CIMac line

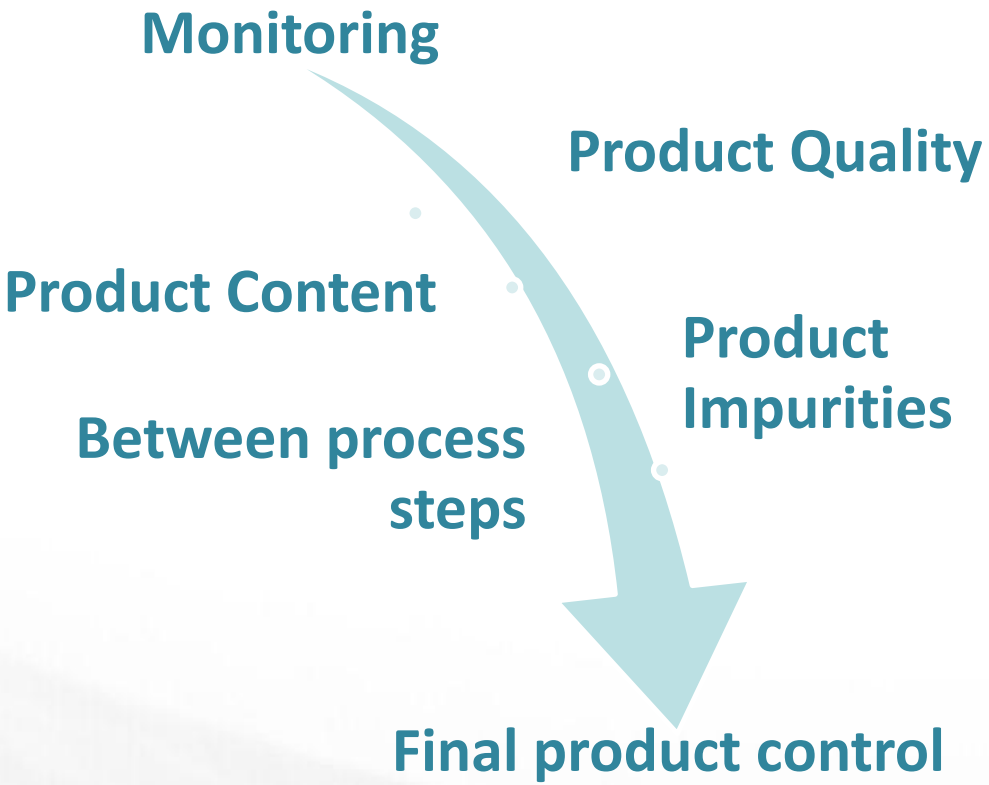
Process

Analytical

Technology

What is PAT?

Process Analytical Technology is a system for analysis and control of manufacturing processes that measures critical quality parameters and performance attributes of raw and in-process materials.



Process Analytical Technology (PAT)

- It enables in-process data to be used for assessing the quality of a batch during manufacture,
- significantly reduces the need for finished product testing,
- and as a result, improves lead times.
- A mechanism to design, analyze and control pharmaceutical manufacturing processes through the measurement of critical process parameters (CPP) which affect product quality attributes (CQA)

Process Analytical Technology (PAT)

- Applications in upstream (culture or fermentation) and downstream processing
- Initiated by the FDA as part of the 21st Century GMP initiative in 2001 with the goal of increasing productivity
- Analytical in PAT includes chemical, physical microbiological, and/or mathematical analyses
- Go to www.biaseparations.com for free educational webinar: **Meeting the challenges of applying PAT to Biopharmaceutical Manufacturing by Susan Jones.**

