Alcian Blue for PAS

REF 860-003

05279194001

IVD Σ 75

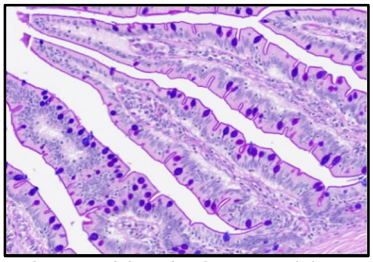

Figure 1. Alcian Blue for PAS staining of small intestine in conjunction with PAS Stain Core Kit.

INTENDED USE

Alcian Blue for PAS, in conjunction with the PAS Staining Kit OR the PAS Stain Core Kit, is intended for laboratory use as a qualitative histologic stain to differentiate between acid and neutral mucins by light microscopy in sections of formalin-fixed, paraffin-embedded (FFPE) tissue on a BenchMark Special Stains instrument.

This product should be interpreted by a qualified pathologist in conjunction with histological examination, relevant clinical information, and proper controls.

This product is intended for in vitro diagnostic (IVD) use.

SUMMARY AND EXPLANATION

Alcian Blue for PAS is a single bottle kit used in conjunction with a VENTANA PAS kit (PAS Stain Core Kit or PAS Staining Kit). The VENTANA PAS kits are based on the first histochemical use of this technique originally described by McManus in 1946 to visualize mucins, glycogen, basement membrane and fungal organisms through the combination of oxidation of polysaccharides by periodic acid and staining with the Schiff's reagent.[1]

Mucins are a key component of goblet cells, intestinal mucosal epithelial cells, whose function is to synthesize and secrete mucus.[2] Goblet cells are normally found in the secretory epithelial cells of the small and large intestines, and are generally absent from the esophagus or stomach.[3]

Alcian Blue for PAS is used to aid the pathologist in the identification of goblet cells. The presence of goblet cells in the esophagus and stomach is abnormal and the stain aids the pathologist in the diagnosis of intestinal metaplasia and Barrett's esophagus.

PRINCIPLE OF THE PROCEDURE

The VENTANA PAS kits use Periodic Acid reagent to oxidize glycols to aldehydes. The Schiff's Reagent forms a colorless dialdehyde compound that is transformed to the magenta staining of glycol containing cellular components.[4] The chemical properties of Alcian Blue enable the dye to detect weakly acidic mucins in goblet cells. Alcian Blue for PAS, with a pH of 2.5, stains acid mucopolysaccharides blue.[5]

This kit is optimized for use on BenchMark Special Stains instruments. The reagents are applied to tissue on microscope slides and mixed over the entire specimen.

MATERIAL PROVIDED

The reagent vial is supplied in a barcode labeled carrier to insert into the reagent tray of the instrument. Each kit contains sufficient reagent for 75 tests:

One 22 mL vial of Alcian Blue contains approximately 1.2% alcian blue in a 3% acetic acid solution.

One vial insert with sipping straw.

Reconstitution, Mixing, Dilution, Titration

No reconstitution, mixing, dilution, or titration of kit reagents is required. Further dilution of any of the reagents may result in unsatisfactory staining.

The reagents in this kit have been optimally diluted for use on BenchMark Special Stains instruments.

MATERIALS REQUIRED BUT NOT PROVIDED

Not all products listed in the method sheet may be available in all geographies. Consult your local support representative.

The following reagents and materials may be required for staining but are not provided:

1. Recommended control tissue
2. Microscope slides, positively charged
3. BenchMark Special Stains instrument
4. BenchMark Special Stains Deparaffinization Solution (10X) (Cat. No. 860-036 / 06523102001)
5. BenchMark Special Stains Liquid Coverslip (Cat. No. 860-034 / 06523072001)
6. BenchMark Special Stains Wash II (Cat. No. 860-041 / 08309817001)
7. A VENTANA PAS kit
    a. PAS Stain Core Kit (Cat. No. 860-048 / 09328823001) and Special Stains Hematoxylin (Cat. No. 860-071 / 09149457001)
    b. PAS Staining Kit (Cat. No. 860-014 / 05279291001)
8. General purpose laboratory equipment

STORAGE AND STABILITY

Alcian Blue for PAS should be stored at 15-30°C.

When properly stored, unopened and opened reagents are stable to the date indicated on the label. Do not use reagent beyond the expiration date indicated on the kit.

