

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Supporting information

Exploring the ability of triple quadrupole inductively coupled plasma mass spectrometry for the determination of Pu isotopes in environmental samples

Wenting Bu^{1*∇}, Mei Gu^{1∇}, Xiaotong Ding¹, Youyi Ni¹, Xuepeng Shao¹,
Xuemei Liu¹, Chuting Yang¹, Sheng Hu¹

¹Institute of Nuclear Physics and Chemistry,
China Academy of Engineering Physics,
Mianyang 621900, China

*Corresponding author

wtbu@caep.cn

[∇]These authors contributed equally to this study.

31 **Table S1.** Typical operating conditions of ICP-MS/MS for the measurement of Pu isotopes.

Instrument parameter	Operating condition
Sample uptake rate	0.2 mL min ⁻¹
RF power	1560 W
Sample depth	4 mm
Carrier gas	0.85 mL min ⁻¹
Nebulizer	TQP-50-A0.5
Extraction lens 1	-24 V
Extraction lens 2	-150 V
Omega bias	-90 V
Omega	7.0 V
Q1 entrance	0.5 V
Q1 outlet	-2.0 V
Cell focus	4.0 V
Cell entrance	-150 V
Cell outlet	-131 V
Deflect	-3.2 V
Plate bias	-94 V
He flow	5.0 mL min ⁻¹
NH3 flow	30%
Octopole bias	-15 V
Octopole RF power	180 V
Energe discrimination	-15 V
Selected mass at 1st QMS	238, 239, 240, 241, 242
Selected mass at 2nd QMS	238, 239, 240, 241, 242
Accumulation time per mass	238, 0.2 s; 239, 1 s; 240 5s; 241, 5 s; 242, 1 s
Number of replicates	5

32

33

34

35

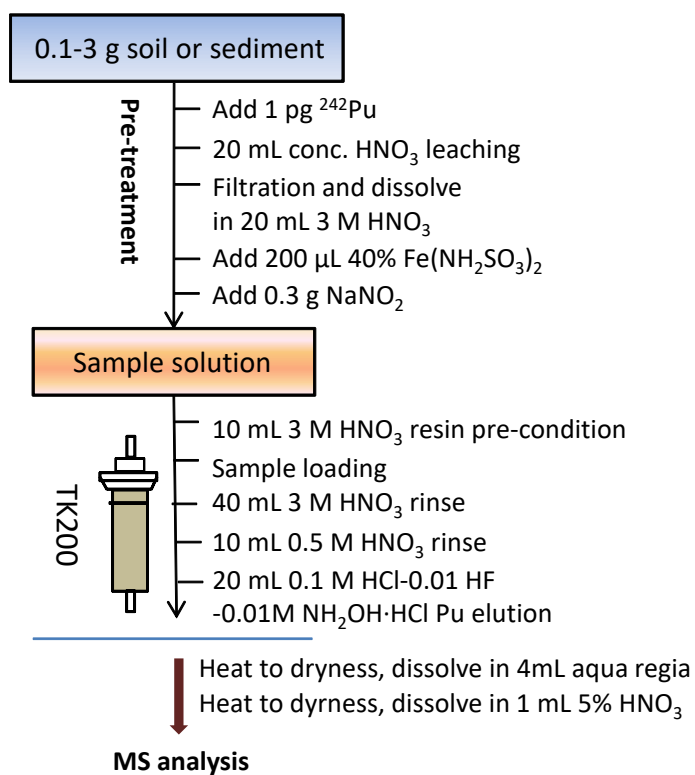
36

37

38

39

40

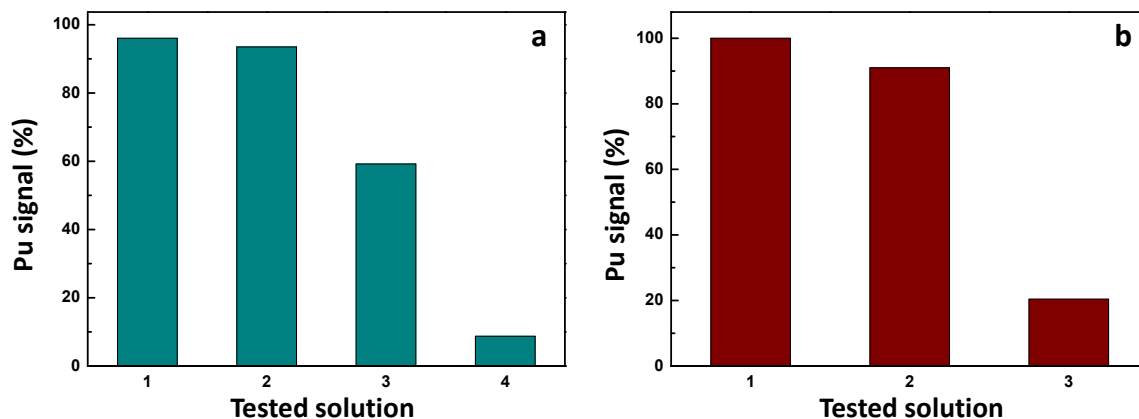


41

42 **Figure S1.** Rapid chemical procedures for Pu separation in soil or sediment samples prior to
43 ICP-MS/MS measurement.

44

45



46

47 **Figure S2.** Comparison of sample matrix effects for Pu with various test solutions (Pu signal
48 was expressed as the signal of Pu for the test solution divided by the signal of Pu for the Pu
49 standard solution). (a) Mixed solutions with 37 elements: 1. 45 ppb; 2. 100 ppb; 3. 450 ppb;
50 900 ppb. (b) Mixed solutions with 14 rare earth elements: 1. 100 ppb; 2. 1000 ppb; 8000 ppb.

51

52

53

54

55

56

57

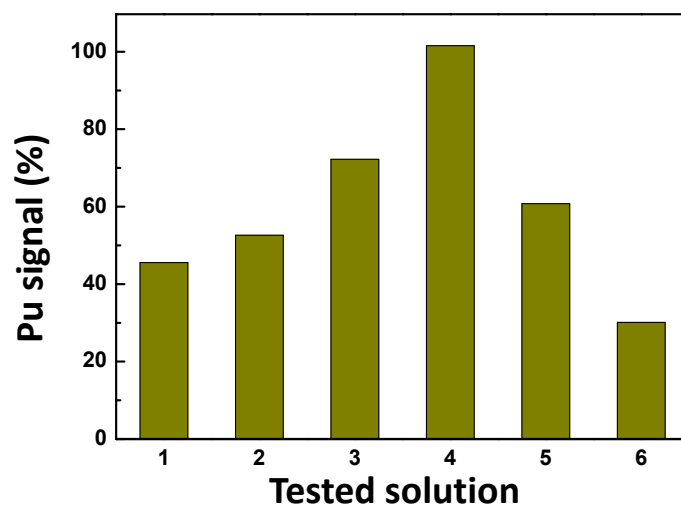
58

59

60

61

62



63

64 **Figure S3.** Comparison of sample matrix effects for different Pu elution solutions (Pu signal
65 was expressed as the signal of Pu for the test solution divided by the signal of Pu for the Pu
66 standard solution). Test solutions: 1. 20mL 8.5M HCl-0.1 M NH₄I; 2. 20mL 8.5M HCl-0.05
67 M NH₄I; 3. 20mL 8.5M HCl-0.01 M NH₄I; 4. 20mL 0.1M HCl-0.01M HF-0.01M
68 NH₂OH·HCl; 5. 20mL 0.5M HCl-0.1M NH₂OH·HCl; 6. 20mL HBr.

69

70

71

72

73

74

75

76