CIMac (Convective Interaction Media analytical columns) for PAT

- CIMac QA
- CIMac DEAE
- CIMac SO3
- CIMac EDA
- CIMac pDNA

CIMac columns

- CIMac
  - ID: 5.2 mm ID x 5 mm L
  - Column Size = 100 µL
  - Max Pressure = 150 bar
  - Flow rates = 0.2 – 2 ml/min
  - Operating Temp = 4 – 40 C
  - Working pH Range = 2 - 13
  - Cleaning pH Range = 1 - 14

CIMac Products

- **Currently available CIMac products – general purpose columns**

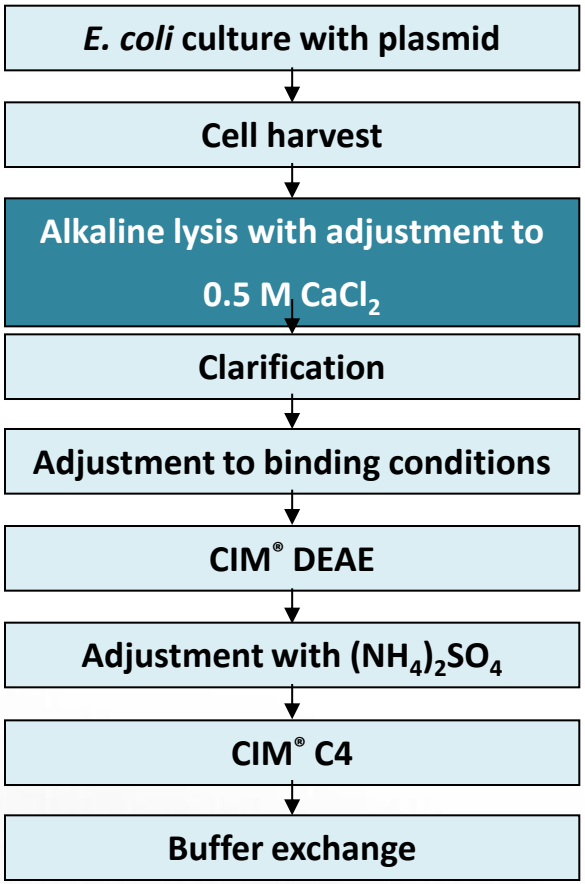
Product number	Product name	Description
110.5113	CIMac QA	Strong anion-exchange monolithic analytical column
110.5114	CIMac DEAE	Weak anion-exchange monolithic analytical column
110.5116	CIMac EDA	Weak anion-exchange monolithic analytical column + activated chemistry for immobilizations
111.6157	CIMac SO3	Strong cation-exchange monolithic analytical column

