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(54) **Title:** PURIFICATION OF AIR

(57) **Abstract:** A process for the reduction of the level of water, carbon dioxide and nitrous oxide in a feed air stream prior to cryogenic distillation, comprising: a) passing said feed air stream at a feed temperature and a feed pressure in a feed direction through a first adsorbent, whose Henry's Law selectivity for CO<sub>2</sub> over N<sub>2</sub>O measured at 30 °C is at least 12.5, and subsequently through a second adsorbent, whose Henry's Law constant for the adsorption of CO<sub>2</sub> measured at 30 °C is less than 1020 mmol/g/atom and whose Henry's Law selectivity for CO<sub>2</sub> over N<sub>2</sub>O measured at 30 °C is at most 5; b) ceasing after a first time period to pass said feed air stream to said first and second adsorbents; c) depressurising the gas in contact with the first and second adsorbents to a second pressure lower than the feed pressure; d) passing a heated regenerating gas at the second pressure and at a temperature which is between 20 °C and 80 °C to at least the second adsorbent in a direction opposite to the feed direction for a second time period, and subsequently passing a second regenerating gas at the second pressure and at a temperature less than the temperature of the heated regenerating gas to the first and second adsorbents in a direction opposite to the feed direction for a third time period; e) ceasing passing regenerating gas to the first and second adsorbents; f) re-pressurising the gas in contact with the first and second adsorbents to the feed pressure; and g) repeating steps a) to f), wherein the second adsorbent occupies from 25% to 40% by volume of the total volume of the first and second adsorbents, and wherein the temperature of the heated regenerating gas is from 10 °C to 60 °C higher than the feed temperature or the temperature of the second regenerating gas, whichever is the higher; and the use of an apparatus comprising a first adsorbent and a second adsorbent as defined above for the reduction of the levels of water, carbon dioxide and nitrogen in a feed air stream wherein the adsorbents are regenerated as set out above.