Chemical Blowing Agents - Reasons for use, Blowing Agents types and Specialty Products

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Energizing Chemistry

What are Chemical Blowing Agents ?

Can be classified as a Plastic Additive.

- Used in a cross section of Polymers.
- Can be used in various processing techniques, e.g. extrusion
- Aid processing.
- Optimisation of end product.

They are Organic or Inorganic compounds.

- They decompose under the influence of temperature or catalysis.
- They are exothermic or endothermic in nature.
- At least one of the decomposition products is a gas
- A foamed cellular structure is formed within the polymer

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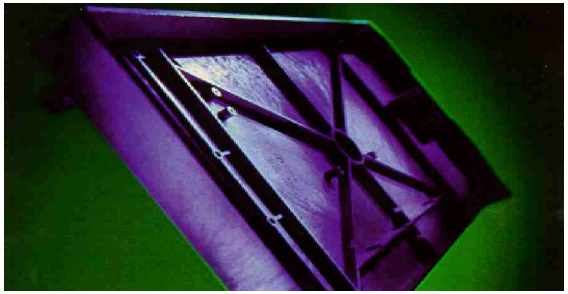
Chemical Blowing Agents – application areas

PVC flooring and wall covering



Polyolefin injection moulding

Rubber seals

Chemical Blowing Agents - reasons for use ?

Application Requirement	Property provided by Blowing Agent
Improve ease of handling	Reduces weight (20 – 50 %) e.g. U-PVC cladding for housing
Improve comfort	Creates a cushion effect e.g. Rubber diving / surfing suits
Improve processing	Reduce cycle times e.g. Polyolefin injection moulding
Improve Quality	Eliminates surface imperfections e.g. Polyolefin anti-sink marks
Improve appearance	Provide textured design e.g. PVC wall coverings

Chemical Blowing Agents - reasons for use ?

Cost Reduction / Environmental Pressures

Raw materials.

- Pressure from suppliers to increase prices.
- **Blowing Agents allows reduction in costs**

Improved Productivity.

- Pressure to increase throughput.
- **Blowing Agents allows cycle time reduction**

Reduce climate impact.

- Pressure to reduce CO_2 emissions
- **Blowing Agents reduces impact on planet.**

Chemical Blowing Agents - types ?

Chemical Blowing Agent	Decomposition Temperature (°C)	Gas yield (ml/g)	Liberated gas	Endo / Exo
ADC (Azodicarbonamide)	200 - 230	~ 220	N_2, CO, (NH_3, CO_2)	Exothermic
TSH (p-toluenesulfonylhydrazide)	110 - 140	~ 120	N_2, H_2O	Exothermic
OBSH (4,4-oxybisbenzenesulfonylhydrazide)	140 - 165	~ 125	N_2, CO_2, H_2O	Exothermic
5-PT (5-phenyltetrazole)	240 – 250	~ 200	N_2	Exothermic
Sodium Bicarbonate **Citric Acid**	150 - 230	~ 165	CO_2, H_2O	Endothermic

