

Arkema at the JEC Composites 2009

On the occasion of JEC 2009, Arkema exhibits its latest innovations for composites industry:

- A new kind of inhibitor, BlocBuilder[®] RC-50, a reactivity controller that gives composite industry makers an excellent control over thermoset resin curing,

Arkema will display BlockBuilder[®] RC-50 during a technical presentation session on Wednesday 25 of March, at 16 pm- Booth W46

- A new ultra-high-performance material designed to medical and aerospace applications, PEKK, the only polymer on the market to withstand continuous ultra-high temperatures, of the order of 260°C. Its properties are comparable to those of some metals, for a lower density.
- Its latest carbon nanotube innovations and its partnership with Zyvex Performance Materials in thermoset epoxy composites.

A global chemical company and France's leading chemicals producer, Arkema consists of three businesses: Vinyl Products, Industrial Chemicals, and Performance Products. Arkema reports sales of 5.6 billion euros. Arkema has 15,000 employees in over 40 countries and six research centers located in France, the United States and Japan. With internationally recognized brands, Arkema holds leadership positions in its principal markets.

**If you require further product information or photos, please contact :
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BlocBuilder[®] RC-50, a reactivity controller that gives an excellent control over thermoset resin curing

On the occasion of JEC 2009, Arkema introduces BlocBuilder[®] RC-50, a new kind of inhibitor. BlocBuilder[®] RC-50 is a reactivity controller that gives composite industry makers an excellent control over thermoset resin curing.

Aimed at fabricators in the closed mold composites industry utilizing pultrusion and Sheet Molding Compound/Bulk Molding Compound (SMC/BMC) manufacturing methods, BlocBuilder[®] RC-50 is a reactivity controller that dramatically increases the potlife of Unsaturated Polyester and Vinyl Ester Resins (UPR/VER), and improves stability. It therefore affords more accurate control for manufacturers and composite molders in their high temperature curing applications. Benefits to the fabricator include less waste, less rejects (of prematurely cured resins), improved productivity and higher quality parts.

Fiberglass-reinforced plastic components are used in a wide variety of products, from kitchen appliances and car hoods to tool handles and bridge components. As demand for these types of components increases, existing continuous pultrusion lines and SMC/BMC operations are required to run faster and with more accuracy. However, with the use of faster peroxide initiators comes the problem of increased reactivity combined with decreased resin stability, which leads to premature curing, and hence hinders the optimum processing of the resin matrix.

To resolve these issues, Arkema has developed a Nitroxide-Mediated Controlled Radical Polymerization (NM-CRP) technology, BlocBuilder[®] RC-50, a reactivity controller which can afford a high degree of control and manipulation in these highly reactive UPR/VER systems. BlocBuilder[®] RC-50 is a stable nitroxide capable of both limiting the inherent termination step in free radical reactions and providing control over the cure kinetics in free radical thermoset systems.

BlocBuilder[®] RC-50 is the only reactivity controller on the market capable of extending potlife by +100%, depending on the nature of the resin, and of improving the stability of the composite materials. In a SMC application for instance, the potlife of the resin at 40°C that is approximately 4 days without inhibitor could be doubled to 8 days by adding 1 phr of BlocBuilder[®] RC-50.

BlocBuilder[®] RC-50 works by trapping the free radicals on the polyester chain that was initiated by the decomposition of organic peroxides. This prevents the polymerization from occurring and

allows the composite system to maintain low viscosity for longer periods of time. When the molded piece is heated to above 60°C, the BlocBuilder® RC-50 additive releases previously free trapped radicals and allows the organic peroxide to initiate the cure reaction. This specific reaction mechanism distinguishes BlocBuilder® RC-50 from any other common inhibitor that merely traps free radicals, reducing the overall state of cure of the UP composite material.

The extended potlife stability of resins at high temperatures affords many benefits to molders, as it:

- Allows fully formulated composite blends to last up to 1 week at high temperature,
- Allows longer storage of pre-mixed material during production run changes,
- Allows faster initiator systems and faster line speeds,
- Improves the consistency and quality of the molded pieces,
- Reduces scrap and disposal costs resulting from prematurely reacted blends,
- Reduces cleanup and labor costs due to aged composite materials in storage tanks,
- Reduces the need for shipment in refrigerated trucks for SMC/BMC applications.

