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金属氢化物柱内氢同位素的快速排代

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摘要 为寻找能够实现快速排代的金属氢化物,对ZrCo、LaNi₅、LaNi_{4.7}Al_{0.3}和Pd材料的填充柱进行了氢氘间的一维排代实验研究,结果表明:排代速率与温度、固相比表面积及分离因子等因素有关;室温下Pd氢化物具有最快的排代速率,其次是LaNi₅、LaNi_{4.7}Al_{0.3}、ZrCo。通过微观的气-固交换过程分析,定性揭示了影响排代速率的因素和条件。高流速排代实验证明,用Pd作柱填充材料,可以实现氢同位素的快速排代。

关键词 [金属氢化物](#) [氢同位素交换](#) [气-固排代](#)

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Studies on Quick Displacement of Hydrogen Isotopes in Metal Hydride Column

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Abstract To study engineering application of quick displacement of hydrogen isotopes and search the hydrides that are able to implement quick displacement, a series of one-dimensional displacement experiments between hydrogen and deuterium in metal hydride columns packed with ZrCo, LaNi₅, LaNi_{4.7}Al_{0.3} and Pd, respectively are carried out. Results indicate that displacement characteristics relate to factors such as temperature, rate of gas flow, specific surface area of solid phase and hydrogen isotope separation factor of the metal-hydrogen system. At room temperature, the palladium hydride possesses with the quickest displacement rate, and the next are LaNi₅, LaNi_{4.7}Al_{0.3} and ZrCo in turn. The preliminary analysis shows that the rule of the exchange reaction of hydrogen isotopes in gas-solid interface determines the displacement behavior. Using Pd as packing material, the engineering applications of quick displacement may well be achieved.

Key words [metal hydride](#) [hydrogen isotope exchange](#) [gas-solid displacement](#)

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