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## Microscopy

# Papanicolaou's solution 1a Harris hematoxylin solution

for cytology

For professional use only



In Vitro Diagnostic Medical Device



### Intended purpose

This "Papanicolaou's solution 1a Harris hematoxylin solution - for cytology" is used for human-medical cell diagnosis and serves the purpose of the cytological investigation of sample material of human origin. It is a ready-to-use staining solution that when used together with other *in vitro* diagnostic products from our portfolio makes cytological target structures evaluable for diagnostic purposes (by fixing, staining, counterstaining, mounting) in human gynecological and clinico-cytological specimen materials, for example cervical smears.

Unstained structures are relatively low in contrast and are extremely difficult to distinguish under the light microscope. The images created using the staining solutions help the authorized and qualified investigator to better define the form and structure in such cases. Further examinations may be necessary to reach a definitive diagnosis.

### Principle

Most used staining procedure for cytological specimen is Papanicolaou's technique and is intended for the the staining of exfoliative cells in cytological specimens.

In the first step, the cell nuclei are stained either progressively or regressively with a hematoxylin solution. Nuclei are stained blue to dark violet.

In the progressive hematoxylin staining method, staining is carried out to the endpoint, after which the slide is blued in tapwater.

With the regressive method the material is over-stained and the excess of staining solution is removed by acid rinsing steps, followed by the bluing step.

The structures of nuclei are more differentiated and better visible by the regressive method.

The second staining step is cytoplasmic staining by orange staining solution, especially for demonstration of mature and keratinized cells. The target structures are stained orange in different intensities.

In the third staining step is used the so-called polychrome solution, a mixture of eosin, light green SF and Bismarck brown. The polychrome solution is used for demonstration of differentiation of squamous cells.

Papanicolaou's solution 1a Harris hematoxylin solution gives a blue to dark violet staining result with clinical specimen material.

### Sample material

Gynecological and non-gynecological specimen as sputum, urine, smears from fine needle aspiration biopsies (FNAB), effusions, rinses

### Reagents

Cat. No. 1.09253

Papanicolaou's solution 1a Harris hematoxylin solution 500 ml, 1 l, 2.5 l for cytology

#### Also required:

##### for cytoplasm staining:

Cat. No. 1.06887 Papanicolaou's solution 2b Orange II solution 500 ml, 2.5 l for cytology

or

Cat. No. 1.06888 Papanicolaou's solution 2a Orange G solution (OG6) 500 ml, 1 l, 2.5 l for cytology

##### for differentiation:

Cat. No. 1.09271 Papanicolaou's solution 3a polychromatic solution EA 31 500 ml, 1 l, 2.5 l for cytology

or

Cat. No. 1.09272 Papanicolaou's solution 3b polychromatic solution EA 30 500 ml, 1 l, 2.5 l for cytology

##### required for regressive staining (see "Procedure"):

Cat. No. 1.00316 Hydrochloric acid 25% 1 l, 2.5 l for analysis EMSURE®

Cat. No. 1.06329 Sodium hydrogen carbonate 500 g, 1 kg, 5 kg for analysis EMSURE® ACS,Reag.Ph Eur

### Sample preparation

The sampling must be performed by qualified personnel.

All samples must be treated using state-of-the-art technology.

All samples must be clearly labeled.

Suitable instruments must be used for taking samples and their preparation. Follow the manufacturer's instructions for application / use.

When using the corresponding auxiliary reagents, the corresponding instructions for use must be observed.

### Fixation of smear samples

Wet fixation immediately with spray fixative M-FIX® for min. 10 min or wet fixation immediately in ethanol 96 % for min. 30 min.

When the smears are fixed with M-FIX®, rinsing steps 1 - 4 in the ascending ethanol sequence prior to staining can be omitted.

### Reagent preparation

The Papanicolaou's solution 1a Harris hematoxylin solution is ready-to-use, dilution of the solution is not necessary and merely produces a deterioration of the staining result and the stability.

**It is recommended to filter the solution prior to its use.**

#### Hydrochloric acid 0.1 %, aqueous

For preparation of approx. 100 ml solution mix:

Distilled water	100 ml
Hydrochloric acid 25 %	0.4 ml

#### Sodium hydrogen carbonate solution 1.5 %

For preparation of approx. 1000 ml of solution, add and dissolve:

Sodium hydrogen carbonate	15 g
Distilled water	1000 ml

## Procedure

### Progressive staining

#### Staining in the staining cell

The slides must be immersed and moved briefly in the solutions, simple immersion alone yields inadequate staining results.

