

CWA DETECTION TUBES

A wide selection of tubes covers all known important CWA

The tubes are not intended for exact pump but can be used in any hand and/or electrical pumps designed for the detector tubes application. Designed with diameter 6 mm and length of 93 102 mm. Different lengths available - negotiations requested.

Advantages:

- Wide choice of tubes.
- Long shelf life for all tubes including the sensitive biochemical DT11.
- Environmental friendly. No toxic materials used for detection methods.
- Possible to use in many known pumps (Czech UNIVER, Draeger, MSA AUER.....).
- Available simulants to train with tubes safely in a standard room.



DT 11 in the hand pump UNIVER



DT 12 in the hand pump ACCURO



Four tubes in the CHP-71 el. pump



Five tubes in the new CHP-5 el. pump

Packing in a box per 10 pieces, always provided with relevant information on the box label. Information in details for each tube in the Specification Sheet, or on request at the company.

PRODUCT INFORMATION**CWA DETECTION TUBE****DT 10**

Application **NERVE AGENTS GB, GD**

Code **DT-10**

Marking 1 red stripe

Sensitivity 0.5 mg.m⁻³ for sarin

Sucking 30 strokes per 100 ml, or 3 litres

Grey → yellow up to orange

Colour

Aminoperoxide reaction

Reaction

Description

The detection tube contains one layer and two ampoules with solutions. The layer contains silicagel impregnated with sodium phosphate. The upper ampoule contains the solution of hydrogen peroxide in a mixture of isopropyl alcohol and water; the bottom ampoule contains the solution of o-dianisidine in acetone.

Detection Procedure

A prescribed number of strokes are executed (equivalent air volume) and both ampoules are broken at once. Their content is shaken down into a layer. The layer colour is compared with the etalon.

Selectivity

Only nerve agents of the G type (tabun, sarin, soman, cyclosin) can be detected using the tube; of the other chemical warfare agents (CWA), only phosgene, diphosgene and chlorocyanide react with a similar mechanism; of TIC, for example, phosphorus trichloride.

Interferences

Strong oxidizing agents, for example, chlorine or nitrogen dioxide that react directly with o-dianisidine, give similar colour.

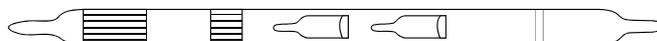
Temperature

0-40°C (below 15°C heating required).

Humidity

The function of the tube does not depend on air humidity, water is embedded in the analytical system.

Construction



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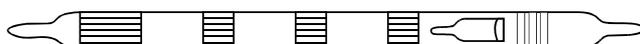
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PRODUCT INFORMATION		
CWA DETECTION TUBE	DT 11	
<p>Application</p> <p>Code</p> <p>Marking</p> <p>Sensitivity</p> <p>Suction</p> <p>Colour</p> <p>Reaction</p> <p>Description</p> <p>Detection Procedure</p> <p>Selectivity</p> <p>Interferences</p> <p>Temperature</p> <p>Humidity</p> <p>Construction</p>	<p>NERVE AGENTS GB, GD, VX, GA, GF, GP</p> <p>DT-11</p> <p>3 red stripes</p> <p>0.05 mg.m⁻³ for sarin, soman</p> <p>10 strokes per 100 ml, or 1 litre</p> <p>White → yellow</p> <p>Biochemical reaction based on the inhibition of acetylcholine esterase that catalyzes the hydrolysis of acetylthiocholine</p> <p>The detection tube contains two layers and two ampoules with solutions. The indication layer contains white granulated cellulose with immobilized beef brain acetylcholine esterase (usually bovine or pork). The comparative layer contains yellow crushed glass impregnated with acetylthiocholine substrate and chromogen preparation (Ellman's reagent). Both ampoules are filled with a buffer solution with pH 8.</p> <p>The ampoule is broken and its content is shaken down on the cellulose. Execute a prescribed number of strokes (equivalent air volume), wait the prescribed time, break the second ampoule and shake down its content through the crushed glass on the cellulose. The change of the colour of the indication layer is evaluated. If a yellow colour appears in the specified time, the atmosphere does not contain CWA; the layer remains unchanged in the opposite case or, as the case may be, the yellow colour appears only after a longer time.</p> <p>All the types of nerve-paralyzing agents (G, GV, V series) and other compounds that inhibit acetylcholine esterase (organophosphorus or carbamate pesticides) can be detected using the tube.</p> <p>High concentrations of oxidation, reduction, acid or alkaline gases and vapours decrease the sensitivity of the tube.</p> <p>0-40⁰C (below 15⁰C heating required).</p> <p>Water is embedded in the analytical system.</p>	
		
