HCFC 141B PHASEOUT

The Application of Multi-Co-blowing Technology Based on Solkane® 365mfc for Household Appliances

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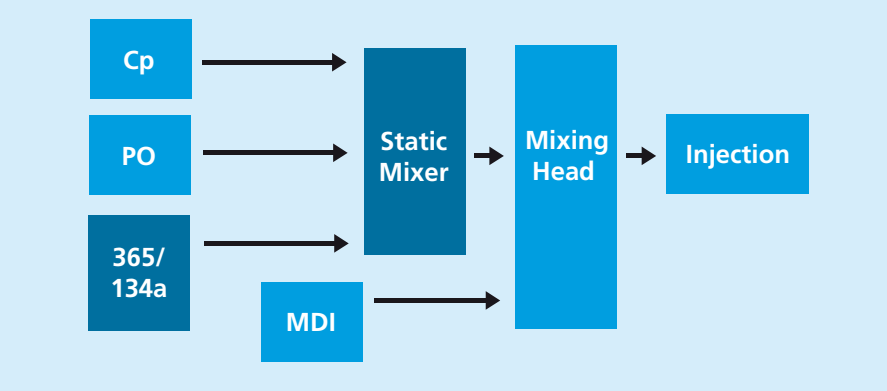
Since the new, stricter product energy efficiency standards were implemented in the household appliance industry, almost all major Chinese refrigerator manufacturers are trying hard to upgrade their products with innovative technology. In recent years, the market for high-quality refrigerators has been growing fast thanks to the Chinese people giving preference to high-quality products and to increasing exports. Meanwhile, Midea is the first company to successfully try the Multi-Co-blowing technology for improving products based on traditional Cp foaming. These Multi-Co-blowing systems involve Cp, Solkane® 365mfc and Solkane® 134a.

1. Basic technical profile

The insulation performance of cp foaming cannot be further improved due to its high vapour thermal conductivity of 12.0 mW/m·K. As a third-generation blowing agent, Solkane® 365mfc has the lowest vapour thermal conductivity,10.6 mW/m·K, enabling it to contribute the best insulation performance to the foam. Besides, due to the lower blowing temperature of – 27 °C, Solkane® 134a produces very fine foam cells, thus leading to a foam with an improved insulation performance. The Cp/365/134a Multi-Co-blowing system is designed to meet the new energy efficiency standards.

2. Production process in brief



3. Comparison of effect of blowing agent system on corrosion of refrigerator internal shell material

Blowing agent / Internal shell		CP	Solkane® 365 mfc	365/cp 30/70	Multi-Co-blowing
Max. mass loss %	ABS	0.00	0.12	0.00	0.00
	PS	100.00	26.13	0.00	0.00

The table shows that the Multi-Co-blowing system is not corrosive to either ABS or PS materials, which are used for the internal shells of refrigerators. Compared to pure Cp foaming, the Multi-Co-blowing system can expand the refrigerator interior shell material more effectively, thus potentially reducing product cost.

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4. Product properties in comparison

4.1 Foam properties in comparison

Foam properties/ Blowing system	Foam density (kg/m^3)	Thermal conductivity ($mW/m \cdot K$)	Compression strength (kPa)	Dimensional stability (%)
Multi-Co-blowing	30	17.8	160	0.1
C-pentane	34	20.2	140	0.3

The data in the table above shows that Multi-Co-blowing technology can improve insulation performance. It is obvious that a reduction in foam density coincides with an increase in compressive strength, so that product costs can be further reduced.

4.2 Product energy efficiency in comparison

Refrigerator type/ Blowing agent	Normal type	Energy saving type	Three-door type
C-pentane system	0.410 kWh/24h	0.398 kWh/24h	0.665 kWh/24h
Multi-Co-blowing sytem	0.370 kWh/24h	0.356 kWh/24h	0.600 kWh/24h

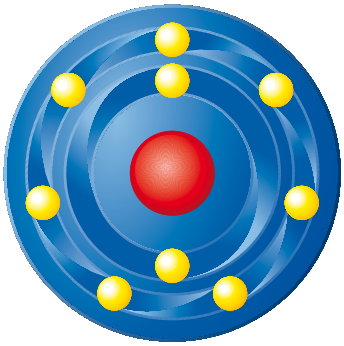
The data in the table above shows that Multi-Co-blowing technology can improve product energy efficiency for various refrigerator types.

Multi-Co-blowing technology improves the energy efficiency of refrigerators.

5. Conclusion

1) **Multi-Co-blowing technology is an effective and realizable technical route to improving the energy efficiency of refrigerators. It is useful for product upgrades.**

2) **Multi-Co-blowing technology can help to optimize product quality at reasonable cost.**



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