WorkBeads 40 Ni-NTA
WorkBeads 40 Co-NTA
WorkBeads 40 Cu-NTA
WorkBeads 40 Zn-NTA

WorkBeads 40 Ni-IDA
WorkBeads 40 Co-IDA
WorkBeads 40 Cu-IDA
WorkBeads 40 Zn-IDA

BabyBio Ni-NTA
BabyBio Co-NTA
BabyBio Cu-NTA
BabyBio Zn-NTA
BabyBio NTA His-tag Screening kit

BabyBio Ni-IDA
BabyBio Co-IDA
BabyBio Cu-IDA
BabyBio Zn-IDA
BabyBio IDA His-tag Screening kit

These products comprise of WorkBeads™ 40 NTA and WorkBeads 40 IDA resins charged with Ni^{2+}, Co^{2+}, Cu^{2+}, or Zn^{2+} ions to be used for Immobilized Metal Ion Affinity Chromatography (IMAC). These resins are designed for purification of poly-histidine tagged (His-tagged) proteins or other metal ion binding proteins. Metal ions have different affinities for these types of proteins which results in resins with slightly different selectivities. These eight different resins are available in prepacked ready-to-use BabyBio™ 1 ml and 5 ml columns which also are combined into BabyBio His-tag Screening kits for fast and convenient screening for finding optimal metal ion to use for highest purity.

- Pre-charged resins with different metal ions for ease of use and for optimal purity of the target protein
- High binding capacity and flow properties
- Available in prepacked BabyBio 1 ml and 5 ml columns and convenient BabyBio His-tag Screening kits

Resin description

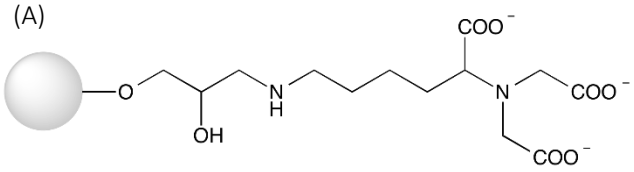
WorkBeads are agarose-based chromatographic resins manufactured using proprietary method that results in porous beads with a tight size distribution and exceptional mechanical stability. Agarose based matrices have been successfully used for decades in biotechnology research from laboratory to production scale, due to their high compatibility with biomolecules including proteins, peptides, nucleic acids and carbohydrates. WorkBeads resins are designed for separations that requiring optimal capacity and purity.

WorkBeads 40 Ni-NTA, WorkBeads 40 Co-NTA, WorkBeads 40 Cu-NTA and WorkBeads 40 Zn-NTA are based on WorkBeads 40 NTA with a chelating ligand based on nitrilotriacetic acid (NTA).
WorkBeads 40 Ni-IDA, WorkBeads 40 Co-IDA, WorkBeads 40 Cu-IDA and WorkBeads 40 Zn-IDA are based on WorkBeads 40 IDA that has a chelating ligand based on iminodiacetic acid (IDA).
The pre-charged WorkBeads 40 NTA and WorkBeads 40 IDA resins are available with four metal ions: Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+} as denoted in their names.

The structures of the chelating ligands used in WorkBeads 40 NTA and WorkBeads 40 IDA are shown in Figure 1.

The main characteristics of these resins are shown in Table 1 and Table 2. For more details, please see instruction IN 40 650 010.

(A)



(B)

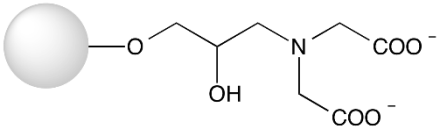


Figure 1. Structure of the chelating ligand used in WorkBeads 40 NTA (A) and WorkBeads 40 IDA (B) resins.

Column description

BabyBio IMAC 1 ml and 5 ml columns are prepacked with the eight different resins described above. The columns are excellent for research scale purification and selectivity screening in process development.

The column is made from biocompatible polypropylene which does not significantly interact with biomolecules. The top and bottom filters are made from polyethylene. The ready to use BabyBio columns are delivered with a plug in the inlet, a cut-off outlet and a cap for storage. The columns can be connected to a syringe, pump or chromatography system using finger tight fittings (coned 10–32) for 1/16" o.d. tubing (standard HPLC PEEK tubing).

