

## Kit RAL StainBox MCDh

REF. 360300-0000

Fixation and differential staining of cellular structures



IFU001A-RAL

For professional use only.  
Please read all this information carefully before using this device.

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### Intended use

Kit RAL StainBox MCDh is intended to be used in combination with RAL StainBox instrument for the fixation and the differential staining of cellular structures prior microscopic examination.

If applicable, RAL Diagnostics recommends using the associated RAL Diagnostics products and cannot guarantee that the expected results will be achieved if used in combination with products of other brands.

### Principle

The MCDh panoptic staining allows to perform blood cell counting, realized by using successively four reagents: MCDh 1, MCDh 2, MCDh 3 and MCDh 4.

MCDh 1, formulated with ethylic alcohol, is a mixture of neutral stains. It allows a smear fixation and prepares the staining, especially the one of hydrosoluble elements such as basophilic granules. Those stains are inactive in alcoholic medium, and only react selectively when released in MCDh 2 solution. This releasing generates the precipitation of neutral stains, leading to erythrocytes, cytoplasm of neutrophilic granulocytes as well as eosinophilic granules staining. MCDh 3 is an aqueous solution which stains cytoplasm of monocytes and lymphocytes. MCDh 3 also eases the metachromasia process as it colors azurophilic granules red. Eventually, MCDh 4 removes excess of stain and participates to differentiation of cellular elements thanks to action of specially selected rinsing agents.

The successive action of MCDh 1, MCDh 2, MCDh 3 and MCDh 4 brings the violet color (typical Romanowsky-Giemsa effect), particularly visible in chromatin, platelets and neutrophilic granules.

## Kit description

### MCDh 1

Clear dark blue solution  
REF. 313590-0250

1 X 230 mL

### MCDh 2

Clear colorless solution  
REF. 3135702A250  
REF. 3135703A250

1 X 230 mL

1 X 230 mL

### MCDh 3

Clear dark blue solution  
REF. 313560-0250

1 X 230 mL

### MCDh 4

Clear colorless solution  
REF. 313600-0250

4 X 230 mL

## Active components

### MCDh 1

May-Grünwald: ca 0.1%  
Methylene azure I blue – CAS - 531-55-5: ca 0.05%

### MCDh 2

Potassic mono phosphate - CAS 7778-77-0: ca 0.05%  
Anhydrous disodic phosphate - CAS 7558-79-4: ca 0.04%

### MCDh 3

Methylene blue – CAS - 61-73-4: < 0.25%

### MCDh 4

Potassic mono phosphate - CAS 7778-77-0: ca 0.03%  
Anhydrous disodic phosphate - CAS 7558-79-4: ca 0.03%

For a specific batch, refer to the analysis certificate of the batch available at [my.ral-diagnostics.fr](http://my.ral-diagnostics.fr).

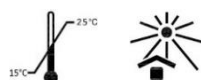
## Storage

Storage temperature: 15-25°C away from light.

Bottle shelf life before opening: refer to the expiry date on the label.

Bottle shelf life after opening: 4 weeks after opening or 300 slides

Once opened, the duration of use overrules the expiry date



## Hazard classification and safety information

### MCDh 1

Danger: H225-Highly flammable liquid and vapour.

P210-Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.



### MCDh 2

Warning: H317 - May cause an allergic skin reaction. H412 - Harmful to aquatic life with long lasting effects.

P261 - Avoid breathing dust/fume/gas/mist/vapours/spray. P280 - Wear protective clothing, protective gloves, eye protection. P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P362+P364 - Take off contaminated clothing and wash it before reuse.



<b>CONT</b>	5-chloro-2-methyl-2H-isothiazol-3-one/ 2-methyl-2H-isothiazol-3-one
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### MCDh 3

No labelling applicable

### MCDh 4

Warning: H226 - Flammable liquid and vapour. H317 - May cause an allergic skin reaction. H412 - Harmful to aquatic life with long lasting effects.

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P261 - Avoid breathing dust/fume/gas/mist/vapours/spray. P280 - Wear protective gloves, protective clothing, eye protection. P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P362+P364 - Take off contaminated clothing and wash it before reuse.



<b>CONT</b>	5-chloro-2-methyl-2H-isothiazol-3-one/ 2-methyl-2H-isothiazol-3-one
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The RFID tag used is a passive short-range contactless memory chip (13,56MHz).

