

二氧化铀热导率的气孔效应

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摘要 本工作测量了气孔率为2.10,3.47,4.32,5.84,和8.67%的UO₂在573—2273K温度范围的热扩散率。算出了相应的热导率。基于UO₂的热传导模型,求得了热导率与温度、气孔率的关系式。与改进的Maxwell-Eucken气孔效应修正式对照,推算了气孔系数的表达式,还给出了UO₂的德拜温度。

关键词 [二氧化铀](#) [热导率](#) [气孔效应](#)

分类号

EFFECT OF POROSITY ON THE THERMAL CONDUCTIVITIES OF URANIUM DIOXIDE

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Abstract The thermal diffusivities of uranium dioxide containing various porosity are measured in temperature range of 573-2273K. Corresponding thermal conductivities are calculated based on the thermal conductive model. The correlation to fit the data is obtained for the thermal conductivity of Uranium dioxide with temperature and porosity as follows: $K_p = 1/4.42 + 20.3P + 0.0197Te^{-(2.14p) + 9.85 \times 10^{-4}e^{-(2.36p)T} e^{-1.12/K_B \cdot T}}$ The pore coefficients β and η in the Maxwell-Eucken's and Loeb's expression for porosity correction are derived. The results indicate the influence of porosity upon β is lower than η . We have $\beta = 1.99 - 0.44 \times 10^{-3}T$ for $T < 1173K$ and $\beta = 1.64 - 0.14 \times 10^{-3}T$ for $T > 1173K$. The calculated Debye temperature of Uranium dioxide is agreeable to previous value obtained by other author.

Key words [Uranium dioxide](#) [Thermal conductivity](#) [Effect of porosity](#)

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