# Article information:

The Chemistry and Applications of Metal-Organic Frameworks | Science
<https://www.science.org/doi/full/10.1126/science.1230444>

# Article summary:

1. Metal-organic frameworks (MOFs) are highly porous materials made by linking inorganic and organic units, with over 20,000 different MOFs reported and studied within the past decade.

2. MOFs have a range of applications including storage of fuels, capture of carbon dioxide, catalysis, gas separation, biomedical imaging, and proton, electron, and ion conduction.

3. The ability to vary the size and nature of MOF structures without changing their underlying topology has led to the creation of materials with ultrahigh porosity and high thermal and chemical stability. Future work will involve the assembly of chemical structures from many different types of building unit to create materials with even more sophisticated properties.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article “The Chemistry and Applications of Metal-Organic Frameworks” published in Science in 2013 provides an overview of the potential applications of metal-organic frameworks (MOFs) and their unique properties. The article highlights the ability to vary the size and nature of MOF structures without changing their underlying topology, which has led to more than 20,000 different MOFs being reported and studied within the past decade. The article also notes that MOFs have a typical porosity of greater than 50% of the MOF crystal volume, with surface area values ranging from 1000 to 10,000 m2/g, exceeding those of traditional porous materials such as zeolites and carbons.

The article presents several advances in the field, including the isoreticular principle for making MOFs with the largest pore aperture (98 Å) and lowest density (0.13 g/cm3), allowing for selective inclusion of large molecules and proteins. The thermal and chemical stability of many MOFs has made them amenable to postsynthetic covalent organic and metal-complex functionalization, enabling substantial enhancement of gas storage in MOFs. The article also notes extensive study in catalysis applications, activation of small molecules (hydrogen, methane, and water), gas separation, biomedical imaging, and proton, electron, and ion conduction.

While the article provides a comprehensive overview of the potential applications of MOFs, it does not explore potential risks or limitations associated with their use. Additionally, there is a lack of discussion on potential environmental impacts or ethical considerations related to their production or use.

Furthermore, while the article acknowledges that methods are being developed for making nanocrystals and supercrystals of MOFs for incorporation into devices, it does not provide any information on current commercial applications or market viability. This may suggest a promotional bias towards promoting research in this field rather than providing a balanced view on its potential applications.

Overall, the article provides a valuable overview of the potential applications of MOFs and their unique properties. However, it is important to consider potential limitations and risks associated with their use, as well as the commercial viability of this technology.

# Topics for further research:

* Environmental impact of metal-organic frameworks production
* Ethical considerations of metal-organic frameworks use
* Limitations and risks associated with metal-organic frameworks
* Commercial applications of metal-organic frameworks
* Market viability of metal-organic frameworks technology
* Safety concerns related to metal-organic frameworks use

# Report location:

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