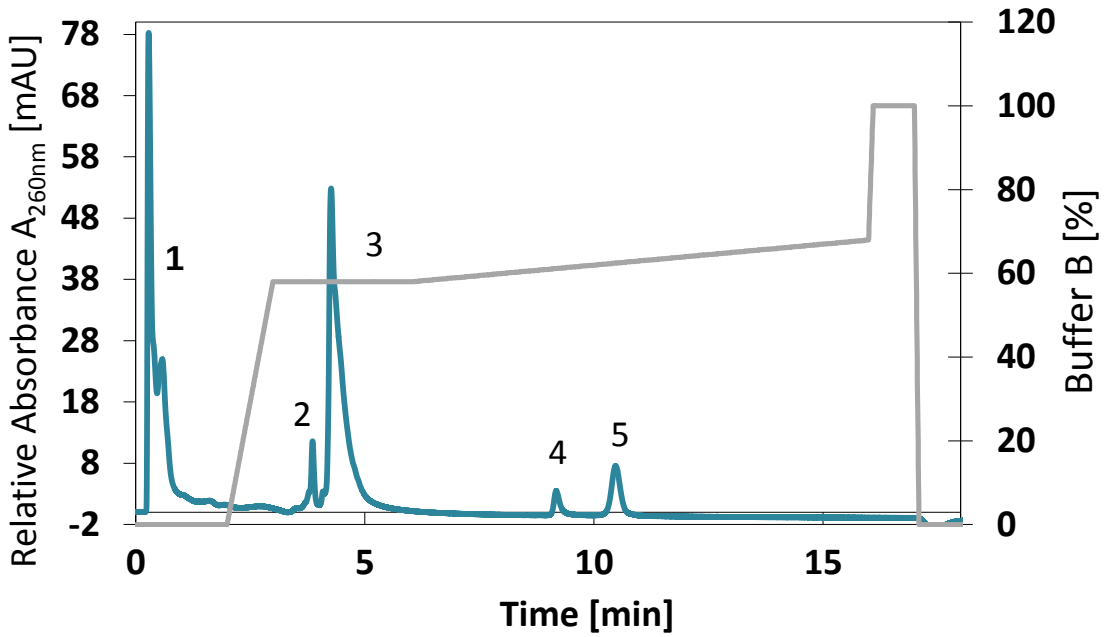
CIMac pDNA

Product number	Product name	Description
150.0001	CIMac pDNA column	Weak anion-exchange monolithic analytical column optimized for the HPLC analytics of plasmid DNA

- DEAE monolithic matrix with a controlled ligand density and structural characteristics
  - 5.2 mm ID x 15 mm L, V = 0.32 mL
- Flow rates: 0.2 – 2 mL/min
- Maximum pressure over the column: 100 bar

