核化学与放射化学 2009 31 (2): 84-89 ISSN: 0253-9950 CN: 11-2045/TL

研究报告

用磷屏放射自显影法测量α核素的放射性活度

冯孝贵;梁俊福;章英杰;王建晨;陈靖

清华大学 核能与新能源技术研究院，北京 102201

收稿日期 2007-11-6 修回日期 2008-1-17 网络版发布日期: 2009-8-8

摘要 介绍了应用磷屏放射自显影法测量α核素放射性活度的实验方法，研究分析了样品与磷屏之间距离（即立体角）、曝光时间及样品放射性活度等因素对磷屏影像光强度的影响。结果表明，经过立体角修正后得到的磷屏影像光强度与测量几何条件无关；在磷屏未饱和的前提下，磷屏影像光强度与磷屏受到的辐射成正比。另外，对曝光环境、扫描次数、磷屏本底、γ或X射线的影响、源的状况等几个在实验过程中需要注意的问题进行了讨论，并给出了相应的建议。

关键词 磷屏；放射自显影；α核素；立体角

分类号 R144

Detection of Alpha Radioactivity Using Autoradiography With Phosphor Screen

FENG Xiao-gui;LIANG Jun-fu;ZHANG Ying-jie;WANG Jian-chen;CHEN Jing

Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 102201, China

Abstract The experimental method for detecting alpha radioactivity using autoradiography with phosphor screen was introduced in this paper. The influences of some parameters, such as the distance between the sample and the phosphor screen (or referred to solid angle), the exposure time and the radioactivity in the sample, on the light intensity of the phosphor screen image were studied. It is shown that the light intensity after solid angle revision does not vary significantly from one geometry to another. The intensity is proportional to the exposure time and the amount of activity in the sample before the phosphor screen is saturated. In addition, several experimental issues should be paid attention to be discussed, including the exposure condition, the number of scans, the background of the phosphor screen, the influence of the gamma or X-ray and the status of the sample.

Key words phosphor screen _ autoradiography _ alpha radioactivity _ solid angle

DOI

通讯作者 冯孝贵