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PRODUCT INFORMATION

CWA DETECTION TUBE
DT 12.1

Application	PHOSGENE, DIPHOSGENE, CYANOGEN CHLORIDE, HYDROGEN CYANIDE CG (DP), CK, AC
Code	DT-12.1
Marking	3 green stripes
Sensitivity	Phosgene (diphosgene) 5 mg.m ⁻³ Cyanogen chloride 5 mg.m ⁻³ Hydrogen cyanide 5 mg.m ⁻³
Sucking	30 strokes per 100 ml, or 3 litres
Colour	Phosgene (diphosgene): yellowish → red Cyanogen chloride: yellowish → pink Hydrogen cyanide: yellowish → pink
Reaction	Phosgene and diphosgene react with 4-(p-nitrobenzyl)pyridine, yielding a quaternary ammonium salt. Cyanogen chloride is indicated by the modified reaction according to König. 4-benzylpyridine and dimedone are the basic components of this preparation. Hydrogen cyanide is converted to cyanogen chloride.
Description	The detection tube contains three layers and an ampoule with the detection solution. The upper layer contains crushed glass and is intended for intercepting the precipitation in the ampoule for phosgene. The central layer contains chloramine B and is intended for converting hydrogen cyanide to cyanogen chloride. The bottom indication layer contains 4-benzylpyridine and dimedone is intended for the detection of cyanogen chloride. The ampoule contains the detection solution for phosgene (diphosgene) and contains 4-(p-nitrobenzyl)pyridine a N-phenylbenzylamine.
Detection Procedure	The ampoule is broken and its content is shaken down on the layer. A prescribed number of strokes are executed (equivalent air volume) and the colour of individual layers is compared with the etalon.
Selectivity	The indication layer for phosgene and diphosgene is also sensitive to other acylation substances, for example, benzoyl chloride, chloromethyl formate... The indication layer for cyanogen chloride is specific to halogenocyanides and phosgeneoxime.
Interferences	High concentrations of hydrogen chloride and other strongly acid gases and vapours may interfere with the detection of phosgene and diphosgene. The layer becomes yellow under the effect nitrogen dioxide. The layer for cyanogen chloride becomes pink by the action of nitrogen dioxide.
Temperature	0-50 °C (below 15°C heating required).
Humidity	The tube can be used in a broad range of air humidity (10-90%).
Construction	



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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 12**

Application	PHOSGENE, DIPHOSGENE, CYANOGEN CHLORIDE, HYDROGEN CYANIDE CG (DP), CK, AC
Code	DT-12
Marking	2 green stripes
Sensitivity	Phosgene (diphosgene) 5 mg.m ⁻³ Cyanogen chloride 5 mg.m ⁻³ Hydrogen cyanide 5 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Phosgene (diphosgene) yellowish → red Cyanogen chloride: yellowish → pink Hydrogen cyanide: yellow → orange up to brown
Reaction	Phosgene and diphosgene react with 4-(p-nitrobenzyl)pyridine, yielding a quaternary ammonium salt. cyanogen chloride is indicated by the modified reaction according to König. 4-benzylpyridine and dimedone are the basic components of this preparation. Hydrogen cyanide reduces sodium picrate yielding the sodium salt of isopurpuric acid.
Description	The detection tube contains three indication layers formed by silicagel impregnated with chromogen preparations. The upper layer serves for the detection of phosgene (diphosgene), the central layer for the detection of cyanogen chloride and the bottom layer for the detection of hydrogen cyanide.
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of individual layers is compared with the etalon.
Selectivity	The indication layer for phosgene and diphosgene is also sensitive to other acylation substances, for example, benzoyl chloride, chloromethyl formate, etc. The indication layer for cyanogen chloride responds to bromocyanide, but also to phosgeneoxime. Other reducing agents may react similarly as hydrogen cyanide, unless they are intercepted by the preceding indication layer. For this reason, the detection of hydrogen cyanide is sufficiently selective.
Interferences	High concentrations of hydrogen chloride and other strongly acid gases and vapours may interfere with the detection of phosgene and diphosgene. The layer becomes yellow by the effect nitrogen dioxide. The layer for cyanogen chloride becomes pink by the action of nitrogen dioxide. The layer for hydrogen cyanide is coloured orange or brown by the action of higher concentrations of sulphur dioxide.
Temperature	0-50°C (below 15°C heating required). Under normal conditions, a higher sensitivity can be achieved, primarily for hydrogen cyanide, when heating the tube after sampling contaminated air.
Humidity Construction	The tube can be used in a broad range of air humidity (10-90%).



