

**MATERIAL SAFETY DATA SHEET**

Product Name: ZSM-5 Zeolite
MSDS No.: Z200604
Effective Date: 01 / 01 / 2008
Manufacturer: Qingdao Wish Chemicals Co., Ltd.

SECTION 1. IDENTIFICATION OF PRODUCT

CHINESE NAME: ZSM-5 分子筛
ENGLISH NAME: ZSM-5 Zeolite
CAS No. 308081-08-5
CHEMICAL FORMULA: $(0.9 \pm 0.2) \text{H} \cdot \text{Al}_2\text{O}_3 \cdot (25-50) \text{SiO}_2 \cdot 2\text{H}_2\text{O}$

SECTION 2. HAZARD INTRODUCTION

INFECTION PATH: Eyes contact; Skin contact; Inhalation; Ingestion

HEALTH HAZARD: The material may generate dust in transportation, loading and unloading process. The dust may cause discomfort to eyes, skin, intake and breath. Eyes contact: May cause abrasion or irritation to eyes. Skin contact: Prolonged or repeated contact may dry skin and cause irritation. Inhalation: Dust may irritate respiratory tract and bring temporary or permanent damage (The product contains crystalline silicon that may cause respiratory diseases). Ingestion: May cause damage to digestive system.

SECTION 3. FIRST AID PROCEDURES

SKIN CONTACT: Immediately flush skin with plenty of flowing water while removing contaminated clothing and shoes. Wash clothing before reuse.

EYES CONTACT: Immediately flush eyes with plenty of flowing water or saline for at least 15 minutes, lifting lower and upper



- eyelids occasionally. Get medical attention immediately.
- INHALATION:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention for any breathing difficulty.
- INGESTION:** If large amounts were swallowed, give large quantities of water to drink, induce vomiting, or use stomach siphon. **DON'T GIVE MILK AND FATTY ACID!** Call a physician immediately.

SECETION 4. FIRE-FIGHTING MEASURES

- DANGEROUS CHARACTER:** ZSM-5 Zeolite is non-combustible material, no special combustion or explosive property.
- EXTINGUISHING MEDIA:** Foam dry chemical or carbon dioxide, sand, water spray.

SECETION 5. ACCIDENTAL RELEASE MEASURES

- DISPOSAL:** If spills happen, take protective measures to avoid generating dust. Cleaners use appropriate personal protective equipment (SECETION 7). If not polluted, the product can be carefully shoveled or swept up and placed in a suitable container. Keep away form liquid or wet air. If polluted, the product must be cleaned up observing environmental regulations. Avoiding generating dust as possible. Do not allow material to be released to the environment without proper governmental permits, e.g. sewer pipes, public water systems and rivers. A recommendable method is burying the waste in a suitable place ratified by relevant departments. Reuse or combustion of the container is prohibited.

SECETION 6. HANDLING AND STORAGE

- HANDLING:** Protect the product label. Note cleaning immediately after contact, especially before eating, drinking and smoking.



STORAGE: Keep in a tightly closed light-resistant container, stored in a cool (< 45 °C), dry, ventilated area. Protect against physical damage. Avoid generating dust as possible.

SECTION 7. EXPOSURE CONTROLS AND PERSONAL PROTECTION

RESPIRATORY PROTECTION: Use dustproof respirator where dust occurs.

EYE PROTECTION: If necessary, chemical goggles and/or face shield.

BODY PROTECTION: If necessary, protective work clothing

PROTECTION OF HANDS: Rubber where contact likely.

OTHER PROTECTION: Wash thoroughly after handling. Wash contaminated clothing before reuse.

