

1 Apparatus

- 1.1. Analytical balance- 0.0001 g sensitivity
- 1.2. Beaker (10 mL, 50 mL)
- 1.3. Vials
- 1.4. Pipettes
- 1.5. Fume hood
- 1.6. Column holder or rack
- 1.7. Alternatively a vacuum box system incl. vacuum pump or a positive pressure set-up (e.g. peristaltic pump based) might be used
- 1.8. Empty columns e.g. AC-142-TK (or empty cartridges e.g. AC-100-R01 in case of use of a vacuum or positive pressure system) incl. appropriate frits

2 Reagents

All references to water should be understood to mean deionized water (18 M Ω).

- 2.1 Hydrochloric acid (HCl), 37%, p.a.
- 2.2 10M HCl - Add ca. 100 mL of water in to a 1000 mL volumetric flask. Add 833 mL concentrated hydrochloric acid. Complete with water. This solution can be used for 1 year after its preparation.
- 2.3 0.1M citric acid – Weigh 1,921 g of citric acid into a 100 mL volumetric flask. Add ca. 80 mL of water to dissolve the citric acid. Complete with water. This solution should be prepared freshly.

NOTE: Alternatively Ti might be eluted using 0.2M oxalic acid or 0.1M hydrogen peroxide

- 2.4 Bulk ZR Resin[1] - A or S grade
- 2.5 optional: ascorbic acid or hydroxylamine hydrochloride as reducing agent for Fe(III)

3 Procedure

3.1 Column preparation:

- 3.1.1 Per column to be packed weigh 100mg of the resin into a suitable vial (e.g. 2 mL Eppendorf cap)
- 3.1.2 Add 1-3 mL of water (alternatively 2M HCl may be used) and allow resin to soak for at least 60 min, preferably while shaking
- 3.1.3 Allow column and frits to soak in water for at least 30 min
- 3.1.4 Place appropriately sized containers below the column.
- 3.1.5 Empty soaked columns.
- 3.1.6 Transfer soaked resin into empty column, allow to settle.
- 3.1.7 Place frit on top of resin. Do not compact the resin (ideally the frit should remain approx. 1 mm above the resin bed.
- 3.1.8 Break tip and allow liquid to pass the column.

3.2 Zr separation:

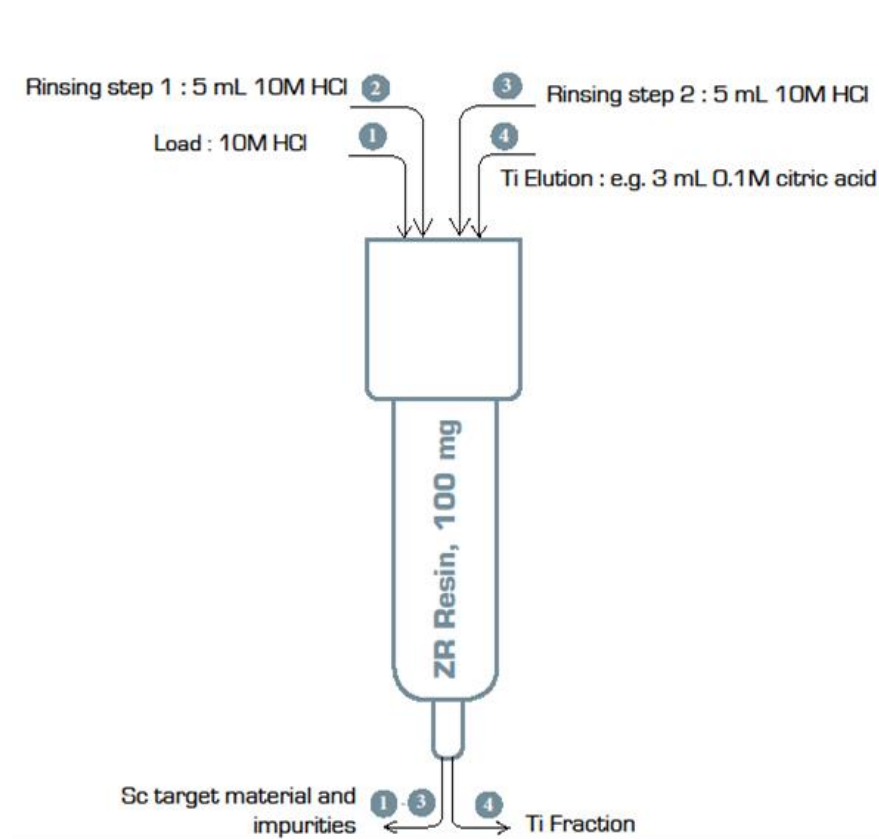
- 3.2.1 Pass 3 mL of 10M HCl through the column to precondition.
- 3.2.2 Load target dissolved in 10M HCl onto the column

NOTE: The method has been tested or up to 50 mg stable Sc

NOTE: In order to improve the Fe removal a suitable reducing agent such as ascorbic acid or hydroxylamine hydrochloride may be added to the dissolved target (a few grains)

- 3.2.3 Rinse column with two times with 5mL 10M HCl
- 3.2.4 Place clean labeled container below column
- 3.2.5 Elute Ti using 3 mL 0.1M citric acid

3.3 Synopsis of the separation



4 References

- (1) Dirks et al.: "CHARACTERISATION OF AN HYDROXAMATE BASED EXTRACTION CHROMATOGRAPHIC RESIN AND ITS APPLICATION TO Zr/Y, Ti/Sc and Ge/Ga SEPARATION". Presented at the 1st RANC, 13/04/16, Budapest (Hungary)