The main characteristics of BabyBio IMAC columns are shown in Table 3. For more details, see instructions IN 45 655 020.

BabyBio His-tag NTA Screening kit
BabyBio His-tag IDA Screening kit

The two different BabyBio His-tag Screening kits contain one 1 ml or 5 ml of each of the four BabyBio columns prepacked with WorkBeads NTA and WorkBeads IDA charged with Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+} ions. The kits are excellent tools for screening combinations of metal ions and chelating ligand (NTA or IDA) to optimize purity and yield when purifying polyhistidine-tagged (His-tagged) proteins. Other native proteins containing histidine, cysteine and tryptophan residues may also bind and can therefore be purified using these columns.

The main characteristics of BabyBio His-tag Screening kit columns are shown in Table 3. For more details, please see instructions IN 45 700 010.

Table 1. Main characteristics of WorkBeads 40 Ni-NTA, WorkBeads 40 Co-NTA, WorkBeads 40 Cu-NTA and WorkBeads 40 Zn-NTA resins.

	WorkBeads 40 Ni-NTA	WorkBeads 40 Co-NTA	WorkBeads 40 Cu-NTA	WorkBeads 40 Zn-NTA
Target substance	His-tagged proteins, proteins containing histidine cysteine and/or tryptophan amino acid side chains			
Matrix	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose
Average particle size[1] (D_{V50})	45 µm	45 µm	45 µm	45 µm
Chelating ligand	Nitrilotriacetic acid (NTA)	NTA	NTA	NTA
Metal ion	Nickel (II)	Cobalt (II)	Cupper (II)	Zink (II)
Metal ion capacity for the chelating ligand[2]	NA	NA	50 - 60 µmol Cu^{2+}/ml resin	NA
Dynamic binding capacity[3]	> 60 mg His_6-GFP/ml resin	NA	NA	NA
Max flow rate (20 cm bed height and 5 bar)	600 cm/h	600 cm/h	600 cm/h	600 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 8 M urea, 6 M guanidine-HCl, non-ionic detergents, 20% ethanol. Chelating substances (e.g. EDTA) will strip off the metal ions. Stripped resin: 10 mM HCl (pH 2), 10 mM NaOH (pH 12), 10 mM sodium citrate-HCl (pH 3)			
pH stability	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)
Storage	2 to 25 °C	2 to 25 °C	2 to 25 °C	2 to 25 °C

1. The median particle size of the cumulative volume distribution.
2. Metal ion capacity is determined by frontal analysis at 50% breakthrough using cupper solution.
3. The binding capacity is determined using a BabyBio Ni-NTA 1 ml. The binding capacity is dependent on the size of the target protein, and on the competition of impurities.

Table 2. Main characteristics of WorkBeads 40 Ni-IDA, WorkBeads 40 Co-IDA, WorkBeads 40 Cu-IDA and WorkBeads 40 Zn-IDA resins.

	WorkBeads 40 Ni-IDA	WorkBeads 40 Co-IDA	WorkBeads 40 Cu-IDA	WorkBeads 40 Zn-IDA
Target substance	His-tagged proteins, proteins containing histidine cysteine and/or tryptophan amino acid side chains.			
Matrix	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose
Average particle size[1] (D_{V50})	45 µm	45 µm	45 µm	45 µm
Chelating ligand	Iminodiacetic acid (IDA)	IDA	IDA	IDA
Metal ion	Nickel (II)	Cobalt (II)	Cupper (II)	Zink (II)
Metal ion capacity for the chelating ligand[2]	NA	NA	50 - 60 µmol Cu^{2+}/ml resin	NA
Dynamic binding capacity[3]	> 60 mg His_6-GFP/ml resin	NA	NA	NA
Max flow rate (20 cm Bed height and 5 bar)	600 cm/h	600 cm/h	600 cm/h	600 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 8 M urea, 6 M guanidine-HCl, non-ionic detergents, 20% ethanol. Chelating substances (e.g. EDTA) will strip off the metal ions. Stripped resin: 10 mM HCl (pH 2), 10 mM NaOH (pH 12), 10 mM sodium citrate-HCl (pH 3).			
pH stability	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)	7 - 9 (working range) 2 - 12 cleaning (stripped resin)
Storage	2 to 25 °C	2 to 25 °C	2 to 25 °C	2 to 25 °C

1. The median particle size of the cumulative volume distribution.
2. Metal ion capacity is determined by frontal analysis at 50% breakthrough using cupper solution.
3. The binding capacity is determined using a BabyBio Ni-NTA 1 ml, equal value is expected for IDA resins.

