Three-bed PVSA Process for High Purity Oxygen from Air

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A three-bed PVSA process was developed to overcome the 94% O_2 purity restriction inherent to air separation in the adsorption process. To develop the PVSA process, two-bed VSA process for air separation and two-bed PSA process for oxygen purification were designed at first. From the VSA and the PSA processes, higher than 90% O2 from air and 99.8+% O_2 from oxygen enriched feeds (higher than 90% oxygen) could be produced, respectively. Then, two different cycles of the PVSA process combined and equilibrium separation with a kinetic separation were designed. To produce 97_% and/or 99_% purity O_2 directly from air, the PVSA process with two zeolite 10X beds and one CMS bed was executed at 33.44 – 45.60 to 253.31 kPa. In addition, the effluent gas from the CMS bed to be used for O_2 purification was backfilled to the zeolite 10X bed to improve its purity, recovery, and productivity in bulk separation of the air.