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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 13**

Application	MUSTARD, NITROGEN MUSTARD H, HD, HN
Code	DT-13
Marking	1 yellow stripe
Sensitivity	1 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 Litres
Colour	Yellowish → blue
Reaction	Reaction of mustards with 4-(p-nitrobenzyl)pyridine, a preparation for alkylation.
Description	The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by silicagel saturated with 4-(p-nitrobenzyl)-pyridine; the detection layer contains sodium perchlorate and sodium hydroxide.
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.
Selectivity	All types of sulphur mustards can be detected using the tube (technical H, distilled HD, sesqui Q, oxygen T) and nitrogen mustards (HN-1, HN-2, HN-3), similarly as other chlorinated alkyl sulfides or amines. The agents of the G series react at higher concentrations. In all these cases, blue colouring arises. With phosgene and diphosgene, red colouring arises, orange colouring with chloroacetophenone.
Interferences	The influence of other compounds: Dimethylsulphate gives a blue product, benzoylchloride an orange one, benzoylchloride a violet reaction product.
Temperature	0-50 ⁰ C (below 15°C heating required). When heating the tube after sampling contaminated air and before breaking the tube, a higher sensitivity can be achieved.
Humidity	Water is embedded in the analytical system.

Construction

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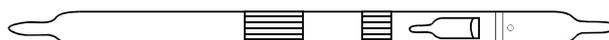
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 14.1**

Application	LEWISIT L
Code	DT-14.1
Marking	1 yellow stripe, 1 yellow dot
Sensitivity	1 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	White → pink Blue colouring may arise during a negative result.
Reaction	Liberation of acetylene and its reaction with Llosvay preparation
Description	The detection tube contains an indication layer and an ampoule with the detection solution. The indication layer contains silicagel impregnated with the modified Llosvay preparation; 20% sodium hydroxide forms the detection solution.
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.
Selectivity	The tube is selective for lewisit, its analogues L-2 and L-3 do not give this reaction, neither other CWA on the basis of arsenic.
Interferences	Hydrogen sulphide may interfere, because it yields brownish colouring, similarly as high concentrations of carbon disulphide.
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Water is embedded in the analytical system.

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PRODUCT INFORMATION		
CWA DETECTION TUBE	DT 14.2	
Application	WARFARE ARSINES SA, L, DA, DC	
Code	DT-14.2	
Marking	1 yellow stripe, 1 blue stripe	
Sensitivity	1 mg.m ⁻³ lewisite	
Suction	30 strokes per 100 ml, or 3 litres	
Colour	Yellowish → pink	
Reaction	Hydrogen arsenide released by the reaction with hydrogen is indicated by the reaction with silver diethyldithiocarbamate with the formation of a colour complex.	
Description	The detection tube contains an indication layer, a retention layer (silicagel), a layer of granulated zinc and an ampoule with the detection solution. The indication layer contains silicagel impregnated with silver diethyldithiocarbamate in 4-benzylpyridine; the ampoule contains diluted hydrochloric acid and copper chloride.	
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the retention layer (the zinc layer must be wetted). Another number of strokes is then executed and the colour of the layer is compared with the etalon.	
Selectivity	The tube makes it possible to detect hydrogen arsenide (before the ampoule is broken), lewisite, diphenylchloro arsine, diphenylcyano arsine and some other warfare arsines. Adamsite does not give a positive result.	
Interferences	Hydrogen sulphide may interfere, because it yields yellow up to grey colouring (AgS).	
Temperature	0-50 ⁰ C (below 15°C heating required).	
Humidity	Water is embedded in the analytical system.	
Notes	It is not permissible to expose the detection tube to the effect of direct sunlight.	
Construction		
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 14.3**