Table 3. Main characteristics of BabyBio metal-ion precharged IMAC 1 ml and 5 ml columns.

	BabyBio Ni-NTA, BabyBio Co-NTA, BabyBio Cu-NTA, BabyBio Zn-NTA[1]	BabyBio Ni-IDA, BabyBio Co-IDA, BabyBio Cu-IDA, BabyBio Zn-IDA[2]
Target substances	His-tagged proteins, proteins containing histidine cysteine and/or tryptophan amino acid side chains	His-tagged proteins, proteins containing histidine cysteine and/or tryptophan amino acid side chains
Resins	WorkBeads 40 Ni-NTA WorkBeads 40 Co-NTA WorkBeads 40 Cu-NTA WorkBeads 40 ZN-NTA	WorkBeads 40 Ni-IDA WorkBeads 40 Co-IDA WorkBeads 40 Cu-IDA WorkBeads 40 ZN-IDA
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size[3] (D_{V50})	45 µm	45 µm
Ligand	Nitrilotriacetic acid (NTA)	Iminodiacetic acid (IDA)
Metal ion	Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+}	Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+}
Static binding capacity[4]	70 mg His-tagged protein/ml resin	NA
Dynamic binding capacity[4]	50 mg His-tagged protein/ml resin	NA
Column volume	1 ml 5 ml	1 ml 5 ml
Column dimension	7 x 28 mm (1 ml) 13 x 38 mm (5 ml)	7 x 28 mm (1 ml) 13 x 38 mm (5 ml)
Recommended flow rate[5]		
BabyBio 1 ml	0.25 - 1 ml/min (37 - 150 cm/h)	0.25 - 1 ml/min (37 - 150 cm/h)
BabyBio 5 ml	1.25 - 5 ml/min (56 - 225 cm/h)	1.25 - 5 ml/min (56 - 225 cm/h)
Maximum flow rate[6]		
BabyBio 1 ml	5 ml/min (780 cm/h)	5 ml/min (780 cm/h)
BabyBio 5 ml	20 ml/min (900 cm/h)	20 ml/min (900 cm/h)
Maximum back pressure	0.3 MPa, 3 bar, 43 psi	0.3 MPa, 3 bar, 43 psi
Chemical stability	Chelating substances (e.g. EDTA) will strip off the metal ions Stripped column: 10 mM HCl (pH 2), 10 mM NaOH (pH 12), 100 mM sodium citrate-HCl (pH 3), 6 M guanidine-HCl	
pH stability	7 - 9 (working range) 2 - 12 cleaning (stripped column) Do not keep the resin at low pH for prolonged time	7 - 9 (working range) 2 - 12 cleaning (stripped column) Do not keep the resin at low pH for prolonged time
Storage	2 to 25°C in 20% ethanol	2 to 25°C in 20% ethanol

1. Columns included in BabyBio His-tag NTA Screening kit 1 ml or BabyBio His-tag NTA Screening kit 5 ml.
2. Columns included in BabyBio His-tag IDA Screening kit 1 ml or BabyBio His-tag IDA Screening kit 5 ml.
3. The median particle size of the cumulative volume distribution.
4. The binding capacity is determined using a BabyBio Ni-NTA 1 ml. The binding capacity is dependent on the size of the target protein, and on the competition with impurities.
5. Optimal flow rate during binding is depending on the sample. During column wash and elution, a flow rate of 1 ml/min and 5 ml/min can be used for 1 ml and 5 ml columns, respectively. Note: The maximum pressure the packed bed can withstand depends on the sample/liquid viscosity and chromatography resin characteristics. The pressure also depends on the tubing used to connect the column and the system restrictions after the column outlet.
6. Aqueous buffers at 20°C. Decrease the maximum flow rate if the liquid has a higher viscosity. Higher viscosities can be caused by low temperature (use half of the maximum flow rate at 4°C), or by additives (e.g. use half of the maximum flow rate for 20% ethanol).