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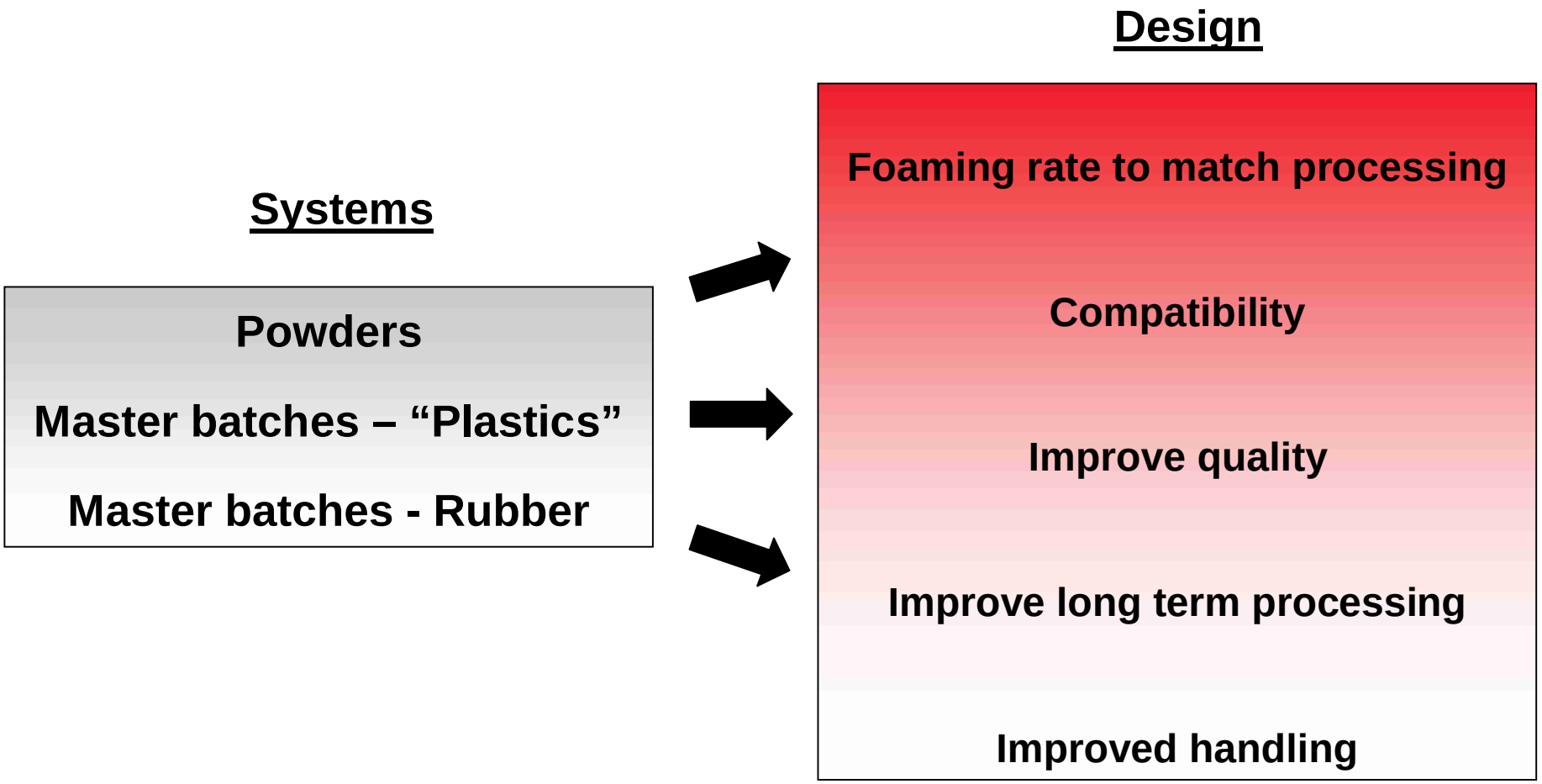
Chemical Blowing Agents – Speciality Products