Application	HYDROGEN ARSENIDE SA
Code	DT-14.3
Marking	1 yellow stripe, 2 blue stripes
Sensitivity	0.5 mg.m ⁻³
Strokes	30 strokes per 100 ml, or 3 litres
Colour	Yellowish → pink
Reaction	Hydrogen arsenide released by the reaction with hydrogen is indicated by the reaction with silver diethyldithiocarbamate with the formation of a colour complex.
Description	The detection tube contains one indication layer, silicagel impregnated with silver diethyldithiocarbamate in 4-benzylpyridine.
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of the layer is compared with the etalon.
Selectivity	Other CWA do not react.
Interferences	Hydrogen sulphide may interfere, because it gives a yellow up to grey colouring (formation of AgS).
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	The detection tube is resistant to changes of air humidity.
Notes	It is not permissible to expose the detection tube to the effect of direct sunlight for a long time.

Construction

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 15**

Application	SULPHUR MUSTARD H, HD
Code	DT-15
Marking	2 yellow stripes
Sensitivity	3 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Yellow → orange (up to red)
Reaction	Probably an addition complex of mustard with 4,4'-bis(diethylamino)benzophenone and magnesium perchlorate
Description	The detection tube contains one indication layer, silicagel impregnated with chromogen preparations (ethyl Michler's ketone, magnesium perchlorate).
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of the layer is compared with the etalon.
Selectivity	All types of sulphur mustards can be detected using the detection tube (technical H, distilled HD, sesqui Q, oxygen T), similarly as other chlorinated alkylsulphides. In all these cases, an orange colouring arises. In the presence of phosgene (diphosgene) and other acylation preparations (acetyl chloride, benzoyl chloride) at concentrations above 20 mg/m ³ , a green colouring arises.
Interferences	High concentrations of hydrogen chloride and ammonia (similarly acid and alkaline gases) cause discolouration of the indication layer.
Temperature	15-50 ⁰ C (below 15 ⁰ C heating required). Under normal conditions, a significantly higher sensitivity can be achieved when heating the tube after sampling contaminated air.
Humidity	The declared sensitivity of the detection tube is not lowered even at relative air humidity above 90%.
Construction	



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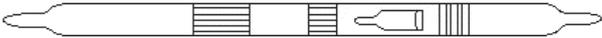
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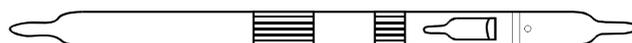
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PRODUCT INFORMATION		
CWA DETECTION TUBE	DT 16	
Application	NITROGEN MUSTARD HN	
Code	DT-16	
Marking	3 yellow stripes	
Sensitivity	1 mg.m ⁻³ for HN-3	
Suction	30 strokes per 100 ml, or 3 litres	
Colour	Yellow → orange	
Reaction	Reaction with the Dragendorff's reagent	
Description	The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by activated silicagel; the detection solution contains the Dragendorff's reagent.	
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.	
Selectivity	All types of nitrogen mustards (HN-1, HN-2, HN-3) can be detected by using the tube. Of the other CWA, the followings agents react similarly: BZ, phencyklidin, CR, VX.	
Interferences	The presence of other substances that do not have the character of CWA and also give a colour response (alkaloids, amines, pyridines, etc.), can be considered as an interfering effect.	
Temperature	0-40 ⁰ C (below 15 ⁰ C heating required).	
Humidity	Water is embedded in the analytical system.	
Construction		
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 17.1**

Application	HYDROGEN CYANIDE AC
Code	DT-17.1
Marking	1 blue stripe, 1 blue dot
Sensitivity	0.5 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Grey → red-violet
Reaction	Hydrogen cyanide reacts with 4-nitrobenzaldehyde in the presence of pyridine, giving rise to coloured benzoin.
Description	The detection tube contains one layer and an ampoule with the detection solution. The layer contains silicagel impregnated with sodium carbonate; the detection solution contains 4-nitrobenzaldehyde in pyridine.
Detection Procedure	The ampoule is broken and its content is shaken down into the layer. A prescribed number of strokes are executed (equivalent air volume) and the colour of the layer is compared with the etalon.
Selectivity	Apart from hydrogen cyanide, tabun, which easily releases hydrogen cyanide, can also be detected (GA sensitivity about 1 mg.m ⁻³).
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Optimum 10-95% of the relative humidity of air.