Applications

Metal ion charged WorkBeads 40 NTA and WorkBeads 40 IDA resins are designed to be used in Immobilized Metal Ion Affinity Chromatography (IMAC).

Principle

IMAC utilizes the affinity of histidine, cysteine and tryptophan amino acid side chains on the protein surface for transition metal ions, such as Ni^{2+}, Co^{2+}, Cu^{2+} and Zn^{2+}, immobilized via a metal chelating ligand on the chromatography resin.

IMAC is commonly used for purification of recombinant His-tagged proteins. The His-tag is usually composed of six to ten histidyl groups and is typically placed at the N- or C-terminus of the target protein, although other positions are possible. His-tagged proteins will bind to the chelating ligand (through the metal ion) and the unbound material will pass through the column. The bound proteins are desorbed by stepwise or gradient elution, using a competing agent, such as imidazole or lower pH.

Imidazole is recommended for elution. This is the most common used competing agent but histidine, ammonium chloride or histamine can also be used. Before sample application the resin should be equilibrated with a low concentration of the competing agent to prevent non-specific binding of endogenous proteins that may bind via histidine clusters for example. This is done easily by using the recommended binding buffer.
Elution with a decrease of pH is also an option. At pH 3 - 5, the histidine residues (pK_a approx. 6) are protonated which leads to the loss of affinity for the metal ion and thus to the release of the protein. However, it is important to consider the target protein stability at low pH.

For more detailed description of the IMAC principle, see instruction IN 40 650 010.

Purification of His-tagged proteins

Figure 2 shows an example of purification of clarified histidine-tagged Green Fluorescent Protein (His_6-GFP) expressed in *E. coli* using BabyBio Ni-NTA 1 ml column.

Column:	BabyBio Ni-NTA 1 ml
Sample:	40 ml His_6-GFP in binding buffer
Binding buffer:	50 mM sodium phosphate, 300 mM NaCl, 10 mM imidazole, pH 8.0
Elution buffer:	50 mM sodium phosphate, 300 mM NaCl, 300 mM imidazole, pH 8.0
Elution:	100% elution buffer in 5 columns volumes (CV)
Flow rate:	0.5 ml/min (78 cm/h)

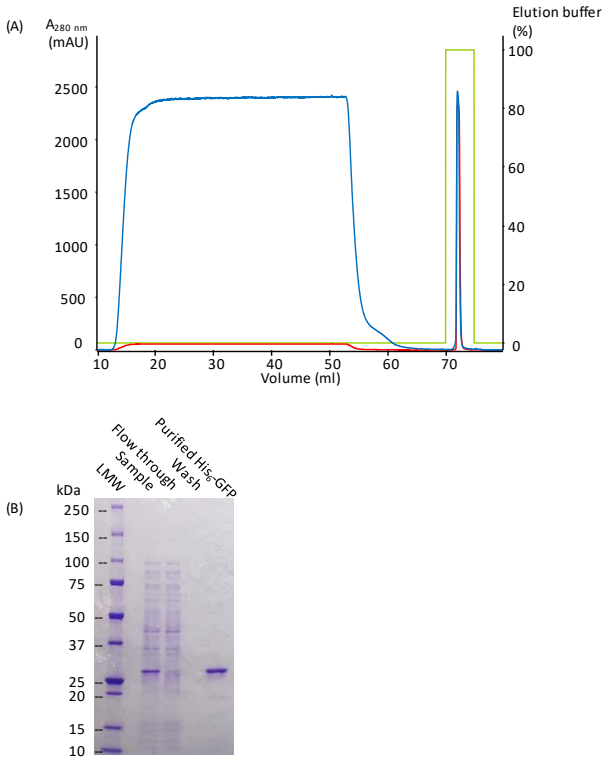


Figure 2. Purification of clarified His_6-GFP using BabyBio Ni-NTA 1 ml. (A) Chromatogram showing the purification of His_6-GFP. Absorbance at 280 nm (blue), absorbance at 490 nm (red) and percentage of elution buffer (green). (B) SDS-PAGE analysis of sample, flow through, wash and eluted peak.

