Metrohm METROHM Ltd. CH-9101 Herisau (Switzerland)

705 UV Digester

Series 01 . . .

Apparatus for the UV photolysis of samples with a moderate organic load

Mains connection:

Mains voltage	U	= 100, 117, 220, 240 V ± 10%
Mains frequency	60 Hz	
Power consumption	S	= 50 VA

8.705.1003 Instructions for Use

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8.705.1003 Instructions for Use 705 UV Digester

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705 UV Digester

Instructions for Use

1. Introduction

The **705 UV Digester** is a digestion apparatus for the UV photolysis of liquid samples with a moderate organic load. Its main area of use lies in the sample pretreatment of water samples for stripping voltammetry or the polarographic trace analysis of elements. However, it can also be employed in the preparation of samples for AAS and ICP-AES.

UV Photolysis is a method to eliminate low to moderate amounts of dissolved organic matter (DOM), which often interfere severely with the trace analysis of heavy metals. It is based on the photolytic generation of OH radicals, which in turn react with the organic compounds and decompose them. Hydrogen peroxide serves as the initiator of the radical reaction. In the 705 UV Digester, the radiant energy of the mercury lamp is transformed into heat, and this has an additional accelerating effect on the digestion.

The **705 UV Digester** comprises a wet part and a control unit. The **wet part** contains the UV lamp (a high-pressure mercury lamp), the cooling equipment and the sample vessel holder for 12 samples. The **control unit** comprises all controls needed for the operation including a time switch to set the irradiation time.