Construction

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 17.2**

Application	HYDROGEN CYANIDE AC, CYANOGEN CHLORIDE CK
Code	DT-17.2
Marking	1 blue stripe
Sensitivity	3 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	AC: grey › red-violet CK: yellowish → red-violet
Reaction	Hydrogen cyanide reacts with 4-nitrobenzaldehyde in the presence of pyridine giving rise to coloured benzoin. According to König, cyanogen chloride reacts with pyridine and dimedone giving rise to a polymethine dye.
Description	The detection tube contains two layers and an ampoule with the detection solution. The upper layer contains silicagel impregnated with sodium carbonate; the bottom layer contains silicagel impregnated with dimedone; the detection solution contains 4-nitrobenzaldehyde in pyridine.
Detection Procedure	The ampoule is broken and its content is shaken down into the layer. A prescribed number of strokes are executed (equivalent air volume) and the colour of the bottom layer is compared with the etalon.
Selectivity	Apart from hydrogen cyanide, tabun, which easily releases hydrogen cyanide, can also be detected. Bromocyanide and phosgeneoxime reacts similarly as cyanogen chloride.
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Optimum 10-95% of the relative humidity of air.

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 17**

Application	HYDROGEN CYANIDE AC, CYANOGEN CHLORIDE CK
Code	DT-17
Marking	1 blue stripe
Sensitivity	0.5 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Yellow → red-violet
Reaction	According to König, cyanogen chloride reacts with 4-benzylpyridine and dimedone giving rise to a polymethine dye. Hydrogen cyanide is converted to cyanogen chloride by means of a chlorination preparation.
Description	The detection tube contains two layers. The upper layer (auxiliary) contains silicagel impregnated with chloramine B, the bottom layer (indication) contains silicagel impregnated with 4-benzylpyridine and dimedone.
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of the bottom layer is compared with the etalon.
Selectivity	Cyanogen bromide and phosgeneoxim (CX) react in the same manner, nitrogen dioxide gives the same pink colour.
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Optimum 10-95% of the relative humidity of air.

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 18**

Application	PHOSGENE CG, DIPHOSGENE DP
Code	DT- 18
Marking	1 green stripe
Sensitivity	1 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Yellowish → red
Reaction	Phosgene and diphosgene react with 4-(p-nitrobenzyl)pyridine yielding a quaternary ammonium salt.
Description	The detection tube contains one indication layer that contains silicagel impregnated with sodium carbonate, 4-(p-nitrobenzyl)pyridine, N-phenylbenzylamine and stabilizers.
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of the layer is compared with the etalon.
Selectivity	Acetyl chloride, benzoyl chloride and other acylation substances give the same colours as phosgene and diphosgene.
Interferences	High concentrations of hydrogen chloride and other acid gases and vapours decrease the sensitivity to phosgene.
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Optimum 10-95% of the relative humidity of air.