SECTION 8. PHYSICAL AND CHEMICAL PROPERTIES

Structure sketch of ZSM-5 Zeolite

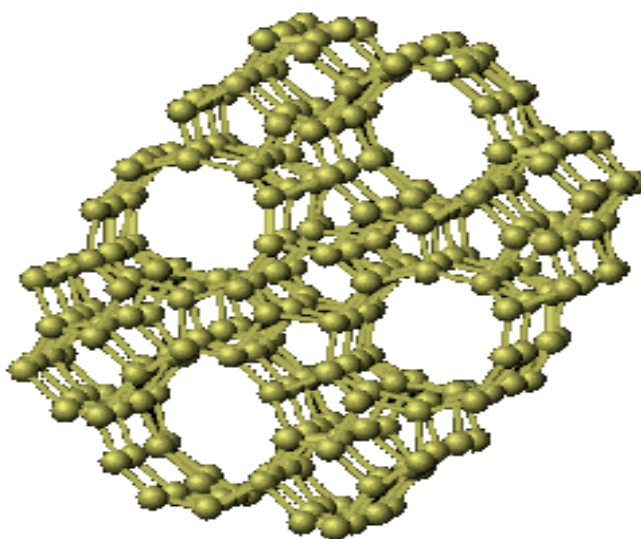


Figure 1 Framework of ZSM-5 Zeolite (010)

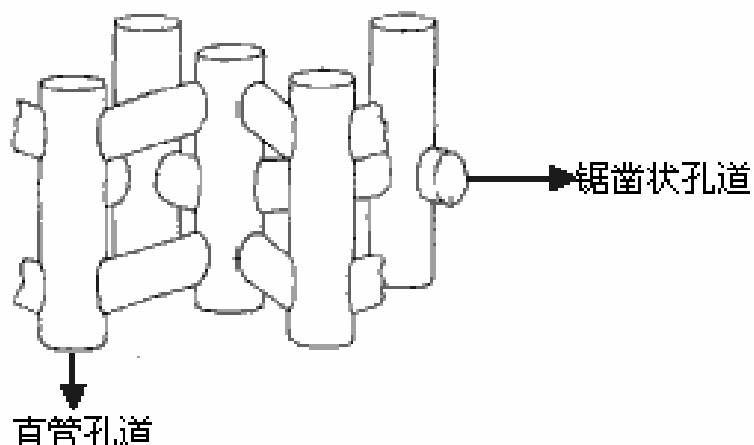


Figure 2 Channels of ZSM-5 Zeolite

APPEARANCE AND FORM:	White powder. Hygroscopic.
PH:	Neutral
MELTING POINT:	>1600°C
BOILING POINT:	Not applicable
HYDROTHERMAL STABILITY:	Structure of zeolite can be kept in a hydrothermal treatment at 700°C in water vapor.
THERMAL STABILITY:	Structure of zeolite can be kept at 1200°C.
PORE SIZE:	~4.6 Å
ODOR:	Odorless
CHEMICAL FORMULA:	$(0.9 \pm 0.2) \text{H} \cdot \text{Al}_2\text{O}_3 \cdot (25-50) \text{SiO}_2 \cdot 2\text{H}_2\text{O}$
GLUTINOSITY:	Non-glutinous
SOLUBILITY:	Insoluble in water.
MAIN USES:	ZSM-5 Zeolite is mainly used as catalyst for diesel hydrodewaxing, fixed-bed catalytic cracking. One of the most popular applications of ZSM-5 Zeolite is used as additives of move-bed FCC catalysts and Si/Al ratio is mainly in the range from 40 to 50 (SiO ₂ /Al ₂ O ₃ molar ratio). In China, ZSM-5 Zeolites with SiO ₂ /Al ₂ O ₃ molar ratio of 38-40 as additives of FCC catalysts are largely used in reducing alkene content in gasoline. In addition, ZSM-5 Zeolites with a SiO ₂ /Al ₂ O ₃ molar ration of 25-30 are used in catalytic cracking of residue in



many countries. Also, ZSM-5 Zeolites are used as shape-selective catalysts in many reactions, such as synthesis of diethylbenzene, isomerization of xylenes, etc..

SECETION 9. STABILITY AND REACTIVITY

STABILITY: Stable under ordinary conditions of use and storage

INCOMPATIBILITIES: Water; Acid and alkaline substance.

CONDITIONS TO Air, moisture, light and incompatibles.

AVOID:

SECETION 10. DISPOSAL CONSIDERATIONS

WASTE CHARATER: The material can be saved for recovery or recycling.

DISPOSAL: The used material adsorbing organic substance should be stored in a special closed container to avoid spontaneous combustion.

RECOMMANDATION: Don't bury the used material adsorbing organic substance into soil. Don't dump the waste material into public water or river.

SECETION 11. TRANSPORT INFORMATION

RECOMMANDATION: Carefully loading and unloading; Avoid physical damage of package and container; Avoid water (rain and sea water etc.) not to damage the package.