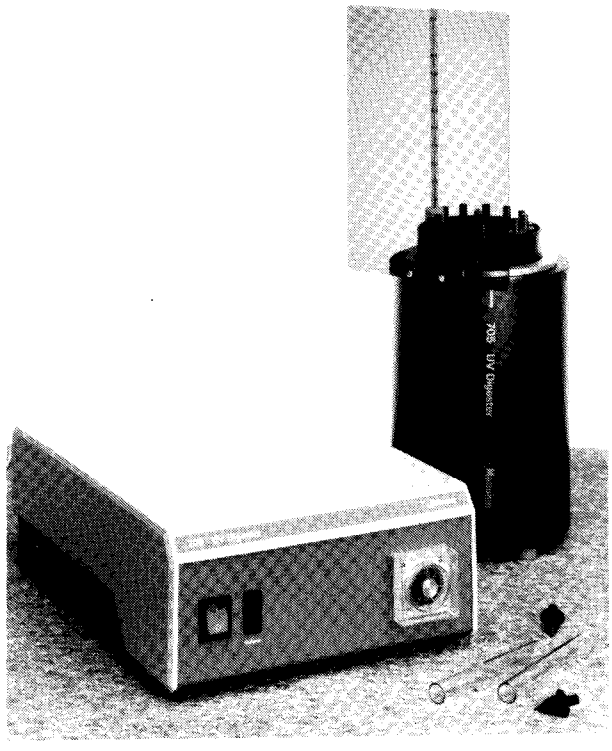


Fig. 1: 705 UV Digester

2. Controls

2.1. Control unit

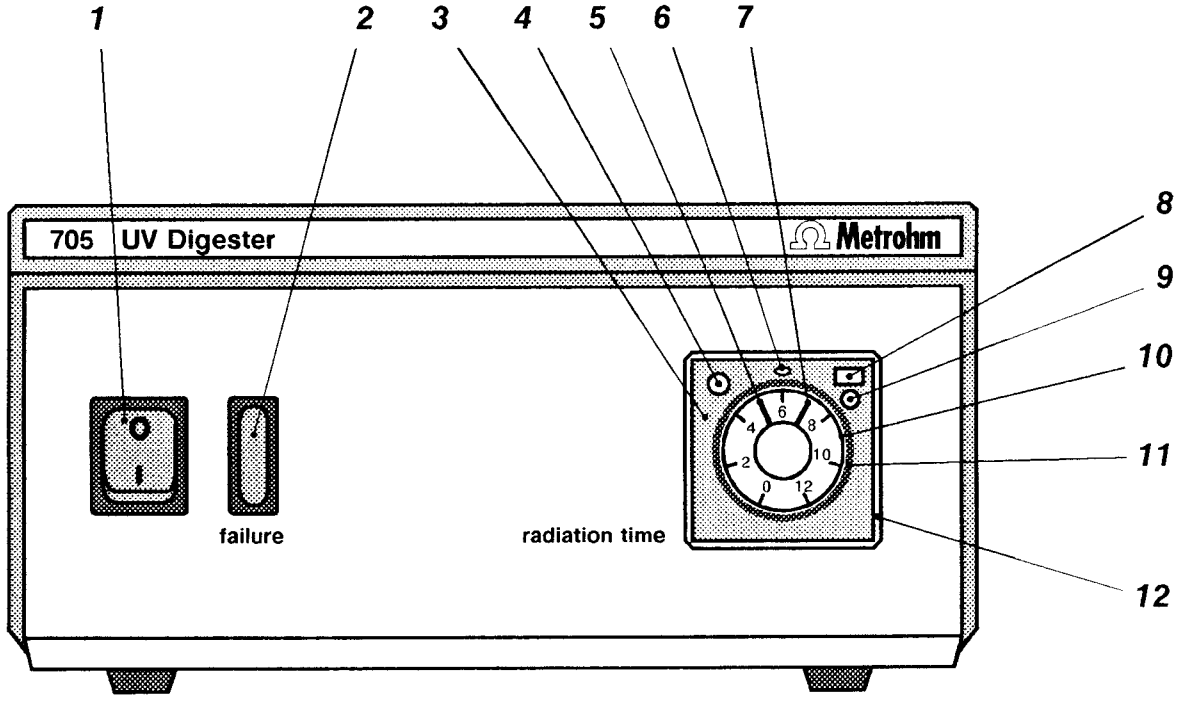


Fig. 2: Front view of control unit

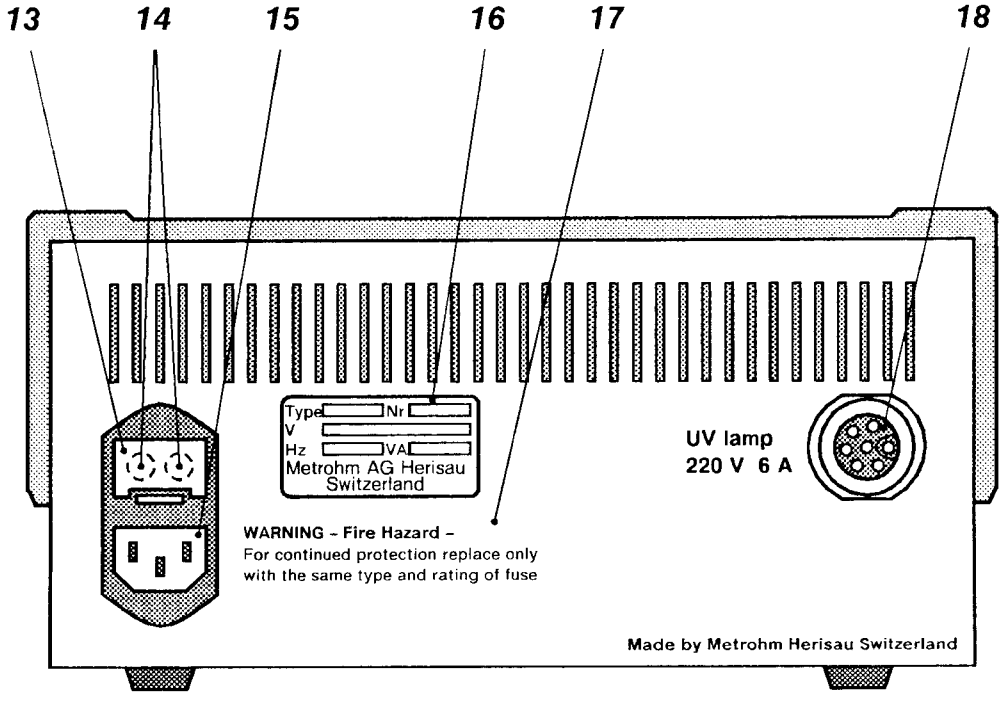


Fig. 3: Rear view of control unit

1 ***Power switch***
for switching the apparatus on and off
I = on O = off
In the operational readiness condition, the red lamp in the switch is lit up.

