

# SELECTIVE REMOVAL OF CH<sub>4</sub> FROM CH<sub>4</sub>/CO/H<sub>2</sub> MIXTURES

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## **Abstract**

The generation of syngas is normally accomplished by reforming of methane (steam-methane reforming or selective oxidation). The mixture exiting the reactor comprise syngas (H<sub>2</sub>/CO mixture), water, carbon dioxide and unreacted methane. Known commercial technology can efficiently remove water and CO<sub>2</sub>, but selective CH<sub>4</sub> removal from this stream is challenging.

In this work we report evidence that a Pressure Swign Adsorption (PSA) process using some specific adsorbents can be used for this purpose. Under certain conditions, methane is preferentially adsorbed on the surface of high-silica zeolite materials like ZSM-5 and zeolite beta. We have measured adsorption equilibrium of pure gases at three different temperatures on ZSM-5 zeolite with different Si/Al ratio and on pure-silica zeolite beta. Measurements of diffusion in ZSM.5 crystals and extrudates was also performed. Moreover, ternary breakthrough experiments CH<sub>4</sub> (20%) / CO (40%) / H<sub>2</sub> (40%) were carried out at different temperatures and flowrates at a pressure of 10 bar. A two-column pressure swing adsorption (PSA) unit was simulated to demonstrate the principle of selective separation.