

Industrial plants for separating mixtures at temperatures of 68...78 K by freezing

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The article deals with physical principles of separating binary and multicomponent mixtures due to the phase transition of a gas-solid body. We estimated the temperature effect on the concentration of the effluent flow and the degree of extraction of the desired product. We also give examples of applying desublimation in xenon enrichment processes, separation of light inert gases and purification of gas concentrates from high-boiling impurities.

Keywords: desublimation, rare gases, separation, gas mixtures

REFERENCES

- [1] Simonenko Yu.M. *Gasworld*, 2014, iss. 36, pp. 38–41.
- [2] Bondarenko V.L., Simonenko Yu.M. *Cryogenic Technologies of Rare Gases Extraction*. Odessa, Astroprint Publ., 2013, 332 p.
- [3] Bondarenko V.L., Podgornyi A.V., Simonenko Yu.M. *Vestnik MGTU im. N.E. Baumana. Ser. Mashinostroenie — Herald of the Bauman Moscow State Technical University. Series Mechanical Engineering*, 2002, special iss. “Kholodil'naya, kriogennaya tekhnika, sistemy konditsionirovaniya i zhizneobespecheniya” [Refrigerating, cryogenic devices, air conditioning and life support systems], pp. 11–14.
- [4] Arkharov A.M., Arkharov I.A., Bondarenko V.L. Neon-Helium Mixtures Separation by Adsorption and Freezing. *4th Annual Polymer Producers Conference. Topical Conference Proceedings, AIChE 2000 Spring National Meeting. March 5–9, 2000, Atlanta, GA, USA*. American Institute of Chemical Engineers, N.Y., 2000, pp. 71–79.
- [5] Arkharov A.M., Bondarenko V.L., Simonenko Yu.M. *Technical gases — Industrial gases*, 2004, no. 3, pp. 27–37.
- [6] Rabinovich V.A., Vasserman A.A., Nedostup V.I., Veksler L.S. *Teplofizicheskie svoystva neona, argona, kriptona i ksenona* [Thermal properties of neon, argon, krypton and xenon]. Moscow, Izd. Standartov Publ., 1976, 636 p.
- [7] Simonenko Yu.M. *Gasworld*, 2013, iss. 26, pp. 18–19.
- [8] Simonenko Yu.M., Bondarenko A.V., Chigrin A.A., Shevich Yu.A. *Chemical and Petroleum Engineering*, 2016, vol. 51, issue 9–10, pp 707–713. DOI: 10.1007/s10556-016-0109-5
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