

**Forane**<sup>®</sup>  
BLOWING AGENTS

**BLOWING AGENTS FOR A CHANGING WORLD**





# A world driven by different regulations resulting from the Montreal protocole

ARKEMA Fluorinated chemicals is today a major supplier of HCFC 142b, 22 and 141b, HFC 365mfc/227ea and 134a, and **Transcend®**.

## NORTH AMERICA

01/2003 HCFC-141b ban (USA)

- ☞ HCFC-142b/22
- ☞ HFC-134a, HFC-245fa

## EUROPEAN UNION

01/2004 HCFCs ban

- ☞ HFC-134a, HFC-365mfc

## EASTERN EUROPE

☑ CFC-11

- ☞ HCFC-141b
- ☞ HFC-134a, HFC-365mfc

## JAPAN

01/2004 HCFC-141b ban

- ☞ HFC-134a, HFC-245fa

## CENTRAL & SOUTH AMERICA

CFC-11

- ☞ HCFC-141b

## AFRICA & MID EAST

☑ CFC-11

- ☞ HCFC-141b

## ASIA

☑ CFC-11

- ☞ HCFC-141b
- ☞ HFC-134a, HFC-365mfc

## AUSTRALIA & NEW ZEALAND

HCFCs quotas

- ☞ HFC-134a, HFC-365mfc, HFC-245fa



# From HCFC to third generation zero ODP blowing agent, Transcend® is a key formulation additive for the future

Pure HCFC 142b or HCFC 142b/HCFC 22 blend alternatives

Pure HFC 134a

2 grades of HFC 365mfc/HFC 227ea  
Pure HFC 134a

HCFC 141b alternatives

Pure Transcend®

**Transcend®** is a 0 ODP, low GWP additive being SNAP/EPA approved in the US. It helps in improving both foam fire properties and blowing agent processing in polyols.

Customised blends of **HFC134a** and **Transcend®** will also be available.

Crossfertilisation between the four applications in which we are already a key player — Refrigeration, Blowing agents, Solvents and Aerosols —, allows ARKEMA to think about next generation foaming agents.

Our R&D centers formulation expertise in fluorinated products makes ARKEMA a Customised Solvents supplier on the market.

**Transcend®**, a product exclusively from ARKEMA, is the key additive which allows us to optimise HFC's based thermostet foam blowing systems formulation.



# Physical properties of Forane<sup>®</sup> blowing agents

PHYSICAL PROPERTIES	HCFC-141b	HCFC-142b	HCFC-22	HFC-365mfc / HFC-227ea		HFC-134a	TRANS-1,2 DICHLORO ETHYLENE TRANSCEND <sup>®</sup>
				93/7	87/13		
Formula	CH <sub>3</sub> -CCl <sub>2</sub> F	C <sub>2</sub> H <sub>3</sub> -ClF <sub>2</sub>	CH-ClF <sub>2</sub>	$\begin{matrix} \text{CF}_3\text{-CH}_2\text{-CF}_2\text{-CH}_3 \\ \text{CF}_3\text{CHF-CF}_3 \end{matrix}$		C <sub>2</sub> H <sub>2</sub> -F <sub>4</sub>	C <sub>2</sub> H <sub>2</sub> -Cl <sub>2</sub>
Molecular weight (g/mol)	117	100.5	86.5	149.4	150.5	102	97
Boiling point under 1.013 bar (°C) (starting)	32	-8.1	-39.9	30	23	-25.4	48
Density of liquid at 25°C (kg/dm <sup>3</sup> )	1.236	1.02	1.05	1.256	1.263	1.04	1.26
Vapour pressure at 25°C (bar)	0.81	3.33	10.39	0.85	1.08	6.66	0.45
Saturated vapour density at the boiling point (kg/m <sup>3</sup> )	5.02	4.77	4.65	6.54	6.91	5.18	Not available
Critical temperature (°C)	205.7	137.1	96.2	184.4	179.7	101.2	235
Critical pressure (bar)	43.4	41.2	49.7	30.8	30.7	40.6	51.9
Critical density, (kg/dm <sup>3</sup> )	0.46	0.44	0.52	0.47	0.47	0.51	0.43
Latent heat of vaporisation at the boiling point (kJ/kg)	206.8	226	211.7	183.5	181.7	205.5	291
Surface tension of the liquid at 25°C, mN/n	18.4	12.12	8.09	14.5	14.1	8.18	27.5
Thermal conductivity (gas) at 25°C, mW/m. °C	9.8	11.94	13.06	10.7	11.2	14.16	10.6 (at 50°C)
Flash point (iso1516/1523)	None	Not applicable	Not applicable	None	None	None	-12°C (ASTMD3828)
Ozone Depletion Potential (ODP)	0.11	0.043	0.034	0	0	0	0
Global Warming Potential (GWP)	630	2,400	1,700	1,030	1,150	1,300	< 11

All toxicity and HSE data are available upon request on each product MSDS  
Material compatibility tables are available too.



# Quality and customer service

ARKEMA is committed to provide high quality products and services to its customers, particularly the SBU Derivatives of Fluorine, including the FORANE® and Transcend® products. Our production plants in Europe have the ISO 9002 accreditation as well as the ISO 14001.

## CONTACTS

ARKEMA offers its customers all the necessary support:

→ **Worldwide sales network**  
with local agencies or sales offices  
and a central department  
**ARKEMA - Fluorochemicals SBU**  
4-8, cours Michelet  
92800 Puteaux - France  
Fax: 33-1-49 00 53 12

→ **Technical service and R & D**  
This department based in the  
company's Pierre-Bénite Research  
Centre (CRRA, ISO 9001 accredited)  
is dedicated to provide all the necessary  
support to ARKEMA's customers  
through specific technical brochures  
or direct contact.  
ARKEMA CRRA - OFA Department  
Rue Henri Moissan - BP 63  
69493 Pierre-Bénite Cedex - France  
Fax: 33-4-72 39 80 28



A global chemical player, Arkema consists of 3 coherent and balanced business segments: Vinyl Products, Industrial Chemicals, and Performance Products. Present in over 40 countries with 18,600 employees, Arkema achieves sales of 5.2 billion euros. With its 6 research centers in France, the United States and Japan, and internationally recognized brands, Arkema holds leadership positions in its principal markets.

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4-8, cours Michelet  
92091 Paris La Défense Cedex - France  
Tél.: +33 (0)1 49 00 80 80 - Fax : +33 (0)1 49 00 83 96  
www.arkemagroup.com

[www.forane.com](http://www.forane.com)