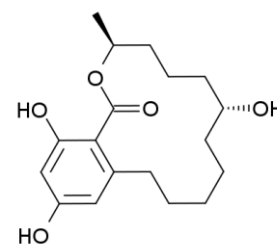


Manual

aokinImmunoClean Immunoaffinity columns for the quantification of Zeranol



Zeranol

1.1. General information

The methods listed in this manual are intended for customers with HPLC systems. The **aokinImmunoClean ZEN** columns can be used with AOAC Official Methods.

aokinImmunoClean ZEN columns have been tested and optimized for quantitative measurement of Zeranol (INN, USAN, BAN, brand names Frideron, Ralabol, Ralgro, Ralone, Zerano; developmental code names MK-188, P-1496 or zearanol, also known as α -zearalanol or simply zearalanol).

aokinImmunoClean ZEN columns are used for quantification of Zeranol in meat or other animal products and in urine. For all questions relating to the optimal use of our columns, please contact our experienced technical staff who will be glad to assist you (info@aokin.com).

To measure Zeranol levels, samples are prepared by mixing with an extraction solution, followed by blending, diluting and filtering. The extract is then applied to the **aokinImmunoClean ZEN** column. The columns contain specific antibodies. The mycotoxin binds to the antibody on the column. The column is then washed to remove impurities of the sample. By passing methanol through the column, the antibody gets denatured and toxin is released. The sample can then be injected into an HPLC system.

1.2. Zeranol

Zeranol is a synthetic nonsteroidal estrogen of the resorcylic acid lactone group related to mycoestrogens found in fungi in the *Fusarium* genus and is used mainly as an anabolic agent in veterinary medicine (ZEN, Zeara), in wheat and other grains. Zeranol is used for use as a growth promoter in livestock, including beef cattle in the United States. In Canada, it is approved for use in beef cattle only. Its application is not approved for use in the European Union.



1.3. Limitations, shelf life and storage

This product has been designed for use with the protocol and reagents described on the following pages. Do not use materials beyond the expiration date. Deviation from these instructions may not yield optimum results. Do not freeze columns or reagents. Do not keep them in the heat. Store at 2-8°C. It is recommended that reagents should be at ambient temperature for usage, best at 18-22°C.

1.4. General recommendation

- Perform test from beginning to end without interruptions.
- Load sample on column immediately
- Mix the eluate in the cuvette very well before injecting eluate into HPLC.
- Avoid contact of any test reagents or solutions (such as acetonitrile, methanol or column eluate) with rubber or soft flexible plastic. These materials may leach fluorescence into the sample.
- Maintain a slow and steady flow rate through the **aokinImmunoClean ZEN** column (1-2 drops/second) during sample loading.
- Elute the column with an incubation step of 3 minutes and at a rate of 1 drop for every 2-3 seconds.

1.5. Types of columns

		
Column type	wide bore	spin
Order No.:	IC-C-11-25	IC-M-11-50
Package size:	25 units / pack	50 units / pack
Elution volume	3 mL = 1 mL + 2 mL	500 µL = 200 µL + 300 µL
Recommended loading:	< 500 ng	< 100 ng

Use of adapters and reservoirs for loading recommended (Order no.: LB-08-13)

1.6. Preparation

1.6.1. Cleaning

All equipment has to be clean and not contaminated with materials that might cause interference with the analysis. All equipment should be washed with a mild detergent solution and then rinsed thoroughly with purified water. This includes glass ware, adapters and syringe barrels used for sample reservoirs. In between assays it is sufficient to rinse with methanol and water. This helps to prevent cross-contamination of samples.

1.6.2. Preparation of reagents

Prepare solutions every week or as needed.

Extraction solvent: Methanol/PBS

Use Methanol HPLC grade only. Use 700 mL methanol and 300 mL PBS buffer, mix.

Diluting buffer: PBS

8.0 g NaCl, 1.2 g Na₂HPO₄, 0.2 g KH₂PO₄, 0.2 g KCl, dissolve in approximately 990 mL purified water, adjust pH to 7.0 with concentrated HCl, bring to 1 liter with purified water.

Wash buffer: PBS/Methanol

Use 100 mL methanol and 900 mL PBS, mix.

Methanol for elution

Use HPLC Grade methanol only.

