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碳纳米管负载的非晶态CoP合金和金属Co对高毒气体PH<sub>3</sub>的催化分解

### Catalytic decomposition of highly toxic PH<sub>3</sub> gas over amorphous CoP alloy and metal Co supported on carbon nanotubes

关键词: [非晶态合金](#) [碳纳米管](#) [钴的磷化物](#) [磷化氢分解](#)

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摘要: 采用沉积-沉淀法和诱导-还原沉积法制备了碳纳米管(CNTs)负载的金属Co和非晶态CoP合金,并将其应用于PH<sub>3</sub>分解反应.同时,通过XRD、TEM、XPS、BET等一系列检测手段,对制备样品的相结构、形貌、组分和比表面积进行了表征.结果发现,反应过程中,Co/CNTs生成了高活性的金属磷化物CoP,而CoP/CNTs生成了CoP和Co<sub>2</sub>P两种金属磷化物.研究表明,Co/CNTs较CoP/CNTs显示出更高的催化活性和稳定性.高温还原预处理方式可提高Co/CNTs在PH<sub>3</sub>分解反应前期的活性,而低温还原的预处理方式有利于CoP/CNTs保持较高的催化活性,减轻样品的失活程度.

**Abstract:** Amorphous CoP alloy and metal Co supported on carbon nanotubes (CoP/CNTs, Co/CNTs) catalysts were synthesized through deposition method. The phase structure, morphology, composition and specific surface area of the catalysts were characterized by XRD, TEM, XPS, BET, etc., and the catalytic activities of the obtained catalysts were evaluated using the decomposition of highly toxic PH<sub>3</sub> gas. The results indicate that the activity and stability of Co/CNTs catalysts are higher than that of CoP/CNTs catalysts. The XRD and XPS analysis of the used catalysts shows that only crystalline CoP is formed on the Co/CNTs catalysts and it could be acted as an active phase for this catalytic reaction, while both crystalline CoP and Co<sub>2</sub>P are present on CoP/CNTs catalysts. The pretreatment at 400°C under H<sub>2</sub> atmosphere is beneficial to Co/CNTs catalysts over PH<sub>3</sub> decomposition reaction, especially at the initial stage. As for CoP/CNTs catalysts, the pretreatment at 200°C under H<sub>2</sub> atmosphere is favorable for the improvement of catalytic activity and alleviation of inactivation as compared to the pretreatment at higher temperature.

**Key words:** [amorphous alloy](#) [carbon nanotubes](#) [cobalt phosphide](#) [phosphine decomposition](#)

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