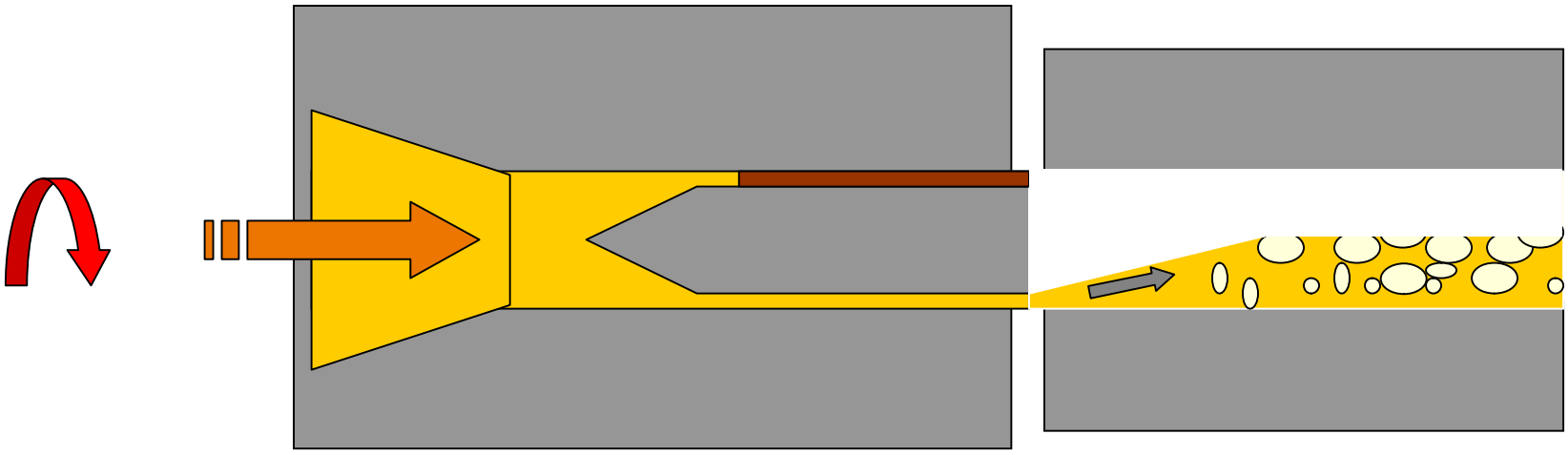


Chemical Blowing Agents – Speciality Products

Benefits added to Blowing Agent systems by "Formulation"

Problem:

Plate-out – undesired segregation of additives, such as plasticisers, stabilisers,… but also BA decomposition products on metal surfaces of moulds, or calendering rolls



Chemical Blowing Agents – Speciality Products

Answer from blowing agent point of view:

Genitron EPA, Genitron EPB, Genitron EPC, Genitron EPE

EP - Extrusions Products – benefits:

- Unique formulations of modified ADC.
- Developed for injection moulding and extrusion of foamed thermoplastics.
- Designed to eliminate or to reduce plate-out.
- Can be used at processing temperatures of 150°C to 230°C.

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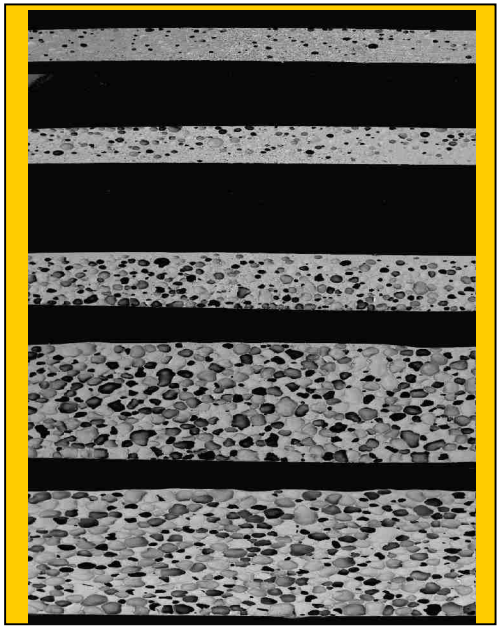
Chemical Blowing Agents – Speciality Products

Benefits added to Blowing Agent systems by manufacturing.

Genitron - Highly Activated Specialities for P-PVC



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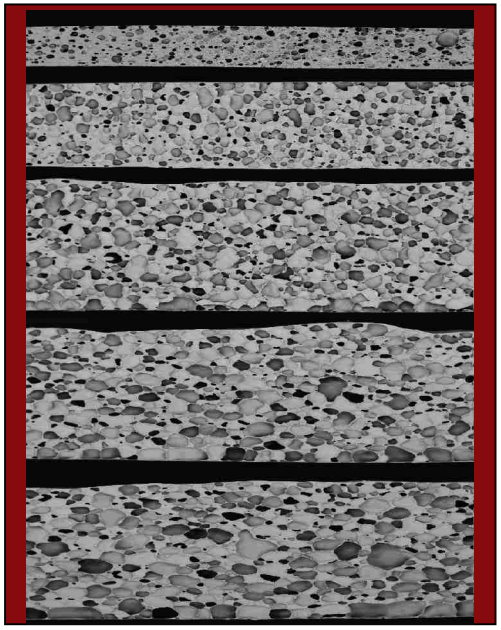


ADC + ZnO

Genitron LE

Composition and intensive mixing results in an excellent activation of the decomposition.

- Faster expansion rates.