BabyBio Ni-NTA 1 ml and 5 ml columns can be used to purify up to 70 mg or 350 mg of proteins, respectively. Similar capacities can be expected for the other BabyBio IMAC columns.

The purity that can be obtained depends on several factors. A sample including impurities that can bind to the resin may reduce the purity of the target protein. Proteins expressed in *E. coli* are usually easier to purify than proteins expressed in

eukaryotic systems (e.g., yeast or mammalian cells) when instead the specific developed WorkBeads NiMAC resin usually performs better, see DS 40 653 010. The purification result also depends on the structure of the chelating ligand and the nature of the immobilized metal ion.

The broad selection of BabyBio IMAC columns offers many possibilities. Choosing between two different ligands, NTA or IDA, charged with either Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+} metal ions.

BabyBio Ni-NTA is recommended as the starting point for His-tagged protein purification as it in many cases will give excellent purification results. For more difficult purifications, a screening is recommended with the different BabyBio IMAC columns to find the optimal combination of ligand and metal ion. For very high purity requirements, it is common to add a second purification step to remove the final impurities and for buffer exchange and salt removal. This can be done by using size exclusion chromatography (gel filtration), such as WorkBeads SEC resins.

Screening for optimal purification of His-tagged proteins

An example of a screening using the eight different precharged BabyBio IMAC columns for purification of a recombinant His_6-tagged Green Fluorescent Protein (His_6-GFP) expressed in *E. coli* is shown in Figure 3. The purity was checked by SDS-PAGE, shown in Figure 4.

Cleaning-in-place

During purification impurities such as cell debris, lipids, nucleic acids and protein precipitates from the samples may gradually build up in the resin. The severity of this process depends on the type of sample applied to the column, and the pre-treatment of the sample. The impurities may reduce the performance of the column over time. Regular cleaning (Cleaning-in-Place, CIP) keeps the resin clean, reduces the rate of further contamination, and prolongs the capacity, resolution and flow properties of the column.
Cleaning with 1 M NaOH applied by a low reversed flow for 2 hours or overnight is often sufficient. Before cleaning of IMAC resins the metal ions must be removed from the resin using, for example, 50 mM Na_2EDTA, pH 8.5. After the cleaning, the resin can be re-charged with fresh metal ions.

Sanitization (reduction of microorganisms) is done by combinations of NaOH and ethanol (e.g., incubation with a mixture of 0.5 M NaOH and 40 % ethanol for 3 hours). The sanitization procedure and its effectiveness will depend on the microorganisms to be removed and needs to be evaluated for each case.

Equipment

Prepacked BabyBio IMAC ready-to-use columns can be used with most standard liquid chromatography equipment. Purification can also be carried out using a syringe connected to the column by a luer or a std HPLC connector.

Storage

Store at 2 to 25°C in 20 % ethanol.
Equilibrate BabyBio columns with 20% ethanol and close it securely using the included plug and cap. Store the column at 2 to 25°C.

Sample: 2 ml His_6-GFP in binding buffer

Columns:	Pre-charged BabyBio IMAC columns 1 ml
Binding buffer:	50 mM sodium phosphate, 300 mM NaCl, 10 mM imidazole, pH 8.0
Elution buffer:	50 mM sodium phosphate, 300 mM NaCl, 300 mM imidazole, pH 8.0
Gradient:	0 to 100% elution buffer in 15 column volumes (CV)
Flow rate:	0.5 ml/min (78 cm/h)