There are no obvious signs to indicate instability of these reagents; therefore, controls should be run simultaneously with unknown specimens. Contact your local support representative if positive control material shows a decrease in staining as it could indicate reagent instability.

SPECIMEN PREPARATION

FFPE tissues are required for use with this product and BenchMark Special Stains instruments. The recommended tissue fixative is 10% neutral buffered formalin.[4]

Perform specimen collection and storage according to Histotechnology: A Self Instructional Text.[4] Cut sections to the appropriate thickness, approximately 4 µm, and place the sections on positively charged glass slides.

1. Dry the slides.[4]
2. Print appropriate barcode label(s).
3. Apply barcode labels to the frosted end of the slides prior to loading the slides onto the instrument (see the instrument User Guide for correct application of labels).

Refer to the Instructions for Use section for the recommended protocol for the BenchMark Special Stains instrument.

WARNINGS AND PRECAUTIONS

1. For in vitro diagnostic (IVD) use.
2. For professional use only.
3. Do not use beyond the specified number of tests.
4. Positively charged slides may be susceptible to environmental stresses resulting in inappropriate staining. Ask your Roche representative for more information on how to use these types of slides.
5. Materials of human or animal origin should be handled as biohazardous materials and disposed of with proper precautions. In the event of exposure, the health directives of the responsible authorities should be followed.[6,7]
6. Avoid contact of reagents with eyes and mucous membranes. If reagents come in contact with sensitive areas, wash with copious amounts of water.
7. Avoid microbial contamination of reagents as it may cause incorrect results.
8. For further information on the use of this device, refer to the BenchMark Special Stains instrument User Guide, and instructions for use of all necessary components located at navifyportal.roche.com.
9. Consult local and/or state authorities with regard to recommended method of disposal.
10. Product safety labeling primarily follows EU GHS guidance. Safety data sheet available for professional user on request.
11. To report suspected serious incidents related to this device, contact the local Roche representative and the competent authority of the Member State or Country in which the user is established.

INSTRUCTIONS FOR USE

Prepare Reagent Vial

Before first use, a vial insert and sipping straw must be placed in the reagent vial.

Remove the shipping cap from the vial and place the insert and straw into the vial. The insert and sipping straw should be left in the vial, once the vial has been opened.

Staining Procedure

1. Load reagents and slides onto the instrument.
2. Place the soft cap into the slot on the reagent holder when the reagent is in use.
3. Perform the staining run according to the recommended protocol in Table 1 or Table 2, and the instructions in the User Guide.
4. When the run is complete, remove the slides from the instrument.
5. Use the soft cap to cover the reagent vial when reagent is not in use.
6. After use, store the reagents according to the recommended storage conditions.

Recommended Protocol

The parameters for the automated procedures can be displayed, printed and edited according to the procedure in the instrument User Guide.

The following procedures allow flexibility to accommodate user preference. This product has been optimized for use with BenchMark Special Stains instruments but the user must validate results obtained with this product.

Table 1. Recommended staining protocol for Alcian Blue for PAS with the PAS Stain Core Kit and Special Stains Hematoxylin on a BenchMark Special Stains instrument.

Staining Procedure	S PAS Alcian Blue
Protocol Step	Method
Deparaffinization	Select to automate paraffin removal
Baking (optional)	The default is not selected. 75°C for 4 minutes is recommended.
Diastase*	Not selected. This option must be validated by the user.
Optimize Alcian Blue Intensity (Alcian Blue)	The default is 8 minutes, at 37°C. Select to enable adjustment of incubation time and temperature. Select an incubation temperature from 37°C to 60°C: 37°C, lighter staining of mucin 60°C, darker staining of mucin Select an incubation time from 8 to 16 minutes: 8 minutes, lighter staining of mucin 16 minutes, darker staining of mucin
Optimize PAS	The default is Periodic Acid for 4 minutes, Schiff's A + Schiff's B for 12 minutes, at 37°C. Select to enable adjustment of incubation time and temperature. Select an incubation temperature from 37°C to 60°C: 37°C, lighter staining of mucin 60°C, darker staining of mucin Select a Periodic Acid incubation time from 4 to 20 minutes: 4 minutes, lighter staining of mucin 20 minutes, darker staining of mucin Select a Schiff's A + Schiff's B incubation time from 8 to 20 minutes: 8 minutes, lighter staining of mucin 20 minutes, darker staining of mucin
Optimize Hematoxylin Intensity	The default is 4 minutes. Select to enable adjustment of incubation time: No Hematoxylin 4 minutes, lighter nuclear staining 12 minutes, darker nuclear staining

* Additional procedure option available for products that can be used in conjunction with the PAS Stain Core Kit and Alcian Blue for PAS.