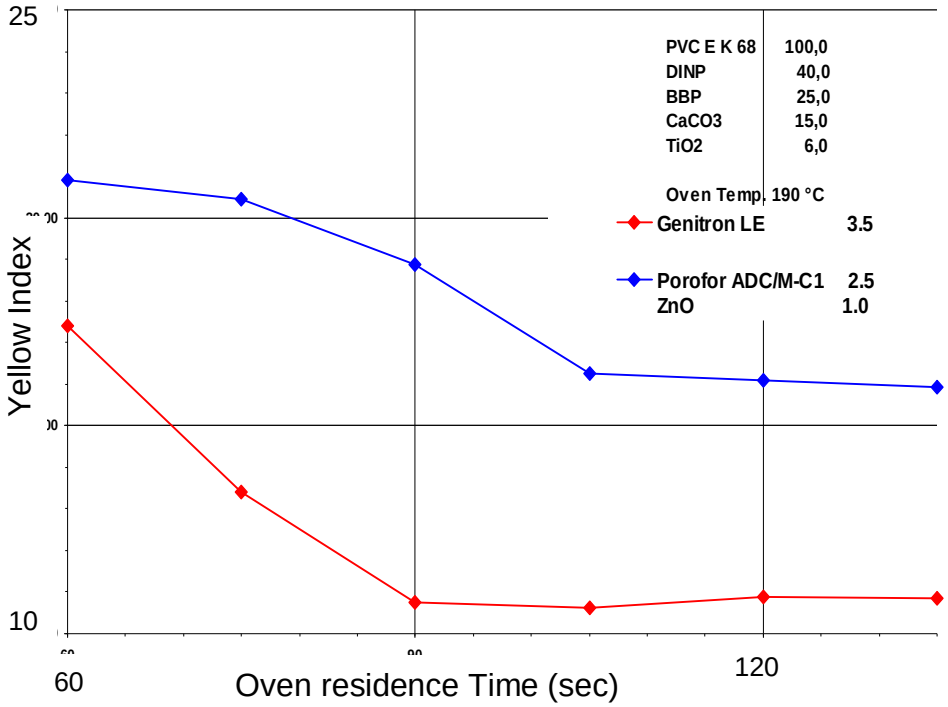
- Faster density reduction

- Offers increase in line speed and temperature reductions options

Chemical Blowing Agents – Speciality Products

Genitron LE - highly activated Specialties for Vinyl's

High speed processing - White foams



Decompose much more efficiently than externally activated plastisol formulations

- Produce whiter foams.

- Option to reduce TiO_2 levels

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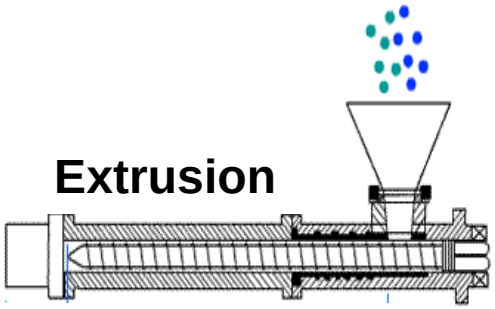
Chemical Blowing Agents – Speciality Products

Benefits added to Blowing Agent systems in “Master batch”



Systems in Pellet form

e.g. **Genitron VPSP 51019 - Thermoplastic**
Genitron EO-75 - Rubber.

Product benefits:

- Dust-free handling
- **Hygiene issues**

- Plastic / Rubber carrier systems
- **Compatibility with resin / dispersion**

- Ability to dose Blowing Agents on-line.
- **Quick response process adjustments**

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Chemical Blowing Agents – Speciality Products

Factors to consider when choosing a blowing agent include ;

1 - Polymer type	2 - Other additives used	3 - Process type
4 - Density target	5 - Is cell structure important	6 - Temperature
7 - Time at temperature	8 - Shear input	9 - Colour
10 - Food contact	11 - Powder or masterbatch	12 - Inhibition
13 - Plate out	14 - Exo / Endothermic	15 - Price

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In these areas the product is available under the TM Ficel.

Relevant safety data and references as well as possibly necessary warning labels can be found in the safety data sheets.
Storage and handling conditions can be found in safety data sheets; additional information are listed on the technical information bulletin (TIB).
Safety data sheets and TIBs are available on request.
Listed raw material properties are typical properties and, unless specifically indicated otherwise, are not to be considered as delivery specification.

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