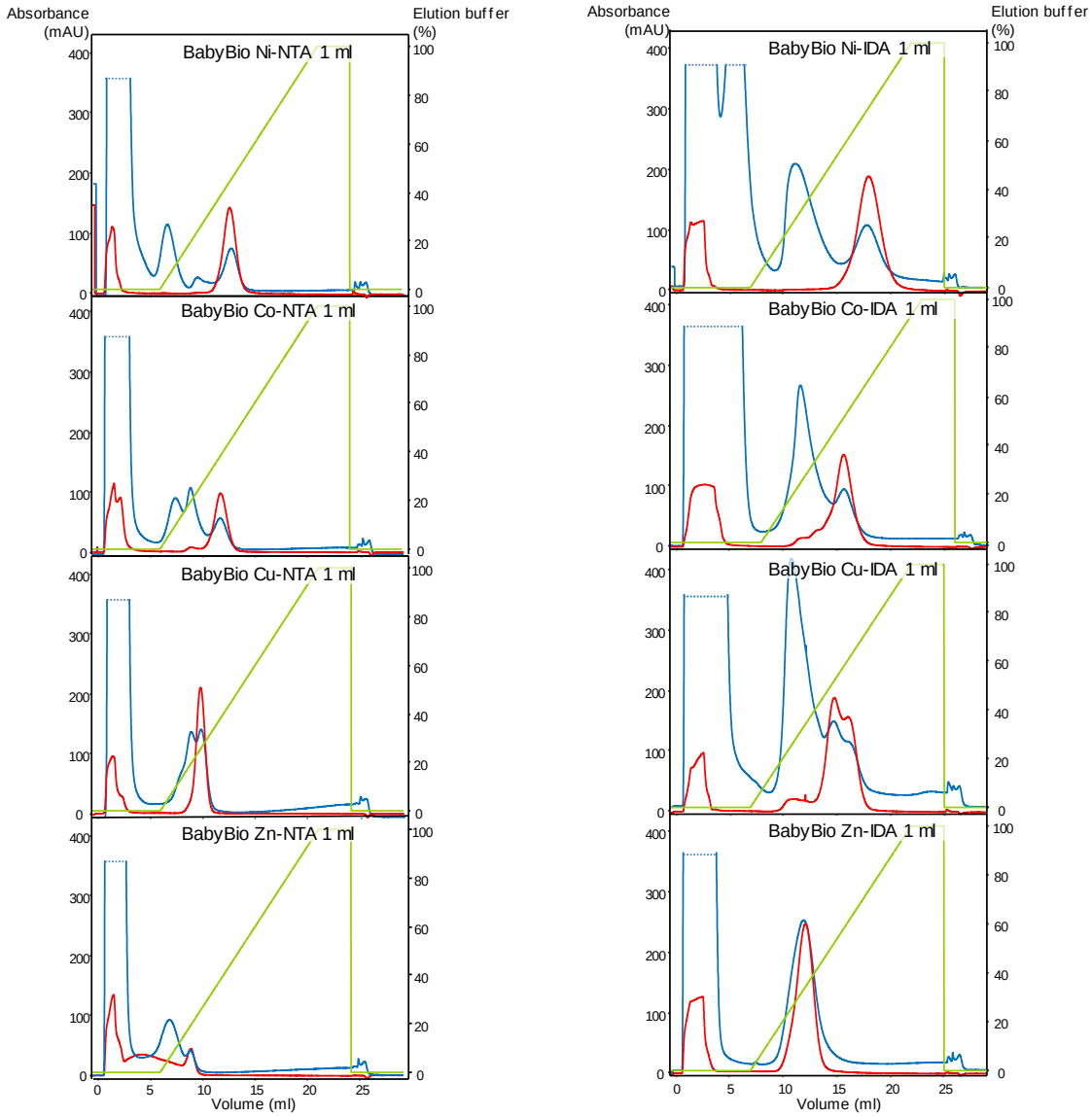


Figure 3. Chromatogram showing comparisons of purifications of clarified His_6-GFP on BabyBio NTA 1 ml and BabyBio IDA 1 ml charged with Ni^{2+}, Co^{2+}, Cu^{2+} and Zn^{2+} ions. The blue and red lines correspond to the absorbance signal at 280 nm and 490 nm, respectively, and the green line to the percentage of elution buffer.

