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(54) **METALLO-ORGANIC POLYMERS FOR GAS SEPARATION AND PURIFICATION**

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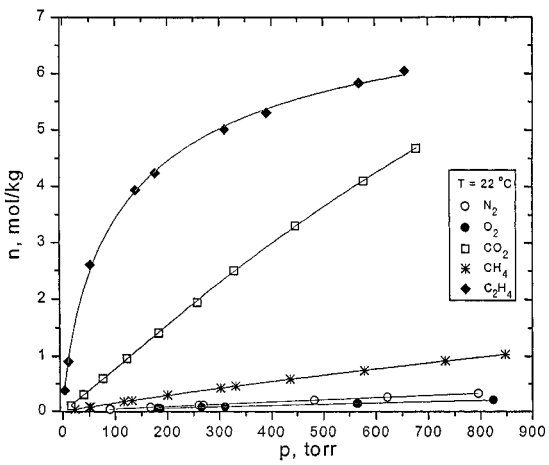
(57) **ABSTRACT**

The present invention provides for methods and compositions for gas separation and purification utilizing a metallo-organic polymer adsorbent in processes for separating carbon dioxide, water, nitrogen oxides and hydrocarbons from gas streams. The metallo-organic polymer adsorbent composition has the formula:

$$[R(L)_n]_m M_n,$$

wherein R represents an organic spacer selected from the group consisting of an organic cyclic or acyclic compound; L represents a ligation group substituted on the organic spacer selected from the group consisting of carboxylate group, —C(=O)O⁻; dithiocarboxylate group, —C(=S)S⁻; and β-diketonate group, —C(=O)C(R')=C(—O⁻)—, wherein R'=H, or an aliphatic or aromatic group; M represents a transition metal or a rare earth metal selected from the group consisting of I to VIIB and VIII metals; m is the oxidation state of transition metal; and n is the number of the ligation group substituted on the organic spacer.

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