## Personnel qualification

All samples and products must be handled by qualified and authorized personnel, using individual or collective protection, in accordance with the national directives in force in the laboratories. Personnel must also be aware of the classification of hazardous materials indicated on the label and the safety data sheet (available at [my.ral-diagnostics.fr](http://my.ral-diagnostics.fr)).

The specimen must be treated in accordance with procedures available in the laboratory and required by national authorities.

The diagnosis must be conducted by qualified and authorized personnel, in accordance with the procedures in force within the laboratory.

## Specific equipment and reagents required but not provided

Microscope slides, absolute ethanol and RAL StainBox REF. 402000

This equipment may vary depending on the protocol. Please refer to the relevant protocol (see the section operating procedure) to ensure that you have the necessary equipment to carry out tests.

## Operating procedure

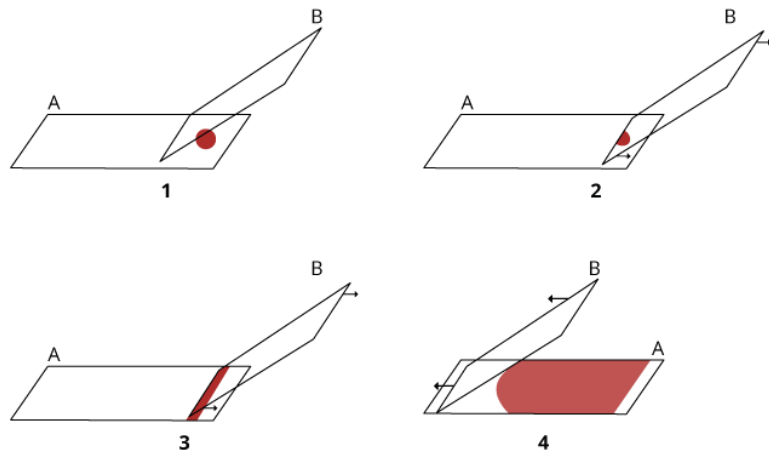
The equipment used for sample processing must comply with the supplier's instructions for use.

### Sample preparation

**Manual blood smear:** Mix the tube by slow inversion and install a smearing droplet device. Invert the tube and lightly press the drop depositor onto a slide to deposit a small drop of blood (Fig. 1- slide A at step 1).

Using another slide tilted at 45° (Fig. 1- slide B at step 1), spread the blood by capillarity on the short edge (Fig. 1- steps 2 & 3) using a pushing motion (Fig. 1- step 4). A good quality smear does not reach the end of the slide and has a gradual decrease in thickness until the end is feathered. Allow the smear to air dry before fixing or staining.

NB: if you do not have a smearing droplet device, open the tube, and use a pipette to deposit a blood drop.




**Figure 1. Schematic representation of performing a blood smear**

A & B: slides, 1 – 4: steps 1 to 4

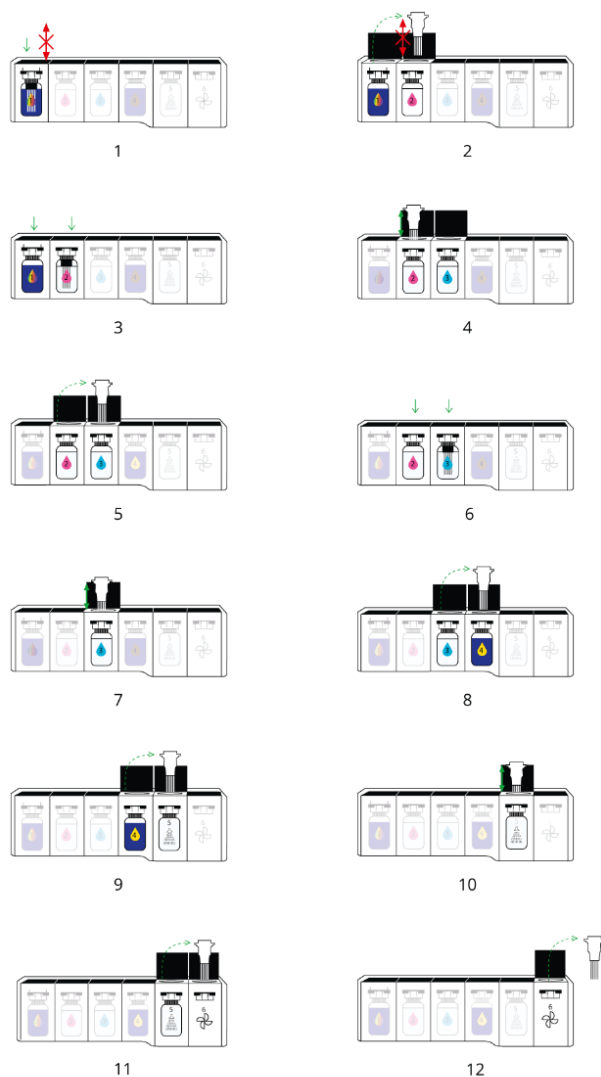
### Reagents and instruments preparation