2 ***Fault display***
The red lamp lights up in the following cases:

- Wet part is not attached
- Mercury lamp has been automatically switched off owing to overheating
- Mercury lamp is defective

The measures to take in the event of a fault are described in *section 6.3.*

3 ***Time switch***
to set the desired irradiation time (see *section 4.2*)

4 ***Operational status indicator***
The red lamp remains lit up until the set irradiation time has elapsed.

5 ***Pointer for remaining irradiation time***
The slave pointer is automatically returned to the position of pointer **7** (set maximum irradiation time) when the apparatus is switched off.

6 ***Trip dog for adjustment ring 11***
Procedure for fixing the adjustment ring, see *section 4.2.3*

7 ***Pointer for irradiation time***
The desired irradiation time can be changed with control knob ***10.***

8 ***Display of the selected time range***
Possible settings: 0...12 h, 0...120 min, 0...12 min, 0...120 s, 0...12 s

9 ***Setscrew to set the time range***
Procedure for changing the time range, see *section 4.2.2*

10 ***Control knob of time switch***
This knob sets the desired irradiation time (pointer **7**).

11 ***Adjustment ring***
This ring can be used to fix a set irradiation time to facilitate subsequent location (procedure, see *section 4.2.3*)

12 ***Cover of time switch***
Detachable cover to protect the time switch against dust, contamination, drips and inadvertent alteration of the set irradiation time.

13 ***Fuse holder***

14 ***Fuses (6.3 A, slow-blow)***
Procedure for changing the fuses, see *section 3.3.3*

15 ***Mains socket***
Mains connection, see *section 3.3.5*

16 ***Rating plate***
Display of model number, series number, mains voltage,
mains frequency and power consumption.

17 ***Important notice***
WARNING: – Fire Hazard –
For continued protection replace only with the same type and rating of fuse

18 ***Connection socket for wet part***
for attachment of cable ***29*** with connector ***31*** permanently connected to wet part.