**To adjust staining preferences, increment the stain temperature and incubation time one parameter at a time.

Table 2. Recommended staining protocol for Alcian Blue for PAS with the PAS Staining Kit on a BenchMark Special Stains instrument.

Staining Procedure	S PAS
Protocol Step	Method
Deparaffinization	Select to automate paraffin removal
Baking (optional)	The default is not selected. 75°C for 4 minutes is recommended.
Alcian Blue	The default is not selected. Select to enable Alcian Blue and Alcian Blue for PAS options.
Diastase for PAS AB* (optional)	Not selected. This option must be validated by the user.
Optimize Stain Intensity (PAS Alcian Blue)	The default is 8 minutes. Select to enable adjustment of staining intensity.** Select an incubation time from 8 to 16 minutes: 8 minutes, lighter staining of mucin 16 minutes, darker staining of mucin

Staining Procedure	S PAS
Protocol Step	Method
Hematoxylin for Alcian Blue (optional)	The default is not selected. Select to enable application of Hematoxylin. Select Optimize Hematoxylin Intensity to enable adjustment of Hematoxylin incubation time.
Optimize Hematoxylin Intensity (PAS Hematoxylin)	The default is 4 minutes. Select to enable adjustment of incubation time: 4 minutes, lighter nuclear staining 12 minutes, darker nuclear staining

*Additional procedure option available for products that can be used in conjunction with the PAS Staining Kit and Alcian Blue for PAS.

**To adjust staining preferences, increment the stain temperature and incubation time one parameter at a time.

Recommended Post-Instrument Processing

1. Dehydrate the slides in two changes of 95% ethanol to remove the leftover solution, followed by three changes of 100% ethanol.
2. Clear slides in 3 changes of 100% xylene.
3. Coverslip with permanent mounting media.
4. Compatible with the VENTANA HE 600 system coverslipping protocol. For further instructions, refer to the VENTANA HE 600 system User Guide.

QUALITY CONTROL PROCEDURE

An example of a positive control material would be FFPE human tissue with acid and neutral mucins present (colon, small intestine, or salivary glands). Control tissue should be fresh autopsy, biopsy, or surgical specimen prepared or fixed as soon as possible in a manner identical to test sections. Such tissues should monitor all steps of the analysis, from tissue preparation through staining.

Use of a tissue section fixed or processed differently from the test specimen provides control for all reagents and method steps except fixation and tissue processing.

The cellular components of other tissue elements may serve as the negative control.

Optimal laboratory practice is to include a positive control section on the same slide as the test tissue. This helps identify any failures applying reagents to the slide. Control tissue may contain both positive and negative staining elements and serve as both the positive and negative control.

The control tissue must be tested with each run.

Known positive tissue controls should only be utilized for monitoring the correct performance of processed tissues and test reagents, not as an aid in formulating a specific diagnosis of patient samples.

If the positive tissue components fail to demonstrate positive staining, results with the test specimens should be considered invalid. If the negative components demonstrate positive staining, results with patient specimens should also be considered invalid.

Unexplained discrepancies in control results should be referred to the local support representative immediately. If quality control results do not meet specifications, patient results are invalid. The cause must be identified and corrected, and the patient samples repeated.

STAINING INTERPRETATION / EXPECTED RESULTS

Alcian Blue for PAS, in conjunction with PAS Stain Core Kit or PAS Staining Kit, is tested to demonstrate acid and neutral mucins.

- Acid mucins: blue
- Neutral mucins: magenta
- Nuclei: purple

SPECIFIC LIMITATIONS

Only positively charged microscope slides have been used and validated for this assay.

PERFORMANCE CHARACTERISTICS

ANALYTICAL PERFORMANCE

Staining tests for sensitivity, specificity, and precision were conducted and the results are listed below.

Sensitivity and Specificity

Analytical sensitivity and specificity for normal and diseased tissue cases was evaluated in conjunction with PAS Stain Core Kit and PAS Staining Kit. All evaluated tissue cases (71/71 with PAS Stain Core Kit and 93/93 with PAS Staining Kit) passed for acceptable staining as shown in Table 3 and Table 4.

Table 3. Sensitivity/Specificity of Alcian Blue for PAS was determined by testing the following FFPE normal tissues.