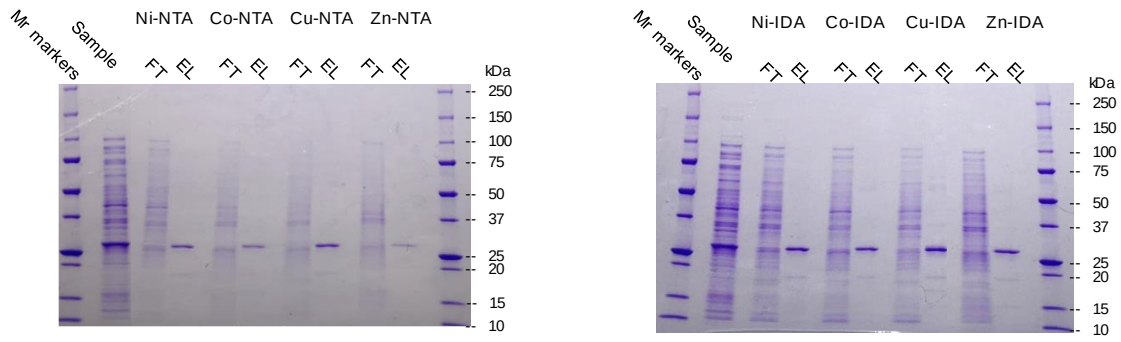


Figure 4. SDS-PAGE analysis of purified His_6-GFP from the previous chromatograms. FT = flow through and EL = eluted proteins

Related products

Product Name	Pack size[1]	Article number
Prepacked columns		
BabyBio NTA 1 ml	1 ml x 5	45 655 113
BabyBio NTA 5 ml	5 ml x 5	45 655 117
BabyBio IDA 1 ml	1 ml x 5	45 655 013
BabyBio IDA 5 ml	5 ml x 5	45 655 017
BabyBio IEX Screening Kit[2]	1 ml x 4	45 900 001
BabyBio S 1 ml	1 ml x 5	45 200 103
BabyBio S 5 ml	5 ml x 5	45 200 107
BabyBio Q 1 ml	1 ml x 5	45 100 103
BabyBio Q 5 ml	5 ml x 5	45 100 107
BabyBio DEAE 1 ml	1 ml x 5	45 150 103
BabyBio DEAE 5 ml	5 ml x 5	45 150 107
BabyBio TREN 1 ml	1 ml x 5	45 655 213
BabyBio TREN 5 ml	5 ml x 5	45 655 217
BabyBio Dsalt 1 ml	1 ml x 5	45 360 103
BabyBio Dsalt 5 ml	5 ml x 5	45 360 107
Bulk resins		
WorkBeads 40 NTA	25 ml	40 602 001
WorkBeads 40 IDA	25 ml	40 601 001
WorkBeads 40S	25 ml	40 200 001
WorkBeads 40Q	25 ml	40 100 001
WorkBeads 40 TREN	25 ml	40 603 001
WorkBeads Dsalt	300 ml	40 360 003
Accessories		
Column plug male 1/16''	10	70 100 010
Column cap female 1/16''	10	70 100 020

1. Other pack sizes can be found in the complete product list on www.bio-works.com
2. BabyBio IEX Screening Kit includes one of each: BabyBio S 1 ml, BabyBio Q 1 ml, BabyBio DEAE 1 ml and BabyBio TREN 1 ml.