Construction

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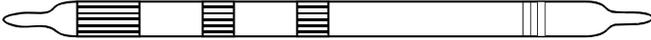
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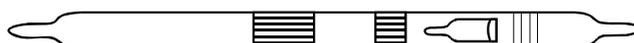
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PRODUCT INFORMATION		
CWA DETECTION TUBE	DT 19	
Application	SULPHUR MUSTARD HD, PHOSGEN (DIPHOSGENE)	
Code	DT-19	
Marking	1 yellow stripe, 1 green stripe	
Sensitivity	3 mg.m ⁻³ HD, CG (DP)	
Suction	30 strokes per 100 ml, or 3 litres	
Colour	HD: yellow → orange (up to red) CG: yellowish → red	
Reaction	HD: Probably an addition complex of mustard gas with 4,4'-bis(diethylamino)benzophenone and magnesium perchlorate CG: Reaction with 4-(p-nitrobenzyl)pyridine yielding a quaternary ammonium salt	
Description	The detection tube contains two indication layers. The upper indication layer contains silicagel impregnated with the ethyl analogue of Michler's ketone and magnesium perchlorate; the bottom indication layer contains silicagel impregnated with 4-(p-nitrobenzyl)pyridine and N-phenylbenzylamine.	
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of both layers is compared with the etalon.	
Selectivity	All types of sulphur mustards can be detected using the detection tube (technical H, distilled HD, sesqui Q, oxygen T), similarly as other chlorinated alkylsulphides. In all these cases, an orange colouring arises. In the presence of phosgene (diphosgene) at concentrations above 20 mg/m ³ , a green colouring arises. Diphosgene, acetyl chloride, benzoyl chloride and other acylation substances give the same colouring as phosgene at the bottom indication layer.	
Interferences	High concentrations of hydrogen chloride and ammonia (similarly acid and alkaline gases) cause discolouration of the indication layer. High concentrations of hydrogen chloride and other acid gases and vapours decrease the sensitivity to phosgene.	
Temperature	15-50 ⁰ C (below 15 ⁰ C heating required). Under normal conditions, a significantly higher sensitivity can be achieved when heating the tube after sampling contaminated air.	
Humidity	Optimum 10-90% of the relative humidity of air.	
Construction		
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PRODUCT INFORMATION		
CWA DETECTION TUBE	DT 20	
Application	AGENT BZ	
Code	DT-20	
Marking	1 white stripe	
Sensitivity	1 mg.m ⁻³	
Suction	30 strokes per 100 ml, or 3 litres	
Colour	White → green-blue	
Reaction	Reaction with the Marquis reagent (sulphuric acid and formaldehyde)	
Description	The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by crushed glass, above which a layer of glass wool is placed. The detection solution contains the Marquis reagent.	
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.	
Selectivity	Of the known CWA, only substance BZ gives a green-blue colour; however, other psychoactive substances may also give a colour change, for example, opiates may cause red up to violet colouring. Other aromatic CWA that act in form of aerosol may cause a colouring of different shade: CS yellow, CR yellow, adamsite red-brown.	
Interferences	The presence of soot during burning of an organic material may be considered as an interfering effect, because soot blackens the indication layer. Highly volatile aromatic substances, such as benzene, toluene or xylene, do not interfere.	
Temperature	0-50 ⁰ C (below 15°C heating required).	
Humidity	Optimum 10-90% of the relative humidity of air.	
Construction		
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 21**

Application	AGENT CN
Code	DT-21
Marking	2 white stripes
Sensitivity	0.5 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	White → raspberry red
Reaction	Reaction with m-dinitrobenzene (Zimmermann's reaction).
Description	The detection tube contains an indication layer and ampoule with the detection solution. The indication layer contains silicagel impregnated with m-dinitrobenzene. The detection solution contains 20% sodium hydroxide.
Detection Procedure	A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.
Selectivity	Of the CWA, agent CS also gives raspberry red colour (minimum sensitivity 1 mg.m ⁻³) or bromobenzylcyanide; at higher concentrations, acetone, bromoacetone and other substances giving the Zimmermann's reaction react similarly.
Temperature	0-50 ⁰ C (below 15°C heating required).
Humidity	Water is embedded in the analytical system.

Construction

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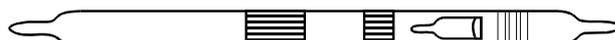
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 22****Application** **AGENT CS****Code** **DT-22****Marking** 3 white stripes**Sensitivity** 1 mg.m⁻³**Suction** 30 strokes per 100 ml, or 3 litres**Colour** White › green-blue**Reaction** Reaction with chloranil.**Description** The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by activated silicagel impregnated with chloranil. The detection solution contains a mixture of ammonium hydroxide with ethanol.**Detection Procedure** A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.**Selectivity** The reaction is relatively selective, nitrogen mustard HN-3 may give a similar colour, other HN a red up to a violet colour.**Temperature** 0-50⁰C (below 15⁰C heating required)**Humidity** Water is embedded in the analytical system.**Construction**