The slides should be allowed to drip off well after the individual staining steps, as a measure to avoid any unnecessary cross-contamination of solutions.

The stated times should be adhered to in order to guarantee an optimal staining result.

Slide with fixed smear	
Ethanol 96 %*	10 sec
Ethanol 80 %*	10 sec
Ethanol 70 %*	10 sec
Ethanol 50 %*	10 sec
Distilled water	20 sec
Papanicolaou's solution 1a Harris hematoxylin solution or Papanicolaou's solution 1b Hematoxylin solution S	3 min
Running tap water	3 min
Ethanol 70 %	30 sec
Ethanol 80 %	30 sec
Ethanol 96 %	30 sec
Papanicolaou's solution 2a Orange G solution or Papanicolaou's solution 2b Orange II solution	3 min
Ethanol 96 %	30 sec
Ethanol 96 %	30 sec
Papanicolaou's solution 3a polychromatic solution EA 31 or Papanicolaou's solution 3b polychromatic solution EA 50	3 min
Ethanol 96 %	30 sec
Ethanol 96 %	30 sec
Ethanol 100 %	5 min
Mixture consisting of: Ethanol 100 % + Neo-Clear™ or xylene (1 + 1)	2 min
Clarify with Neo-Clear™ or xylene.	5 min
Clarify with Neo-Clear™ or xylene.	5 min
Mount the Neo-Clear™-wet slides with Neo-Mount™ or the xylene-wet slides with e.g. Entellan™ new and cover glass.	

\* These steps can be omitted when smears are fixed with M-FIX®.

After dehydration (ascending alcohol series) and clarification with xylene or Neo-Clear™, cytological samples can be mounted with water-free mounting agents (e.g. Entellan™ new, DPX new, or Neo-Mount™) and a cover glass and can then be stored.

The use of immersion oil is recommended for the analysis of stained slides with a microscopic magnification >40x.

### Regressive staining

#### Staining in the staining cell

The slides must be immersed and moved briefly in the solutions, simple immersion alone yields inadequate staining results.

The slides should be allowed to drip off well after the individual staining steps, as a measure to avoid any unnecessary cross-contamination of solutions.

The stated times should be adhered to in order to guarantee an optimal staining result.

Slide with fixed smear	
Ethanol 96 %*	10 sec
Ethanol 80 %*	10 sec
Ethanol 70 %*	10 sec
Ethanol 50 %*	10 sec
Distilled water	10 sec
Papanicolaou's solution 1a Harris hematoxylin solution or Papanicolaou's solution 1b Hematoxylin solution S	6 min
Distilled water	10 sec
Hydrochloric acid 0.1%, aqueous	10 sec
Distilled water	10 sec
Sodium hydrogen carbonate solution 1.5 %	1 min
Running tap water	3 min
Ethanol 70 %	30 sec
Ethanol 80 %	30 sec
Ethanol 96 %	30 sec
Papanicolaou's solution 2a Orange G solution or Papanicolaou's solution 2b Orange II solution	3 min
Ethanol 96 %	30 sec
Ethanol 96 %	30 sec
Papanicolaou's solution 3a polychromatic solution EA 31 or Papanicolaou's solution 3b polychromatic solution EA 50	3 min
Ethanol 96 %	30 sec
Ethanol 96 %	30 sec
Ethanol 100 %	5 min
Mixture consisting of: Ethanol 100 % + Neo-Clear™ or xylene (1 + 1)	2 min
Clarify with Neo-Clear™ or xylene.	5 min
Clarify with Neo-Clear™ or xylene.	5 min
Mount the Neo-Clear™-wet slides with Neo-Mount™ or the xylene-wet slides with e.g. Entellan™ new and cover glass.	

\* These steps can be omitted when smears are fixed with M-FIX®.

After dehydration (ascending alcohol series) and clarification with xylene or Neo-Clear™, cytological samples can be mounted with water-free mounting agents (e.g. Entellan™ new, DPX new, or Neo-Mount™) and a cover glass and can then be stored.

The use of immersion oil is recommended for the analysis of stained slides with a microscopic magnification >40x.