No preparation needed. The solutions are ready to use and the reagents containers have been designed to be used for slides staining.

On the StainBox main screen, press the button  to open all the StainBox lids. Remove the bottle caps and security rings 1 to 5 and screw them on their respective supports. Then be sure to place the bottles in their location (Table 1. Bottles support and location). Close all the lids manually and follow the instructions on the screen.

Station	1	2	3	4	5
Bottle	MCDh 1	MCDh 2	MCDh 2	MCDh 3	MCDh 4
Support					
LED colour	Flickering LED	Pink LED	Blue LED	Yellow LED	White LED

**Table 1. Bottles support and location**



- 1- Place the slide-holder in the first station
- 2- At the end of the countdown, lids 1 & 2 will open. Transfer the slide-holder in the station 2. Do not agitate.
- 3- Close lids 1 & 2.
- 4- At the end of the countdown, lids 2 & 3 open. Agitate the slides in station 2 (according to the protocol in use).
- 5- Transfer slide-holder over to station 3. Agitate the slides in station 3 (according to the protocol in use)
- 6- Close lids 2 & 3.
- 7- At the end of the countdown, lids 3 & 4 open. Agitate the slides in station 3 (according to the protocol in use).
- 8- Transfer slide-holder over to station 4. Agitate the slides in station 4 (according to the protocol in use) and close lids 3 & 4. At the end of the countdown, lids 4 & 5 open.
- 9- Transfer the slide-holder to station 5, close the lid 4.
- 10- Let the lid 5 open and agitate according to the protocol in use.
- 11- At the end of the countdown transfer the slide-holder in station 6 and close the lids 5 & 6.
- 12- When finished, remove the stained slides from station 6 and close the lid. The slides are ready to analyze.

### Protocols

The staining steps of the protocols indicated below consist of a successive dipping of the slides in the different staining baths.

Staining settings, recommended by RAL Diagnostics, are pre-set in the RFID tag.

**Figure 2. Schematic representation of staining steps of the RAL StainBox instrument**

**Manual bath staining method - CellaVision® DC-1 automate analysis**

Processing time: 11 min 30

Steps	Reagent	Time [mm:ss]	Indications
Fix and pre-stain	MCDh1	06:00	No
Stain	MCDh2	01:00	Agitate in the bath, 5 to 10 times at the end of countdown*
Stain	MCDh2	02:00	Agitate in the bath, 5 to 10 times at the beginning and the end of countdown*
Stain	MCDh3	00:30	
Rinse	MCDh4	02:00	
Dry	No	03:00	No

\* Start agitation at lid opening.

**Manual bath staining method - Manual microscopic analysis**

Processing time: 09 min 40

Steps	Reagent	Time [mm:ss]	Indications
Fix and pre-stain	MCDh1	06:00	No
Stain	MCDh2	01:00	Agitate in the bath, 3 to 5 times at the end of countdown*
Stain	MCDh2	02:00	
Stain	MCDh3	00:30	
Rinse	MCDh4	00:10	Agitate continuously in the bath during countdown
Dry	No	03:00	No

Note: In case of refringence/water artefact phenomena, pre-fix the slides 2min in a bath of absolute ethanol before staining. Directly start the staining after pre-fixation step without drying the slides.

**Expected results**

**Nuclei / chromatin:** +/- dense purple  
**Granulocytes cytoplasm:** light purplish-pink  
**Granulocytes eosinophilic granules:** orangey  
**Granulocytes basophilic granules:** dark blue  
**Granulocytes neutrophilic granules:** +/- deep purple  
**Lymphocytes cytoplasm with RNA:** pure blue  
**Lymphocytes cytoplasm without RNA:** light blue  
**Lymphocytes azurophilic granules:** red  
**Monocytes cytoplasm:** cloudy blue  
**Erythrocytes:** pinkish-beige  
**Platelets chromomere:** purplish-red  
**Platelets hyalomere:** bluish  
**Blood parasites nucleus:** red  
**Blood parasites cytoplasm:** blue

If observed results vary from those expected, please contact RAL Diagnostics technical service through your usual supplier for assistance.

