted a patent for a process that uses atmospheric gases as agents for foaming extruded low-density polystyrene sheet, replacing ozone-damaging chlorofluorocarbons. Foaming is achieved by using carbon dioxide, nitrogen, or blends of these gases with a special masterbatch that is 0.001 to 0.035 of the total mix. The masterbatch includes a nucleator and styrenic resin, which act as plasticizers in the sheet. The claimed benefits are improved melt flow and melt strength, tougher foam, and enhancement of sheet quality. Some 273,000 tonnes/yr of PS sheet are used in the U.S., mostly in fast-food and retail packaging.

Whitbread, a British brewer, is marketing beer in cans that contain a two-piece injection molded polypropylene insert loaded with nitrogen gas. The insert is wedged into the can when it is filled. When the can is opened, the gas escapes from the insert, and this, together with carbon dioxide dissolved in the beer, creates a foam head that is said to look just like the head on draught beer pulled down at a local pub. The inserts are made by Lawson Mardon Plastics, in Sutton-in-Ashfield, England. The company says recyclability of the cans is not affected, since the PP insert evaporates when the aluminum is remelted

Brazil imported 113,000 tonnes of finished plastics goods in the first half of last year, which was more than four times more than the country imported in all of 1991, according to the Association of the Brazilian Plastics Industry, or ABIPLAST, San Paulo. Brazilian processors only exported 15,000 tonnes of finished plastics goods through November of 1992.