## Result

Staining with	3a / EA 31	3b / EA 50
Cytoplasm cyanophilic (basophilic) eosinophilic (acidophilic) keratinized	blue-green to green pink pink-orange	blue-green pink pink-orange
Erythrocytes	red	
Nuclei	blue to dark violet	
Microorganisms	grey-blue, grey-green	

## Technical notes

The microscope used should meet the requirements of a medical diagnostic laboratory.

When using automatic staining systems, please follow the instructions for use supplied by the supplier of the system and software.

Remove surplus immersion oil before filing.

## Analytical performance characteristics

"Papanicolaou's solution 1a Harris hematoxylin solution" stains and thereby visualizes biological structures, as described in the "Result" chapter of this IFU. The use of the product is only to be carried out by authorized and qualified persons, this includes, among other things, sample and reagent preparation, sample handling, histoprocessing, decisions regarding suitable controls and more.

For the following stains, the analytical performance was confirmed in terms of specificity, sensitivity and repeatability of the product with a rate of 100 %:

	Inter-assay Specificity	Inter-assay Sensitivity	Intra-assay Specificity	Intra-assay Sensitivity
Cytological staining				
Nuclei	20/20	20/20	7/7	7/7
Cytoplasm cyanophilic (basophilic)	20/20	20/20	7/7	7/7
Cytoplasm eosinophilic (acidophilic)	20/20	20/20	7/7	7/7

## Analytical performance results

Intra- (performed on the same batch) and inter-assay (performed on different batches) data list the number of correctly stained structures in relation to the number of performed assays.

The results of this Performance Evaluation confirms that the product is suitable for the intended use and performs reliably.

## Diagnostics

Diagnoses are to be made only by authorized and qualified personnel. Valid nomenclatures must be used.

This method can be supplementarily used in human diagnostics.

Further tests must be selected and implemented according to recognized methods.

Suitable controls should be conducted with each application in order to avoid an incorrect result.

## Storage

Store the Papanicolaou's solution 1a Harris hematoxylin solution - for cytology at +15 °C to +25 °C.

Dye precipitation in the staining solution might occur with storing temperatures below +15 °C. In that case the bottles should be put into a water bath of approx. 60 °C for 2 - 3 hours. The solution should be filtered before use.

## Shelf-life

The Papanicolaou's solution 1a Harris hematoxylin solution - for cytology can be used until the stated expiry date.

After first opening of the bottle, the contents can be used up to the stated expiry date when stored at +15 °C to +25 °C.

The bottles must be kept tightly closed at all times.

Avoid exposure to heat.

## Capacity

1.09253 Papanicolaou's solution 1a Harris hematoxylin solution  
1500 - 2500 stainings / 500 ml

1.09254 Papanicolaou's solution 1b Hematoxylin solution S  
1500 - 2500 stainings / 500 ml

1.06888 Papanicolaou's solution 2a Orange G solution)  
1500 - 2000 stainings / 500 ml

1.06887 Papanicolaou's solution 2b Orange II solution  
1500 - 2000 stainings / 500 ml

1.09271 Papanicolaou's solution 3a polychromatic solution EA 31  
1500 - 2000 stainings / 500 ml

1.09272 Papanicolaou's solution 3b polychromatic solution EA 50  
1500 - 2000 stainings / 500 ml

## Additional instructions

### For professional use only.

In order to avoid errors, the application must be carried out by qualified personnel only.

National guidelines for work safety and quality assurance must be followed. Microscopes equipped according to the standard must be used.

If necessary use a standard centrifuge suitable for medical diagnostic laboratory.

## Protection against infection

Effective measures must be taken to protect against infection in line with laboratory guidelines.

## Instructions for disposal

The package must be disposed of in accordance with the current disposal guidelines.

Used solutions and solutions that are past their shelf-life must be disposed of as special waste in accordance with local guidelines. Information on disposal can be obtained under the Quick Link "Hints for Disposal of Microscopy Products" at [www.microscopy-products.com](http://www.microscopy-products.com). Within the EU the currently applicable REGULATION (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 applies.