HPLC Mobile Phases

Acetonitrile:Water:Methanol (45:45:10)

HPLC Grade Acetonitrile: 450 mL

HPLC Grade Methanol: 100 mL

Purified Water: 450 mL

Total Volume: 1000 mL

aokin AG Robert Rössle Str. 10
D-13125 Berlin / Germany

Telephone: +49 (0)30 9489 2160
Fax : +49 (0)30 9489 2161

web : <http://www.aokin.com>
mail : info@aokin.com

Subject to change without notice.

aokin AG 07/2020

FB-619-11-R3

Methanol:0.01 M Acedic Acid (3:1)
HPLC Grade Methanol: 750 mL
0.01 M Acedic Acid: 250 mL
Total Volume: 1000mL

Water:Methanol:Acetonitrile (40:30:30)
HPLC Grade Acetonitrile: 300 mL
HPLC Grade Methanol: 300 mL
Purified Water: 400 mL
Total Volume: 1000 mL

Solutions should be filtered and degassed before use.

Prepare Working Solutions of Zeranol (5 µg/mL):
100 µL of Zeranol Standard (50 µg/mL)
900 µl Acetonitrile
Total Volume: 1 mL

Prepare Zeranol spiked sample at 250 µg/kg
Add 25 µL Zeranol Standard (50 µg/mL) sample to 5 g sample

1.7. Materials required for the sample preparation and the HPLC

<i>aokinImmunoClean C ZEN</i>	(IC-C-11-25, 25 units/pack)
<i>aokinImmunoClean M ZEN</i>	(IC-M-11-50, 50 units/pack)
<i>aokin</i> Filter Paper	(LB-05-07-100, 100 units/pack)
Glass fiber filters GF/F	(LB-04-13-GF/F-100, 100 units/pack)
Reaction tubes (2 ml, with lid)	(LB-05-05, 500 units/pack)
Test tubes (15 ml, with lid)	(LB-05-01-100, 100 units/pack)
Test tubes (50 ml, with lid)	(LB-03-02-1000, 1 L)
Methanol, HPLC Grade	
Sodium Chloride, pure	
Acetonitrile, HPLC Grade	
Distilled, reverse osmosis or deionized water	
Graduated cylinder stand (50 mL)	(LB-08-16, 1 unit)
Graduated cylinder stand (250 mL)	(LB-08-17, 1 unit)
Cuvette Rack	(LB-05-04)
Digital Scale	(LB-07-04, 1 unit)
Commercial blender, with metal or glass beaker for use with Acetonitrile mixtures	(EX-08, 1 unit)
Commercial blender, with plastic beaker (200 mL) for use with Methanol mixtures	(EX-07-06, 1 unit)
Vacuum-pump (diaphragm pump)	(LB-04-10, 1 unit)
Trap for Vacuum-pump (vacuum bottle), 500 mL	(LB-04-12, 1 unit)
Vacuum manifold	(LB-04-09, 1 unit)
Filter funnel (for retainig paper filters)	(LB-06-01, 1 unit)
Adjustable Micropipette, 1000 µL	(LB-04-05-1000, 1 unit)
Micropipette tips for adjustable Micropipette, 1000 µL	(LB-04-08-1000L, 500 units/pack)

1.8. Set up and equilibration of columns

Allow column to be at ambient temperature. Remove bottom cap and place the column onto a vacuum manifold, or in a pump stand or collection tube. Open top cap and fill column with wash buffer. Connect adapter and a reservoir to the column. Use a flow rate of 1 mL/min and have 1-2 ml pass through the column. This step ensures an equilibration of the column. Close the valve again to stop the flow.

2. Points of critical importance for reproducibility and recovery

2.1. Representative sampling

A representative sample is essential for accurate and reliable results. Samples should be collected and homogenized before taking a subsample.

2.2. Sample preparation

Different procedures require different reagents. Please make sure that your protocol consists of the following points:

- Adjust to neutral pH.
- Remove all precipitation by glassfiber filtration using a 1.7 µm mesh size.
- Equilibrate column to room temperature, best by rinsing with wash buffer.
- Load column with flow rate of 1 mL/min.
- Wash column with wash buffer
- Dry column by vacuum or air pressure.
- 1 mL apply Methanol. Incubate for 3 minutes by stopping flow. Apply 2 mL Methanol
- Elute by vacuum or air pressure at 1 mL/minute or by back flushing with a syringe.
- Quantify the concentration by comparing the sample peak height or area to the standard.

aokinImmunoClean ZEN columns have been optimized for quantitative measurement of Zeranol in animal products. Test methods vary in the amount of sample passed through the affinity column resulting in different limits of detection.

General recommendation:

- Perform test from beginning to end without interruptions.
- Load sample on column immediately after dilution.
- Avoid contact of any test reagents or solutions (such as acetonitrile, methanol or column eluate) with rubber or soft flexible plastic. These materials may leach chemicals into the sample.
- Maintain a slow and steady flow rate through the column during sample loading.
- Elute the column slowly, do an incubation step.

