

influence to each other is minimised. Column chromatography and catalytic esterification were chosen for upgrade research of pyrolysis oil of solid waste. The column chromatography experiment result shows that dichloromethane and acetone have good separation efficiency for hydrocarbons, which reaches 37.63%. The catalytic pyrolysis mechanism research of waste cardboard was carried out on a PY-GC/MS platform. The results show that HZSM-5 (HZ) has a good ability for cracking the oligomers, increasing the hydrocarbons and lowering the aldehydes and acids, which is being proved to be a good-performance catalyst. HY-51 would decrease the content of aldehydes and increase the yield of hydrocarbons, while do not promote the crack of oligomers, increase the content of acids, and get coking leading to inactivation. It indicates that HY-51 needs further modification for the using in the catalytic pyrolysis of waste cardboard despite its high catalytic activity. ReY shows a limited catalytic effect for the pyrolysis of waste cardboard, while PA performs an ignorable effect. Various active metal ions were loaded on catalyst HZSM-5 for modification. The catalytic pyrolysis mechanism research of waste tire was carried out on a PY-GC/MS platform. The catalytic pyrolysis mechanism research of waste PE was carried out on a PY-GC/MS platform. HZSM-5, HY-51 and ReY show alike influence on the catalytic pyrolysis of waste PE. All of them decrease the content of olefins and increase that of the alkanes and aromatic hydrocarbons. PA performs a mild effect, which promotes some olefins transfer to alkanes.

Key Words: Solid waste; Pyrolysis; Quality improvement; PY-GC/MS

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## 可燃固体废弃物的高值化预处理调质和源头控污机理

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**摘要:**我国可燃固体废弃物热处置过程中污染物的排放控制基本停留在过程和末端处理水平,导致固体废弃物焚烧处理为“先生成、后治理和控制”,导致诸多问题。由于可燃固体废弃物是多尺度跨度大、成份复杂多变的复杂混合物,具有组分复杂多变、含水率高、热值变化幅度大等特点。目前利用较多的可燃固废的直接焚烧处理导致燃烧不充分、效率低、二次污染严重等问题,因此针对可燃固废多形态(固态、液态、气态)高值化转化再利用技术日益受到关注。开展此类研究需要针对我国可燃固废高含水率、组分复杂、尺度变化大、热值多变的特点,研究热化学、机械、干化、不同成分配比调质等源头调质模式,分析预处理工艺的系统节能以及多形态高值化产物的二次污染排放问题,探索低能耗、低排放、高值化转化的方法和途径。该研究从可燃固废源头多形态(固态、液态、气态)高值化及控污入手,开展可燃固废源头多形态热转化调质、污染物源头富集表征、生物化学法污染物源头控制、各元素交替影响规律等系列研究,以期建立各类形态下高值化产物的净化调质方法,获得可燃固体废弃物多形态高值化产物中污染物的富集表征和交互影响规律,从而探索出可燃固体废弃物的源头控污机制,为近零排放资源化利用提供支持。

**关键词:**可燃固废 高值化 预处理 控污

# High Value Pretreatment and Source Control Quenching Mechanism of Combustible Solid Waste Pollution

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**Abstract:** Emission control of contaminants during combustible solid waste thermal disposal stays at process and end treatment levels, resulting in solid waste incineration as “early production, later governance and control” issue in our country. Combustible solid waste is a complex mixture of multi-scale, which is usually characterized by variable components, high moisture, high degree of heat value variability and so on. Currently direct incineration of combustible solid waste causes incomplete combustion, low efficiency, secondary pollution and the other issues. Therefore, much research has been being focused on the polymorphic (solid, liquid, gas) high-value conversion and recycling technologies of combustible solid waste. And such research concentrates on characteristics of combustible solid waste, such as high moisture, complex components, high degree of heat value variability and so on. Source-quenched mode research mainly aims at thermal chemical, mechanical, drying, different composition ratio quenching and so on. Energy saving in pretreatment system and secondary pollution emission of multi-form high-value products would be analyzed systematically. And ways and means of low-power, low-emission, high-value conversion must be explored. This project proceeds from the polymorphic (solid, liquid, gas) high-value conversion and pollution control disposal of combustible solid waste. A series of studies will be developed on polymorphic and quenching of combustible solid waste thermal conversion, enrichment characterization of pollutants' sources, biochemical control of pollution sources and each element alternating influence rule. Therefore, high-value products quenched purification methods would be established, enrichment characterization of pollutants in enrichment characterization and interact influence rules for combustible solid waste would be obtained, thereby pollution source control mechanisms of combustible solid waste would be explored. And finally the project would provide support for near-zero emission energy utilization.

**Key Words:** Combustible solid waste; High value; Pretreatment; Pollution control

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## 甲醇制烃类选择性调控的催化基础

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**摘要:** 甲酸甲酯是重要的大宗化学品,具有广泛用途,可用作溶剂、环境友好型发泡剂以及生产甲酸、甲酰胺和二甲基甲酰胺等下游化学品。开发甲酸甲酯绿色化生产新途径成为亟待解决的问题,旨在开发应用固体催化剂的非均相反应过程。本着延伸甲醇下游产业链、构建甲醇转化合成高附加值化学品绿色高效新过程的目的,该报告将研究工作拓展到甲醇定向氧化制大宗化学品甲酸甲酯过程。研制了整装式Al纤维载持纳米孔金(NPG)催化剂(NPG/Al-fiber),以甲醇/O<sub>2</sub>/N<sub>2</sub>=2/1/17(10 vol%甲醇)混合气为原料,170℃下,金含量为2 wt%的催化剂上,在300 h测试中可以获得35%的甲醇转化率,85%的甲酸甲酯选择性且不失活。