
“Fluorocarbons: Balanced Solutions For Society”

Metered Dose Inhalers...A Working Example

A Worldwide Perspective

Metered dose inhalers (MDIs) are pressurized, hand-held devices that use propellants to deliver doses of medication to the lungs of a patient. These delivery devices are critically important to public health and are used to administer various medications for a range of medical conditions. MDIs play a particularly significant role in the treatment of asthma and chronic obstructive pulmonary disease (COPD). MDIs are the primary drug delivery device used worldwide for asthma and COPD.

Asthma and Chronic Obstructive Pulmonary Diseases



Asthma is a disease of the lungs and airways with symptoms of breathlessness, tightness of the chest, wheezing and cough. It is estimated that over 300 million people suffer from asthma worldwide, and the prevalence and mortality from asthma is on the rise. Evidence now confirms that asthma prevalence is increasing as urbanization of developing countries continues. Asthma-related hospital admissions are also increasing, especially among children. However, most asthma deaths and violent attacks are preventable with proper, ongoing treatment. COPD diseases, such as emphysema and chronic bronchitis are progressive, generally irreversible, and severely restrict a patient’s ability to breathe. COPD is the fifth leading cause of death worldwide, with an estimated 600 million cases and three million deaths annually.

The CFC MDI Transition and the Environment

The international community agreed – through the Montreal Protocol – to phase out chlorofluorocarbon (CFC) production for nearly all uses in the developed world by January 1996. Recognizing that CFC-free alternatives would not be available by that date for certain important products, the Parties established a temporary process for exempting “essential uses” from the phaseout. A use is considered essential if it “is necessary for health, safety or is critical for the functioning of society” and there are no “technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health.” The Parties to the Protocol have confirmed, on an annual basis, that MDIs for asthma and COPD are essential.

The members of the International Pharmaceutical Aerosol Consortium (IPAC) are currently engaged in an extensive programme to transition out of CFC MDIs and have invested substantial resources to develop and launch CFC-free alternatives. The challenging but worthwhile progression away from CFC-propelled medications to CFC-free alternatives has been an unprecedented undertaking involving millions of patients and their healthcare providers in over 100 countries around the world. The CFC MDI transition has now reached a mature stage in developed countries and should be concluded in the relative near-term. There is an increasing focus on effectively managing and accomplishing the transition in developing countries, which present some unique challenges. Ongoing education programmes to teach doctors and patients about the new products are of the utmost importance as patients with respiratory disease are extremely sensitive to even the smallest changes in medication.

HFCs – The Balanced Solution

In response to the Montreal Protocol, MDI manufacturers and others evaluated potential non-CFC propellants that could be used safely and effectively in MDIs. In the course of this extensive review, HFCs emerged as the only propellant suitable for use in metered dose inhalers. No other compounds have been proven to meet the stringent criteria necessary for medical propellants:

- liquefied gas
- appropriate solvent properties
- very low toxicity
- appropriate density
- chemically stable
- compatible with a wide range of medicines
- acceptable to patients (taste and smell)
- non-flammable



The propellant must demonstrate these criteria through rigorous testing and assessment to provide the necessary basis for review and approval by the health authorities. HFC-134a and -227 are the only proven alternatives that meet these criteria. These propellants are non-flammable and have been shown to be safe for human inhalation through extensive toxicity testing. Both have vapour pressures suitable for MDI usage and are essentially biologically inert. HFCs do not deplete the ozone layer, and they have significantly lower global warming potentials than the CFCs that they replace in pharmaceutical applications.

Patient Care Principles

IPAC companies support the following principles:

- MDIs, nebulisers, and dry powder inhalers (DPIs) are all important therapy options for asthma and COPD patients; however, these delivery systems are not equally suitable for all patients. Therefore, it is important to maintain the range of therapeutic options to effectively treat patients.
- Treatment of asthma and COPD is not uniform among all patients and must be individualized and is therefore critical that physicians be allowed to select the therapy that provides the best control for the individual patient.
- The effective treatment of asthma and other respiratory diseases depends on the continuing availability of the MDI.
- Sound MDI manufacturing operations and responsible disposal/recycling are critical to minimizing emissions.
- In 2005, the Intergovernmental Panel on Climate Change (IPCC) and Technology and Economic Assessment Panel (TEAP) issued a significant and comprehensive Special Report on the important linkages between efforts to minimize greenhouse gas emissions and phase-out ozone depleting substances: Safeguarding the Ozone Layer and The Global Climate System: Issues Related to HFCs and PFCs. IPAC concurs with the key conclusions in the IPCC/TEAP Special Report, including: the health and safety of the patient is of paramount importance in treatment decisions and in policy making that might impact those decisions;
- The major impact in reducing GWP with respect to MDIs is the completion of the transition from CFC to HFC MDIs; and
- Based on the hypothetical case of switching the most widely used inhaled medicine (salbutamol) from HFC MDIs to DPIs, the projected recurring annual costs would be in the order of US\$ 1 billion with an effective mitigation cost of 150-300 US\$/t CO₂-eq for a reduction of about 10 MtCO₂ eq by 2015.

Balanced Solutions for Society

Metered dose inhalers are a perfect example of the concept.

HFCs provide for safe and efficacious delivery of live-saving respiratory medicines.

The Alliance for Responsible Atmospheric Policy is a leading industry voice which coordinates industry participation in the development of reasonable international and U.S. government policies regarding ozone protection and global climate change.

The International Pharmaceutical Aerosol Consortium is comprised of leading manufacturers of MDIs and other inhaled therapies. IPAC fully supports the transition away from CFC-based MDIs under the Montreal Protocol. IPAC seeks to ensure that the vital role of the MDI is fully appreciated and accounted for in the implementation of the Montreal and Kyoto Protocols.



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