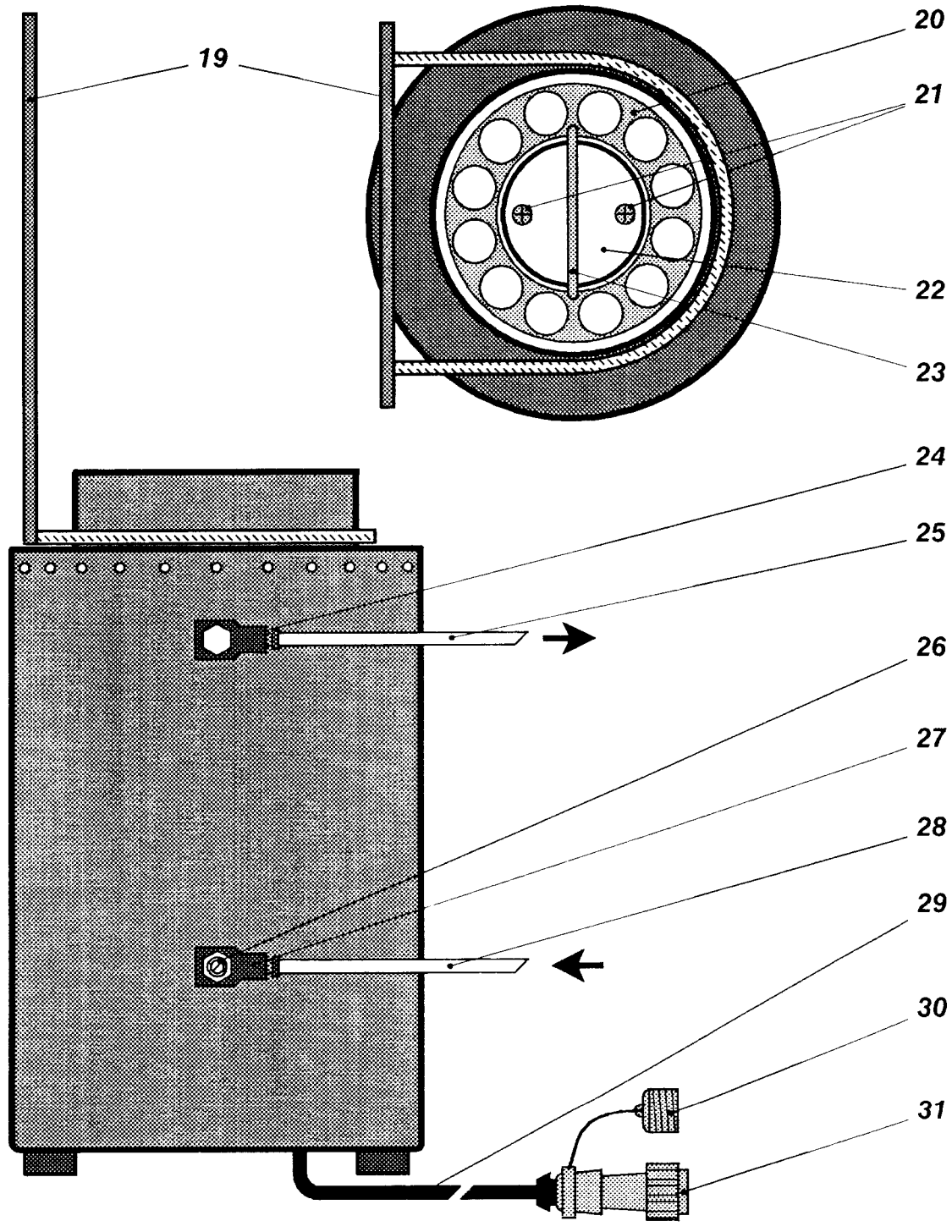


Fig. 4: Top and side view of the wet part

19 ***6.2745.000 Protective shield***

20 ***6.2041.040 Sample vessel holder***

21 ***Fastening screws for cover 22***
must be unscrewed to change the lamp (see *section 3.2.1* and *section 6.4.2*).

22 ***Cover with top lamp mounting***
Care: Can become hot during operation!

