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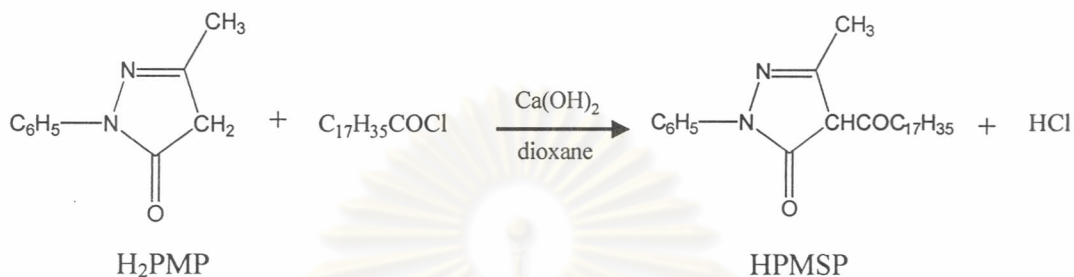
APPENDICES

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Appendix A

Synthesis of 1-phenyl-3-methyl-4-stearoyl-5-pyrazolone (HPMSP)

The reaction in HPMSP synthesis occurred as given below:



The 15 g of 1-phenyl-3-methyl-pyrazolone (H₂PMP) were added in a flask equipped with a stirrer, dropping funnel and a reflux condenser, to dissolve in 60-80 mL dioxane at 60 °C. The 12 g of calcium hydroxide and amounts of 27 g of stearoylchloride were added dropwise within 1 min. The reaction mixture became a thick paste and the temperature increased during the first few minutes. The mixture was refluxed for 30 min. The calcium complex in the flask was decomposed by pouring the mixture into dilute hydrochloric acid (200 mL, 1 M), yielding cream colored crystals. The crystals were collected on a buchner funnel and recrystallized from ethanol/toluene (9:1) solution.

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Appendix B

Calculation of organic matter contents in doped mesoporous silica

The organic matter contents in doped mesoporous silica were calculated from starting materials. Table B shows starting materials' data for a synthesis of HPMSF doped mesoporous silica.

Table B Starting materials' data of a synthesis of HPMSF doped mesoporous silica.

| TEOS | | H ₂ O (NaOH 0.1 M) | | CTAB | | MeOH | | HPMSF | |
|--------|--------|----------------------------------|--------|--------|--------|---------|--------|--------|--------|
| (g) | (mole) | (g) | (mole) | (g) | (mole) | (g) | (mole) | (g) | (mole) |
| 5.2329 | 0.0251 | 62.9696 | 3.4983 | 1.6401 | 0.0045 | 10.1429 | 0.3166 | 0.6600 | 0.0015 |

From Table B

Amount of TEOS 0.0251 mole provides SiO₂ 0.0251 mole

$$= \text{SiO}_2 \ 0.0251 \times 60.0843 = 1.5081 \text{ g}$$

Amount of CTAB 1.6401 g = CTA⁺ 1.2805 g

Amount of HPMSF = 0.6600 g

Organic matter contents in mesoporous silica

$$= 1.2805 + 0.6600 = 1.9405 \text{ g}$$

Mass of mesoporous silica

$$= 1.5081 + 1.2805 + 0.6600 = 3.4487 \text{ g}$$

Therefore, organic matter contents in mesoporous silica

$$= \frac{1.9405}{3.4487} \times 100 = 56.27 \%$$

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Appendix C

Extraction data

A data obtained from each extraction experiment was recorded as shown in Table C.

Table C Copper extraction property of HPMSp doped mesoporous silica synthesized from different catalyst concentrations.

| [NaOH] (M) | Mass (g) | HPMSp ($\times 10^{-5}$ mol) | pH | | [Cu ²⁺] (ppm) | | Cu ²⁺ extracted | | | Cu ²⁺ /HPMSp |
|---------------|-------------|-------------------------------------|----------------------|---------------------|---------------------------|---------------------|----------------------------|-------|----------|----------------------------|
| | | | before extraction | after extraction | before extraction | after extraction | (ppm) | (%) | (mol/kg) | |
| 0.010 | 0.2003 | 8.789 | 2.03 | 1.94 | 198.30 | 81.99 | 116.31 | 58.65 | 0.2285 | 0.5207 |
| 0.050 | 0.2002 | 8.678 | 2.03 | 2.19 | 198.30 | 101.55 | 96.75 | 48.79 | 0.1901 | 0.4387 |
| 0.075 | 0.2004 | 8.696 | 2.03 | 2.39 | 198.30 | 99.44 | 98.86 | 49.76 | 0.1941 | 0.4473 |
| 0.100 | 0.2000 | 8.709 | 2.03 | 2.52 | 198.30 | 95.09 | 103.21 | 52.05 | 0.2030 | 0.4663 |

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