Tissue	PAS Stain Core Kit # cases passed / # tested	PAS Staining Kit # cases passed / # tested
Colon	6 / 6	6 / 6
Small Intestine	10 / 10	9 / 9
Esophagus	6 / 6	7 /7
Stomach	6 / 6	9 / 9
Skin	6 / 6	15 / 15
Salivary Gland	6 / 6	11 / 11

Table 4. Sensitivity/Specificity of Alcian Blue for PAS was determined by testing the following FFPE diseased tissues.

Tissue	PAS Stain Core Kit # cases passed / # tested	PAS Staining Kit # cases passed / # tested
Barrett's Esophagus	17 / 17	11 / 11
Intestinal Metaplasia (Esophagus)	7 / 7	16 / 16
Intestinal Metaplasia (Stomach)	7 / 7	9 / 9

Precision

Precision of Alcian Blue for PAS was determined in conjunction with PAS Stain Core Kit and PAS Staining Kit across multiple runs, days, instruments, and reagent lots using multiple cut slides from 3 normal colon tissue cases and 3 normal small intestine tissue cases. All acceptance criteria were fully met. Precision studies were performed according to Table 5.

Table 5. Precision slide studies for Alcian Blue for PAS.

Parameters Tested	# of conditions	PAS Stain Core Kit # cases passed / # tested	PAS Staining Kit # cases passed / # tested
Run to Run	3 runs, same day	54 / 54	54 / 54
Day to Day	5 days	90 / 90	90 / 90
Instrument to Instrument	3 instruments	54 / 54	54 / 54
Intra Run	same day, same instrument	54 / 54	54 / 54
Lot to Lot	3 lots	54 / 54	54 / 54

TROUBLESHOOTING

1. Section thickness may affect quality and intensity of staining. If staining is inappropriate, contact your local support representative for assistance.
2. Necrotic or autolyzed tissue may exhibit nonspecific staining.
3. If the positive control is negative, tissue may have been improperly collected, fixed, or deparaffinized. Follow the proper procedure for collection, storage, and fixation.
4. If the positive control is negative, check that the slide has the proper barcode label. If the slide is labeled properly, check the other positive controls from the same run to determine if the controls were properly stained.
5. If excessive background staining occurs: incomplete paraffin removal could cause staining artifacts or no staining. If all paraffin is not removed from the slide, repeat the staining run using the extended deparaffinization option, if available.
6. If tissue sections wash off the slide, confirm the slides are positively charged.
7. Extended stay of the slides on the instrument after run completion may affect quality and intensity of the staining. If the staining is inappropriate, remove slides promptly at the end of the run and proceed to post-instrument processing.
8. For corrective action, refer to the Instructions for Use section, the instrument User Guide or contact your local support representative.

REFERENCES

1. Layton C, Bancroft JD. Bancroft's Theory and Practice of Histological Techniques. In: Elsevier, 2019. Accessed 02/15/2021.
2. Dao D, Le PH. Histology, Goblet Cells. In 04/09/2020 ed. Treasure Island, FL: StatPearls; 2020.
3. Pleskow D, Tolga E. Barrett's Esophagus: Emerging Evidence for Improved Clinical Practice. Elsevier Inc.; 2016.
4. Carson FL, Cappellano C. Histotechnology: A Self Instructional Text, 5th edition. American Society for Clinical Pathology Press; 2020, 2022.
5. Fagan C, Dapson RW, Horobin RW, Kiernan JA. Revised tests and standards for Biological Stain Commission certification of Alcian blue dyes. Biotech Histochem. 2020;95(5):333-340.
6. Occupational Safety and Health Standards: Occupational exposure to hazardous chemicals in laboratories. (29 CFR Part 1910.1450). Fed. Register.
7. Directive 2000/54/EC of the European Parliament and Council of 24 June 2020 on the protection of workers from risks related to exposure to biological agents at work.

NOTE: A point (period/stop) is always used in this document as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols

Ventana uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard (for USA: see elabdoc.roche.com/symbols for more information).

GTIN	Global Trade Item Number
Rx only	For USA: Caution: Federal law restricts this device to sale by or on the order of a physician.

REVISION HISTORY

Rev	Updates
H	Updated to add PAS Stain Core Kit to the Intended Use, Summary and Explanation, Principle of the Procedure, Materials Required but not Provided, Recommended Protocol, Staining Interpretation / Expected Results, and Analytical Performance sections. Updated to current template. Updated figure 1.

INTELLECTUAL PROPERTY

For USA: Rx only

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