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 23**

Application	CYANOGEN CHLORIDE CK
Code	DT-23
Marking	2 blue stripes
Sensitivity	0.5 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Yellowish → red-violet
Reaction	According to König, cyanogen chloride reacts with 4-benzylpyridine and dimedone to a polymethine dye.
Description	The detection tube contains one layer and an ampoule with the detection solution. The layer contains silicagel impregnated with dimedone; the detection solution contains 4-benzylpyridine in ethanol.
Detection Procedure	The ampoule is broken and its content is shaken down on the layer. A prescribed number of strokes are executed (equivalent volume of air) and the layer colour is compared with the etalone.
Selectivity	Apart from cyanogen chloride, cyanogen bromide and phosgeneoxime can also be detected.
Interferences	Nitrogen dioxide may cause a colour effect.
Temperature	0-50°C (below 15°C heating required)
Humidity	Optimum 10-95% of the relative humidity of air.

Construction

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 24**

Application	HYDROGEN CYANIDE AC
Code	DT-24
Marking	2 blue stripes, 1 blue dot
Sensitivity	10 mg.m ⁻³
Suction	30 strokes per 100 ml, or 3 litres
Colour	Yellow → orange-brown
Reaction	Hydrogen cyanide reacts with sodium picrate yielding the sodium salt of isopurpuric acid.
Description	The detection tube contains one indication layer that contains silicagel impregnated with sodium carbonate, picric acid and dimethyl sulfoxide.
Detection Procedure	A prescribed number of strokes are executed (equivalent air volume) and the colour of the layer is compared with the etalon.
Selectivity	Sulphur dioxide, hydrogen sulfide and other reducing substances give a similar colour.
Interferences	High concentrations of acid gases and vapours decrease the detection sensitivity.
Temperature	10-50 ⁰ C (below 15°C heating required).
Humidity	Optimum 10-70% of the relative humidity of air.

Construction

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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 26**

- Application** ADAMSITE
- Code** DT-26
- Marking** 2 white stripes, 1 dot
- Sensitivity** 3 mg.m⁻³
- Suction** 30 strokes per 100 ml, or 3 litres
- Colour** White → green
- Reaction** Several reactions proceed simultaneously:
a) Reaction of adamsite with sulphuric acid; mechanism is not known;
b) In the environment of sulphuric acid, mercury nitrate gives nitric acid that nitrates the adamsite molecule.
c) The effect of mercury nitrate (mechanism is not known).
- Description** The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by unimpregnated silicagel; the detection solution contains mercury nitrate in concentrated sulphuric acid.
- Detection Procedure** A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.
- Selectivity** Green colouring is specific for adamsite; chloroacetophenone may give a similar colour of a different shade (red), bromobenzylcyanide or vapours of petrol or kerosine (yellow up to yellow-brown).
- Temperature** 0-50⁰C (below 15⁰C heating required).
- Humidity** Optimum 10-90% of the relative humidity of air.

Construction

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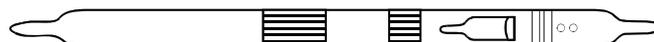
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PRODUCT INFORMATION**CWA DETECTION TUBE****DT 27****Application** **AGENT CR****Code** **DT-27****Marking** 2 white stripes, 2 dots**Sensitivity** 0.1 mg.m⁻³**Suction** 30 strokes per 100 ml, or 3 litres**Colour** White (yellowish) → red-violet**Reaction** Diazo-coupling reaction
Agent CR acts as a diazotation reagent

The arising diazonium salt couples with the Bratton-Marshall reagent to a characteristic azo dye.

Description The detection tube contains an indication layer and ampoule with the detection solution. The indication layer is formed by activated silicagel impregnated with sodium nitrite. The detection solution contains N-(1-naphthyl)-ethylenediamine hydrochloride in the mixture of pyridine with 20% hydrochloric acid (1:1).**Detection Procedure** A prescribed number of strokes are executed (equivalent volume of air), the ampoule is broken and its content is shaken down on the layer. The layer colour is compared with the etalon.**Selectivity** The reaction is specific for agent CR.**Temperature** 5-50⁰C (below 15⁰C heating required).**Humidity** Water is embedded in the analytical system.**Construction**

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