**Performance**

The performance of the Kit RAL StainBox MCDh reagents was evaluated in a hospital laboratory with 301 clinical samples (blood, bone marrow, thick smears). The sensitivity of the Kit RAL StainBox MCDh reagents was evaluated in comparison with the routine laboratory's reference technique: MGG in bath. All tests were performed in parallel under the same conditions. The results obtained in this study show that the efficiency of the Kit RAL StainBox MCDh is equivalent to the MGG routine method.

To ensure product performance, use clean and dry laboratory equipment.

The laboratory is responsible for notifying the manufacturer and state competent authority of any serious incident relating to the use of the medical device.

## User quality control

Users are responsible for determining the appropriate quality control procedures for their laboratory and complying with applicable laboratory regulations.

RAL Diagnostics recommends staining a freshly made blood smear with a normal WBC count and no known abnormal pathology at reagent renewal and for the first staining cycle each day. Slides stained for quality control purposes should be checked to ensure that they are satisfactory for intended test (properly stained and free of precipitate).

These quality control procedures should only be performed by qualified personnel.

## Other products

For more information contact your usual supplier.

## Recommendations, notes and troubleshooting

### Products appearance

If the appearance of the products differs from the description above, do not use it and contact RAL Diagnostics technical service through your usual supplier for assistance.

### Procedures notes

To prevent degradation of the products, please comply with the storage and handling recommendations specified in this manual.

It is strongly recommended to change the bottle 5 (MCDh4) every week or every 75 slides. At each kit replacement, be sure to remove inviolability rings and caps before screwing the staining devices.

In case of refringence/water artefact phenomena, pre-fix the slides 2min in a bath of absolute ethanol before staining. Directly start the staining after pre-fixation step without drying the slides.

### Products stability

Every RAL Diagnostics product can be used until the expiry date indicated on, in its original packaging if it is still hermetically sealed.

### Staining stability

Staining quality and reproducibility depend on the correct use of the products. Staining conducted according to these recommendations will remain stable for several days. If it is necessary to store the stained smear for several months or years, RAL Diagnostics recommends mounting them with a coverslip using a suitable mounting liquid and storing them in a light and dustproof container.

### Instructions for cleaning and waste disposal

All biological samples, effluents and used consumables should be considered potentially hazardous.











To avoid any risk, apply the following instructions: dispose of samples, effluents and consumables in accordance with laboratory standards and applicable national and local standards and regulations.
























Chemical and biological waste must be collected and processed by specialized, registered companies.



## Table of symbols and abbreviations

Depending on the product, you may find the following symbols on the device or the packaging material.

GHS PICTOGRAMS	INTERPRETATION
	Explosive
	Flammable
	Oxidizer
	Compressed gas
	Corrosive
	Toxic
	Harmful
	Health Hazard
	Environmental Hazard
	No labelling applicable

SYMBOL	INTERPRETATION
	Batch code
	Serial number
	Catalogue reference
	Date of manufacture
	Use up to
	Unique device identifier
	Manufacturer
	Importer
	Entity distributing the medical advice in the region concerned
	CE marking device
	In vitro diagnostic medical device
	Authorized Representative in the European Community
	Authorized Representative in Switzerland
	Complies with UK guidelines
	Do not use if packaging is damaged
	Keep away from light
	Temperature limit: 15-25°C
	Temperature limit: 15-30°C
	Keep dry
	Box: handling upwards
	Fragile
	Sterilised by irradiation
	Single sterile barrier system with outer protective packaging
	Sterile and radiation-sterilised barrier suit
	Do not reuse
	Do not resterilize
	Contents sufficient for n tests
	Hazardous material contained
	Consult instructions for use
	Use
	After opening, use within XX months
	The product must not be used in conjunction with an automatic colouring machine
	Indicates a medical device that contains potentially carcinogenic, mutagenic or reprotoxic (CMR) substances, or substances classified as endocrine disruptors

## Bibliography

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## Changes tracking

Date	Version	Changes
05/2022	IFU001A-RAL	IVDR (EU) 2017/746 compliance



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