

---

# 二甲氧基甲烷的合成路线设计

## 摘 要

电催化氧化合成体系无需氧化剂，反应条件温和，能够高效的氧化有机原料。传统的氧化有机物体系中，需要借助催化剂，如用  $\text{H}_2\text{O}_2$ 、分子筛作为催化剂时，虽然具有绿色环保的优点，不过存在易分解、转化率低、氧化效果不理想等缺点，而选择有机过氧化物作为催化剂，虽具有较强的催化性能，不过同时还有易燃易爆、不易储存、毒性大等缺点。本文设计选用电催化氧化甲醇合成二甲氧基甲烷，结合文献报道，设计制备电极材料，以及选取三种咪唑新离子液体制作电解质溶液。根据反应机理预测最佳的反应条件：工作电极为焙烧温度为  $300^\circ\text{C}$ 、焙烧时间为 3h、升温速率为  $5^\circ\text{C}/\text{min}$ 、Pt 的负载含量为 5wt.% 所制；电催化氧化的工艺条件为恒定电位为 4.5V、反应时间 24h、无水甲醇与  $[\text{Emim}]\text{BF}_4$  离子液体摩尔比在 14:1。并各条件因素的影响推测在最佳条件下甲醇的转化率为 27.64%，二甲氧基甲烷的选择性为 96.23%。

**关键词：**电催化；离子液体；甲醇；二甲氧基甲烷

---

## Abstract

The electrocatalytic oxidation synthesis system does not require an oxidant, the reaction conditions are mild, and it can efficiently oxidize organic raw materials. In the traditional oxidized organic matter system, a catalyst is needed, such as  $\text{H}_2\text{O}_2$  and molecular sieve as a catalyst. Although it has the advantages of green environmental protection, it has the disadvantages of easy decomposition, low conversion rate, and poor oxidation effect. The choice of organic peroxide as a catalyst has strong catalytic performance, but it also has the disadvantages of being flammable and explosive, not easy to store, and highly toxic. In this paper, electrocatalytic oxidation of methanol to synthesize dimethoxymethane is selected, combined with literature reports, electrode materials are designed and prepared, and three new imidazole ionic liquids are selected to make electrolyte solutions. According to the reaction mechanism, the optimal reaction conditions are predicted, and the conversion rate of methanol under the optimal conditions is 27.64%, and the selectivity of dimethoxymethane is 96.23%.

**Key words** : electrocatalysis; Ionic liquid; methanol; dimethoxymethane

---

---

# 目 录

<b>第 1 章 绪论</b> .....	<b>1</b>
1.1 电化学的概念 .....	1
1.2 电极 .....	1
1.3 电化学的应用 .....	2
1.4 有机合成电化学 .....	2
1.5 甲醇的性质及其应用□ .....	4
1.6 本论文研究的主要内容 .....	5
<b>第 2 章 二甲氧基甲烷的合成路线设计</b> .....	<b>6</b>
2.1 实验药品及实验仪器 .....	6
2.2 电化学体系的设计 .....	7
2.3 电极材料制备 .....	8
2.4 电催化工艺条件的选择 .....	9
2.5 电化学活性的测定 .....	9
2.6 表征手段选择方法 .....	10
2.7 本章小结 .....	11
<b>第 3 章 预测的实验结果和讨论</b> .....	<b>12</b>
3.1 电极制备条件对电极的影响 .....	12
3.2 电催化氧化工艺条件的影响 .....	12
3.3 本章小结 .....	14
<b>结 论</b> .....	<b>15</b>
<b>参考文献</b> .....	<b>16</b>
<b>致 谢</b> .....	<b>18</b>

---

以上内容仅为本文档的试下载部分，为可阅读页数的一半内容。

如要下载或阅读全文，请访问：

<https://d.book118.com/887064141102006146>