Example Procedures:

A. Standard procedure for Aquatic Products and Animal Derived Food

Sample extraction:

- Place 5.0 g of sample (e.g. muscle tissue) homogenate into 50mL polypropylene centrifuge tube
- Add to tube 10ml 0.05M Sodium acetate and 20 µl Glucuronidase/Arylsulfatase, incubate at 37°C for 12h
- Add 10 ml Acetonitrile and 200ul 1.0 M NaOH into the tube.
- Shake for 30 min with an orbital shaker
- After centrifugation at 4000 rpm for 3 min, the supernatant was decanted into a clean tube

Dilution:

- Pipette 10 ml supernatant extract into a clean vessel.
- Dilute extract with 30 ml pH 7.4 PBS. Mix well.
- Filter diluted extract through glass microfiber filter and collect filtrate in a clean container.

B. Setup column

- Connect *aokin*CAadapter and a 10 mL syringe barrel (best flow when bubble free).
- Place on vacuum manifold or pump stand.
- Flush with 2 mL PBS

C. Column chromatography:

- Pass 8 mL filtered diluted extract (8 ml = 0.5 g sample equivalent) through column at a steady slow rate of about 1 drops/second until air comes through column.
- Pass 10 mL of distilled water or PBS through the column at a rate of about 2 drops/second.

D. Recovery

- Recovery of > 80% tested in PBS/Methanol 10%
- Exact results are found in the attached data sheet.
- Test the recovery of *aokinImmunoClean ZEN* columns with your protocol and HPLC technique, and use a correction factor as determined.

E. HPLC setup

Example 1:

- Column: reverse phase C18, 4.6 x 75 mm (3 µm)
- Mobile phase: acetonitrile:water (10:90 by volume) degassed, isocratic
- Flow rate: 0.6 mL/min
- Injection volume: 50 µL
- Lamp: deuterium or mercury lamp
- Detection: 218 nm
- Sample loop: 200 µL
- Retention time: 5-6 minutes

Example 2:

- Column: reverse phase C18, 3.9 x 300 mm (4 µm) (Waters part #WAT011695)
- Mobile phase: acetonitrile:water (10:90 by volume) degassed, isocratic
- Flow rate: 0.6 mL/min.
- Injection volume: 50 µL
- Lamp: deuterium or mercury lamp
- Detection: 218 nm
- Sample loop: 200 µL
- Retention time: 10-11 minutes

Example 3:

- Column: reverse phase Synergi 4 µm, Hydro-RP, 250 x 4.6 mm, with precolumn, Phenomenex Co.
- Column temperature: 30°C
- Mobile phase: acetonitrile:water (10:90 by volume) degassed, isocratic
- Flow rate: 1.2 mL/min.
- Injection volume: 70 µL
- Detection: 220 nm, Diode array detector
- Retention time: 5.6 – 5.8 minutes

There are a number of equally suitable components that can be used for these examples.

Trouble shooting

3.1. Problem: Samples do not mix

- If samples are very absorbent double the amount of extraction liquid and double the extract volume passed through the column to 20 mL keep the same sensitivity of your analysis system.

3.2. Problem: Overestimation

- Check calculation for spiked sample and standard curve.

3.3. Problem: Underestimation

- Check the extraction procedure.
- Check pH to be neutral before loading the column.
- Control the flow rates and the incubation step for elution.
- Slow down the elution or use a larger amount of elution volume.
- Check calculations for spiked samples.
- Make sure to use the correct HPLC procedure.
- Check calculation for spiked sample and standard curve.
- Control the procedure with analyzing a reference matrix material.

Liabilities

The customer is solely and fully responsible for educating oneself about the proper testing and sampling procedures using this product. **aokin** makes no warranty of any kind. **aokin** is not liable or responsible for any unsatisfactory or faulty results.

Ordering and technical support

To place an order please contact **aokin** at info@aokin.com

For technical information please contact info@aokin.com

Please contact the application laboratory and service staff for all questions relating to the optimal use of our columns, we will be glad to assist you.

aokin AG Robert Rössle Str. 10
D-13125 Berlin / Germany

Telephone: +49 (0)30 9489 2160
Fax : +49 (0)30 9489 2161

web : <http://www.aokin.com>
mail : info@aokin.com

Subject to change without notice.

aokin AG 07/2020

FB-619-11-R3

*aokin is ISO 9001 certified.
aokin laboratory is accredited ISO 17025.*