Determination of technetium-99 in environmental samples: A review

Due to the lack of a stable technetium isotope, and the high mobility and long half-life, 99Tc is considered to be one of the most important radionuclides in safety assessment of environmental radioactivity as well as nuclear waste management. 99Tc is also an important tracer for oceanographic research due to the high technetium solubility in seawater as TcO$_4^-$.

A number of analytical methods, using chemical separation combined with radiometric and mass spectrometric measurement techniques, have been developed over the past decades for determination of 99Tc in different environmental samples. This article summarizes and compares recently reported chemical separation procedures and measurement methods for determination of 99Tc. Due to the extremely low concentration of 99Tc in environmental samples, the sample preparation, pre-concentration, chemical separation and purification for removal of the interferences for detection of 99Tc are the most important issues governing the accurate determination of 99Tc. These aspects are discussed in detail in this article. Meanwhile, the different measurement techniques for 99Tc are also compared with respect to advantages and drawbacks. Novel automated analytical methods for rapid determination of 99Tc using solid extraction or ion exchange chromatography for separation of 99Tc, employing flow injection or sequential injection approaches are also discussed.

General information
State: Published
Organisations: Radioecology and Tracer Studies, Radiation Research Division, Risø National Laboratory for Sustainable Energy, Lanzhou University
Pages: 1-20
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Analytica Chimica Acta
Volume: 709
ISSN (Print): 0003-2670
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.06
Web of Science (2017): Impact factor 1.363
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.01
Web of Science (2016): Impact factor 1.74
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.94
Web of Science (2015): Impact factor 1.682
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.64
Web of Science (2014): Impact factor 2.003
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.74
Web of Science (2013): Impact factor 1.547
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 4.55
Web of Science (2012): Impact factor 1.747
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 4.62
Web of Science (2011): Impact factor 1.65
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Web of Science (2010): Impact factor 2.083
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Web of Science (2004): Indexed yes
Web of Science (2003): Indexed yes
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Web of Science (2000): Indexed yes
Original language: English
Keywords: Radiation ecology and tracers
Electronic versions:
Postprint_determination.pdf
DOIs:
10.1016/j.aca.2011.10.020
Source: orbit
Source-ID: 312620
Research output: Research - peer-review | Journal article – Annual report year: 2011