CIMac™ pDNA Analytical Column





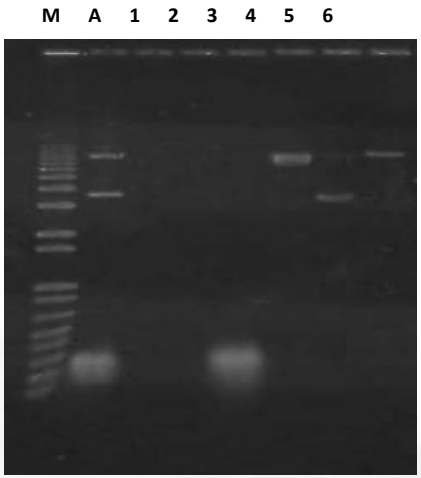
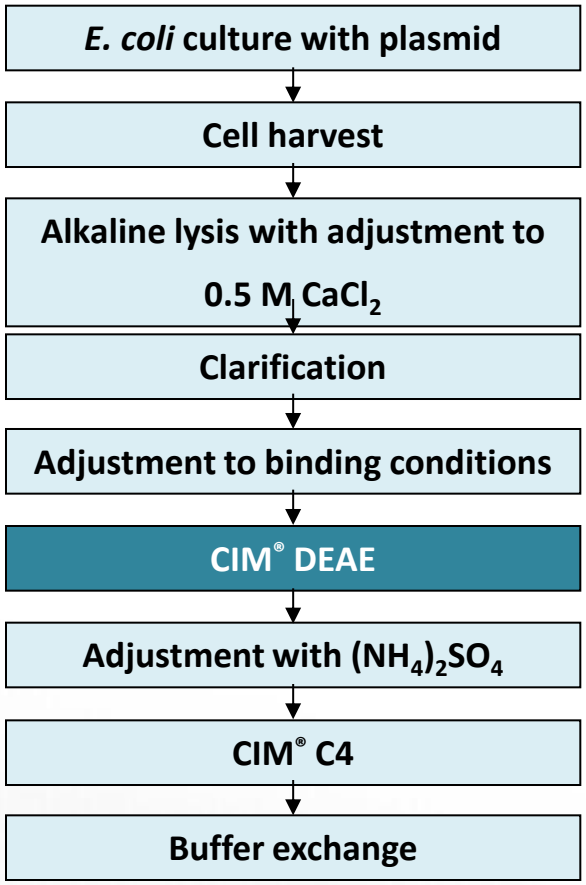
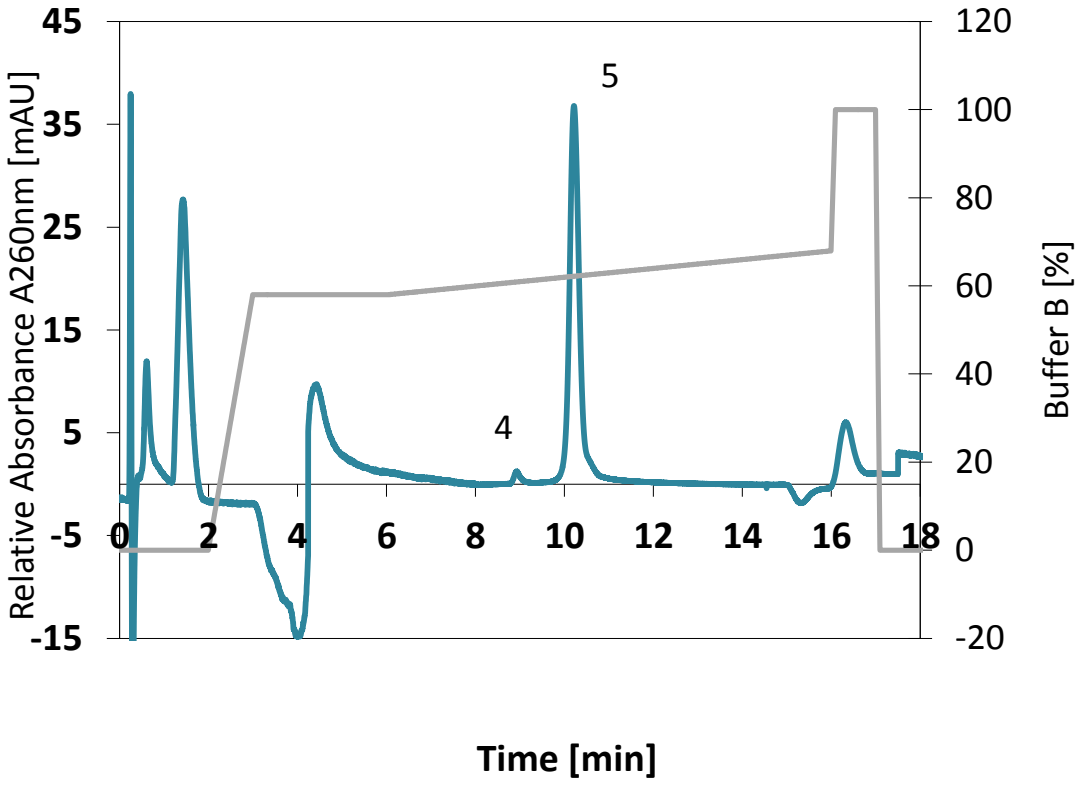


Figure 1: Agarose gel electrophoresis - Molecular weight marker (lane M), sample alkaline lysate plasmid pEGFP-N1 (lane A), peak 1 (lane 1), peak 2 (lane 2), peak 3 (lane 3), peak 4 (lane 4), peak 5 (lane 5), pDNA open circular form standard (lane 6)

CIMac™ pDNA Analytical Columns





Conditions: Flow rate – 1 ml/min; Buffer A – 200 mM Tris pH 8.0 and buffer B – 200 mM TRIS + 1 M NaCl pH 8.0; Injection volume – 20 µl; Sample was diluted 1:3 with water; UV detection – 260 nm; Peak 1 and Peak 2 – other impurities, Peak 3 – RNA, Peak 4 – OC pDNA, Peak 5 – SC pDNA.