Ordering information

Product name	Pack size	Article number
BabyBio NTA His-tag Screening kit 1 ml[1]	1 ml x 4	45 700 101
BabyBio NTA His-tag Screening kit 5 ml[1]	5 ml x 4	45 700 102
BabyBio Ni-NTA 1 ml	1 ml x 1	45 655 101
	1 ml x 2	45 655 102
	1 ml x 5	45 655 103
	1 ml x 10	45 655 104
BabyBio Ni-NTA 5 ml	5 ml x 1	45 655 105
	5 ml x 2	45 655 106
	5 ml x 5	45 655 107
	5 ml x 10	45 655 108
BabyBio Co-NTA 1 ml	1 ml x 1	45 655 131
	1 ml x 2	45 655 132
	1 ml x 5	45 655 133
	1 ml x 10	45 655 134
BabyBio Co-NTA 5 ml	5 ml x 1	45 655 135
	5 ml x 2	45 655 136
	5 ml x 5	45 655 137
	5 ml x 10	45 655 138
BabyBio Cu-NTA 1 ml	1 ml x 1	45 655 121
	1 ml x 2	45 655 122
	1 ml x 5	45 655 123
	1 ml x 10	45 655 124
BabyBio Cu-NTA 5 ml	5 ml x 1	45 655 125
	5 ml x 2	45 655 126
	5 ml x 5	45 655 127
	5 ml x 10	45 655 128
BabyBio Zn-NTA 1 ml	1 ml x 1	45 655 141
	1 ml x 2	45 655 142
	1 ml x 5	45 655 143
	1 ml x 10	45 655 144
BabyBio Zn-NTA 5 ml	5 ml x 1	45 655 145
	5 ml x 2	45 655 146
	5 ml x 5	45 655 147
	5 ml x 10	45 655 148

1. Includes one column each charged with Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+}

Ordering information

Product name	Pack size	Article number
BabyBio IDA His-tag Screening kit 1 ml[1]	1 ml x 4	45 700 001
BabyBio IDA His-tag Screening kit 5 ml[1]	5 ml x 4	45 700 002
BabyBio Ni-IDA 1 ml	1 ml x 1	45 655 001
	1 ml x 2	45 655 002
	1 ml x 5	45 655 003
	1 ml x 10	45 655 004
BabyBio Ni-IDA 5 ml	5 ml x 1	45 655 005
	5 ml x 2	45 655 006
	5 ml x 5	45 655 007
	5 ml x 10	45 655 008
BabyBio Co-IDA 1 ml	1 ml x 1	45 655 031
	1 ml x 2	45 655 032
	1 ml x 5	45 655 033
	1 ml x 10	45 655 034
BabyBio Co-IDA 5 ml	5 ml x 1	45 655 035
	5 ml x 2	45 655 036
	5 ml x 5	45 655 037
	5 ml x 10	45 655 038
BabyBio Cu-IDA 1 ml	1 ml x 1	45 655 021
	1 ml x 2	45 655 022
	1 ml x 5	45 655 023
	1 ml x 10	45 655 024
BabyBio Cu-IDA 5 ml	5 ml x 1	45 655 025
	5 ml x 2	45 655 026
	5 ml x 5	45 655 027
	5 ml x 10	45 655 028
BabyBio Zn-IDA 1 ml	1 ml x 1	45 655 041
	1 ml x 2	45 655 042
	1 ml x 5	45 655 043
	1 ml x 10	45 655 044
BabyBio Zn-IDA 5 ml	5 ml x 1	45 655 045
	5 ml x 2	45 655 046
	5 ml x 5	45 655 047
	5 ml x 10	45 655 048

1. Includes one column each charged with Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+}

Ordering information

Product name	Pack size	Article number
WorkBeads 40 Ni-NTA	25 ml	40 651 001
	150 ml	40 651 003
	1 L	40 651 010
WorkBeads 40 Co-NTA	25 ml	40 651 401
	150 ml	40 651 403
	1 L	40 651 410
WorkBeads 40 Cu-NTA	25 ml	40 651 301
	150 ml	40 651 303
	1 L	40 651 310
WorkBeads 40 Zn-NTA	25 ml	40 651 501
	150 ml	40 651 503
	1 L	40 651 510
WorkBeads 40 Ni-IDA	25 ml	40 650 001
	150 ml	40 650 003
	1 L	40 650 010
WorkBeads 40 Co-IDA	25 ml	40 650 401
	150 ml	40 650 403
	1 L	40 650 410
WorkBeads 40 Cu-IDA	25 ml	40 650 301
	150 ml	40 650 303
	1 L	40 650 310
WorkBeads 40 Zn-IDA	25 ml	40 650 501
	150 ml	40 650 503
	1 L	40 650 510

Orders: sales@bio-works.com or contact your local distributor.

For more information about local distributor and products visit www.bio-works.com
or contact us at info@bio-works.com

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