## Auxiliary reagents

Cat. No.	1.00316	Hydrochloric acid 25% for analysis EMSURE®	1 l, 2.5 l
Cat. No.	1.00579	DPX new non-aqueous mounting medium for microscopy	500 ml
Cat. No.	1.00974	Ethanol denatured with about 1 % methyl ethyl ketone for analysis EMSURE®	1 l, 2.5 l
Cat. No.	1.03981	M-FIX® spray fixative for cytodiagnosis	100 ml, 1 l
Cat. No.	1.04699	Immersion oil for microscopy	100-ml dropping bottle, 100 ml, 500 ml
Cat. No.	1.05175	Hematoxylin solution modified acc. to Gill II for microscopy	500 ml, 2.5 l
Cat. No.	1.06329	Sodium hydrogen carbonate for analysis EMSURE® ACS, Reag. Ph Eur	500 g, 1 kg, 5 kg
Cat. No.	1.06887	Papanicolaou's solution 2b Orange II solution for cytology	500 ml, 2.5 l
Cat. No.	1.06888	Papanicolaou's solution 2a Orange G solution (OG6) for cytology	500 ml, 1 l, 2.5 l
Cat. No.	1.07961	Entellan™ new rapid mounting medium for microscopy	100 ml, 500 ml, 1 l
Cat. No.	1.08298	Xylene (isomeric mixture) for histology	4 l
Cat. No.	1.09016	Neo-Mount™ anhydrous mounting medium for microscopy	100-ml dropping bottle, 500 ml
Cat. No.	1.09254	Papanicolaou's solution 1b Hematoxylin solution S for cytology	500 ml, 2.5 l
Cat. No.	1.09271	Papanicolaou's solution 3a polychromatic solution EA 31 for cytology	500 ml, 2.5 l
Cat. No.	1.09272	Papanicolaou's solution 3b polychromatic solution EA 50 for cytology	500 ml, 1 l, 2.5 l
Cat. No.	1.09843	Neo-Clear™ (xylene substitute) for microscopy	5 l

## Hazard classification

Cat. No. 1.09253

Please observe the hazard classification printed on the label and the information given in the safety data sheet.

The safety data sheet is available on the website and on request.

## Main components of the product

Cat. No. 1.09253

C.I. 75290 5.3 g/l  
Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> x 18 H<sub>2</sub>O 67 g/l  
1 l = 1.04 kg

## Other IVD products

Cat. No.	1.05174	Hematoxylin solution modified acc. to Gill III for microscopy	500 ml, 1 l, 2.5 l
Cat. No.	1.09204	Giemsa's azur eosin methylene blue solution for microscopy	100 ml, 500 ml, 1 l, 2.5 l
Cat. No.	1.09269	Papanicolaou's solution 3d polychromatic solution EA 65 for cytology	100 ml, 2.5 l

Cat. No. 1.09270	Papanicolaou's solution 3c polychromatic solution EA 65 for cytology	100 ml
Cat. No. 1.09275	Shorr staining solution for hormonal cytodiagnosis	500 ml
Cat. No. 1.11661	Hemacolor® Rapid staining of blood smear staining set for microscopy	1 set
Cat. No. 1.15355	CYTOCOLOR™ Cytological standard stain acc. to Szczepanik for microscopy	6x 500 ml

### General remark

If during the use of this device or as a result of its use, a serious incident has occurred, please report it to the manufacturer and/or its authorised representative and to your national authority.

### Literature

1. Routine Cytological Staining Techniques: Theoretical Background and Practice, Mathilde E. Boon, Johanna S. Drijver, 1986, Elsevier Science Publishing Company
2. Conn's Biological Stains: A Handbook of Dyes, Stains and Fluorochromes for Use in Biology and Medicine, 10th Edition, (ed. Horobin, R.W. and Kiernan, J.A). Bios, 2002
3. Romeis - Mikroskopische Technik, Editors: Maria Mulisch, Ulrich Welsch, 2015, Springer Spektrum, 19. Auflage
4. Theory and Practice of Histological Techniques, John D Bancroft and Marilyn Gamble, 6th Edition
5. Gynäkologische Zytodiagnostik Lehrbuch und Atlas, Hans-Jürgen Soost, Siegfried Baur, Georg Thieme Verlag Stuttgart, Auflage, 1990



H318: Causes serious eye damage.

H373: May cause damage to organs (Kidney) through prolonged or repeated exposure if swallowed.

P260: Do not breathe mist or vapors.

P280: Wear eye protection/ face protection.

P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

P314: Get medical advice/ attention if you feel unwell.

P501: Dispose of contents/ container to an approved waste disposal plant.



Consult instructions for use



Manufacturer



Catalog number



Batch code



Caution, consult accompanying documents



Use by YYYY-MM-DD



Temperature limitation

Status: 2023-Apr-28

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