CIMac™ pDNA Analytical Columns

E. coli culture with plasmid

↓

Cell harvest

↓

Alkaline lysis with adjustment to 0.5 M $CaCl_2$

↓

Clarification

↓

Adjustment to binding conditions

↓

CIM® DEAE

↓

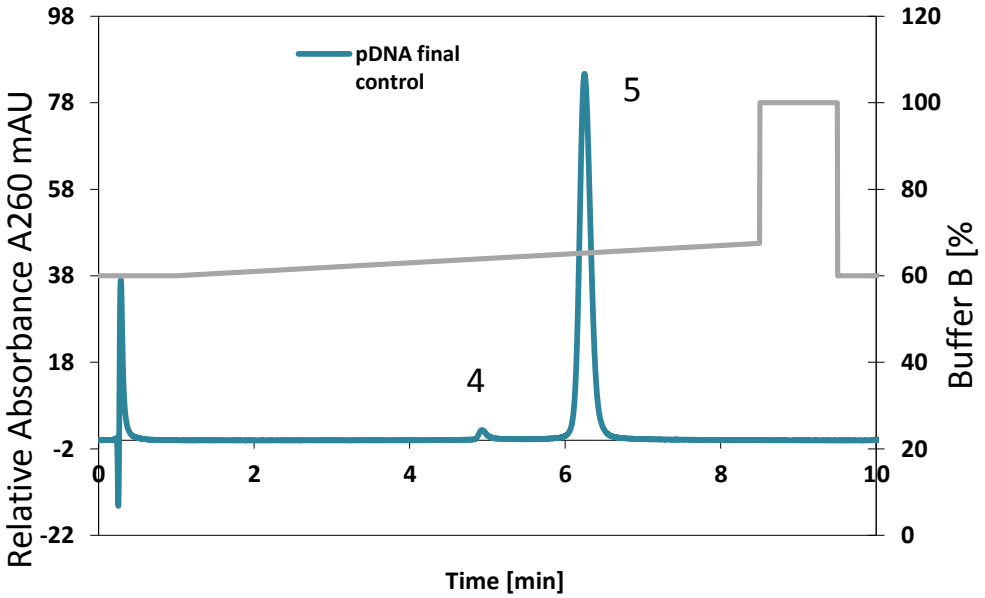
Adjustment with $(NH_4)_2SO_4$

↓

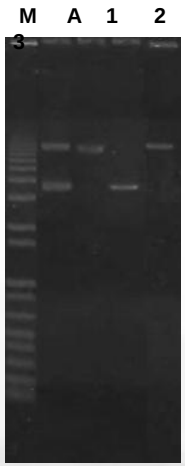
CIM® C4

↓

Buffer exchange



Conditions: Flow rate – 1 ml/min; Buffer A – 200 mM Tris pH 8.0 and buffer B – 200 mM TRIS + 1 M NaCl pH 8.0; Injection volume – 5 µl; UV detection – 260 nm; Peak 1 – OC pDNA form; Peak 2 – SC pDNA form;



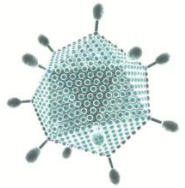
Topoisomers	
OC	2 %
SC	98 %

Figure 2: Agarose gel electrophoresis - Molecular weight marker (lane M), final product of plasmid pEGFP-N1 (lane A), peak 1 (lane 1), peak 2 (lane 2), pDNA open circular form standard (lane 3).

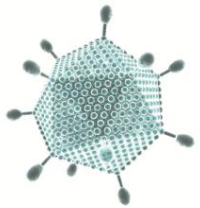
CIMac (Convective Interaction Media analytical columns) for PAT

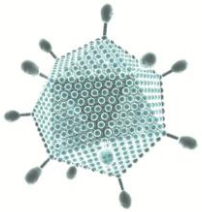
- CIMac QA
- CIMac DEAE
- CIMac SO3
- CIMac EDA
- CIMac pDNA

CIMac Analytical Columns for AdV



- Fast analytics of Adenoviruses (AAVs, other viruses and VLPs)
- Fast finger-printing of your Production Process
- In-process Control – improving you production process
- Final Control





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June 2014

Portorož, Slovenia

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