BlocBuilder® RC-50 replaces other inhibitors and provides controlled radical curing at high temperatures without problems of slow kinetics, incompatibility, discoloration or odor. It does not require a larger amount of organic peroxide for the curing process, as it does not decrease peroxide activity.

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**Arkema presents a new ultra-high-performance material:
PEKK, a « polymer of extremes »**

As part of its strategy to further expand in performance materials, Arkema acquired at the beginning of 2009 the American company Oxford Performance Materials (OPM), which markets polyether ketone ketone (PEKK), a range of ultra-high-performance technical polymers, under the tradename OXPEKK®.

PEKK features outstanding characteristics: today it is the only polymer on the market to withstand continuous ultra-high temperatures, of the order of 260°C (its melting point is 360°C), and its properties are comparable to those of some metals, for a lower density. It also offers very good dimensional stability, excellent resistance to chemicals, and unrivaled abrasion resistance. PEKK already has many applications, including in:

- the medical sector, for the manufacture of long-term medical implants and prostheses (its density, close to that of bone, and its bio-compatibility with bone make it an ideal substitute to titanium prostheses, which have a limited lifetime),
- aerospace, where it replaces much heavier parts made from aluminum,
- ultra-deep-water oil and gas extraction, where high temperatures and severe pressure make it a choice material for the manufacture of extremely tough connection components.

For further information visit www.oxfordpm.com

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Arkema presents its latest carbon nanotube innovations together with its partnership with Zyvex Performance Materials

At the beginning of 2006 Arkema inaugurated a 20 ton/year carbon nanotube pilot production plant in Lacq, France, the first stage of what was poised to become a legitimate industrial project. Since then, Arkema has continued to develop a large number of carbon nanotube-based products, and now offers a comprehensive range, while establishing many global research partnerships with public laboratories, universities, as well as leading converters and manufacturers in their sectors of activity.

A comprehensive ever-expanding product range

Arkema is developing multiwall carbon nanotubes of a high and consistent quality under the trademark *Graphistrength*[®]. Thanks to their excellent inherent properties, *Graphistrength*[®] products can be used successfully in very small quantities to impart outstanding characteristics in terms of mechanical properties and electrical conductivity to the materials to which they are added.

For over three years now, Arkema has been relentlessly improving and enhancing its carbon nanotube offering to fulfil the needs and requirements of its customers and research partners. As a result, the *Graphistrength*[®] range now includes a large number of liquid masterbatches and formulations in addition to the carbon nanotube powder range.

Significant recent developments

Arkema is to launch *Graphistrength*[®] C M12-30 on the market, a « universal » masterbatch containing 30 % by weight of carbon nanotubes which can be diluted in various thermoplastic matrices like polyamides, polyesters and polycarbonate. This new masterbatch represents decisive progress by combining a high carbon nanotube concentration, safety and flexibility of use. Its dilution in technical thermoplastics easily leads to compounds with remarkable electrostatic dissipation (ESD) properties for low carbon nanotube concentrations. These compounds can be either extruded or injection-molded.

Arkema is also developing a new specific masterbatch, *Graphistrength*[®] C E1-20, in a fluoro-elastomer matrix. Soon available on the market, this product can be diluted easily and safely using standard equipment. It produces materials combining remarkable ESD and mechanical properties for low carbon nanotube concentrations.

JEC, from March 24th to 26th 2009
Paris – Porte de Versailles
Hall 1 – Stand R 38

A strategic partnership with Zyvex Performance Materials in thermoset epoxy composites

Arkema and Zyvex Performance Materials have been working together for a number of years on applications for epoxy composites.

Within this partnership, Zyvex Performance Materials has developed specific products based on the Kentera™ technology to optimize the action of *Graphistrength*® multiwall carbon nanotubes when they are added to composite materials, with spectacular results in terms of superior mechanical properties.

Until now, these products were mainly available on the American market from Zyvex Performance Materials under the trademark Epovex™. Arkema is now further consolidating its partnership with Zyvex Performance Materials by including formulations based on the Kentera™ technology within its own range with a view to supplying the European market.

Further detailed on www.graphistrength.com

Graphistrength® is a registered trademark belonging to Arkema.

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