23 ***Holding bracket of sample vessel holder 20***

24 ***Cooling water outlet***

25 ***6.1801.120 Cooling water tubing***
for leading cooling water to drain

26 ***Regulator for cooling water flow rate***
Regulation, see *section 4.3.2*

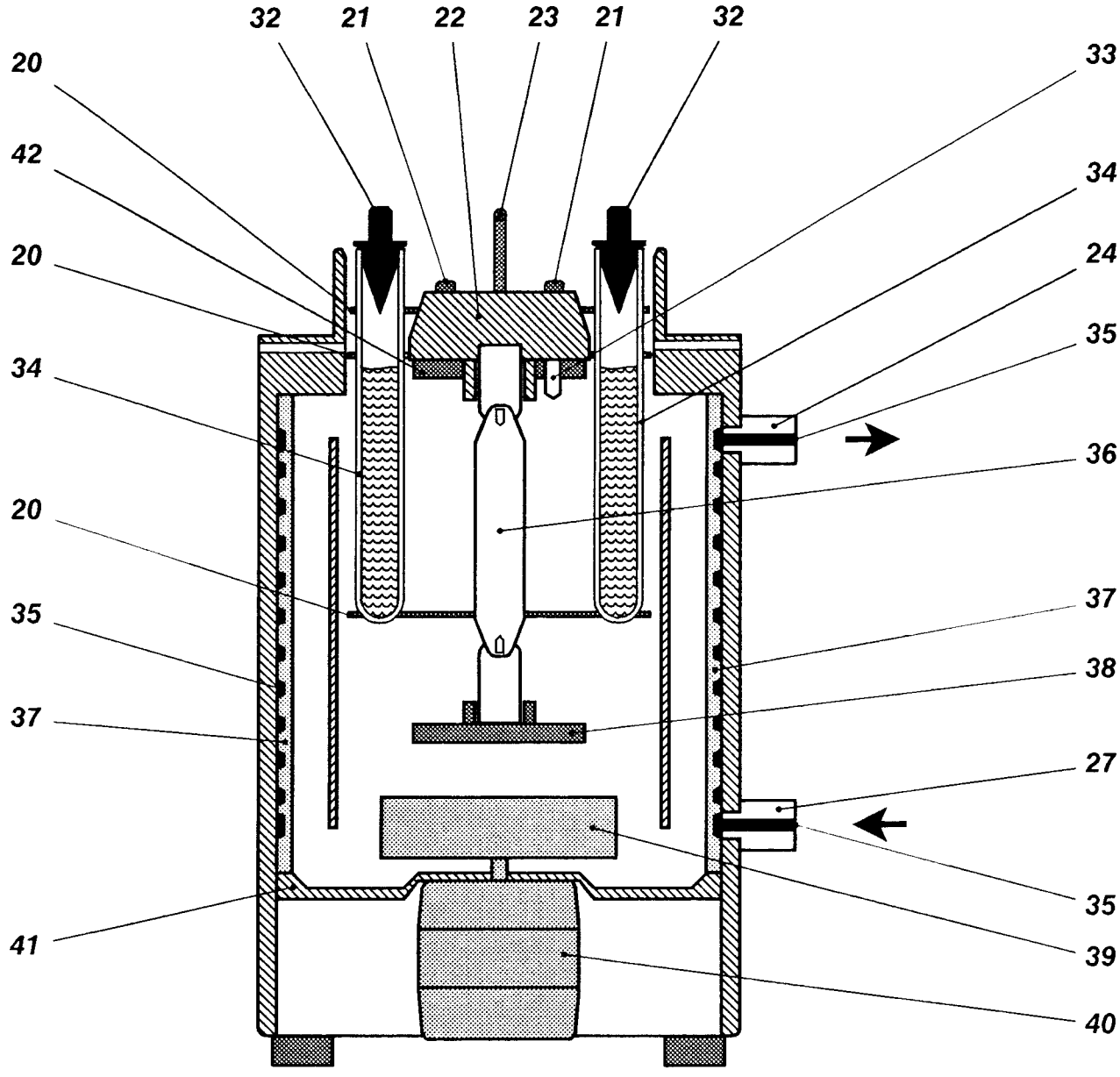


Fig. 5: Cross-section through the wet part

27 *Cooling water inlet*

28 *6.1801.120 Cooling water tubing* for supply of cooling water

29 *Connecting cable to control unit*

30 *Protective cap for connector 31*

31 *Cable connector for connection to control unit (socket 18)*

32 *6.1446.100 PTFE Stopper* for sample vessel *34*

33 *Temperature sensor* for overtemperature protection (lamp automatically switched off on overheating)

34 *6.2414.000 Sample vessel*

35 *Cooling water*

36 *6.2804.030 UV lamp*

37 *Heat sink with slots for cooling water*

38 *Bottom lamp mounting*

39 *Fan rotor*

40 *Fan motor*

41 *Drip tray for spilled solutions*

42 *Support for cover 42*

3. Installation

3.1. Setting up the apparatus

3.1.1. Packaging

Control unit and wet part of the 705 UV Digester are supplied together with the separately packaged accessories in special packages which afford excellent protection. These contain shock-absorbing foam linings foamed to the individual shape and wrapped in blue plastic film. The actual units are packed in an evacuated, dustproof polyethylene bag. It is essential to keep all these special packagings in a safe place as they and they alone ensure indemnified transport of the apparatus in the event of return.

3.1.2. Checking

Immediately after receipt of the shipment, check that the shipment is complete and free from damage (compare with delivery note and list of accessories in *section 8*). If transport damage is found, see directions in *section 9* "Warranty".

3.1.3. Location

In the wet part of the 705 UV Digester, UV irradiation produces ozone from the air. Under normal circumstances, i.e. with inserted, fully loaded sample vessel holder, the measurable ozone concentration in the immediate vicinity ($\leq$10 cm) of the wet part is $\leq$0.025 ppm or $\leq$50 µg/m^3 (measured with Dräger detector tube). If operated for a considerable length of time without sample vessel holder, however, higher ozone concentrations can appear. Thus, position the 705 UV Digester in the laboratory at a place suitable for operation and free from vibration in a **fume hood** (cupboard), protected against corrosive atmospheres and contamination by chemicals.

3.2. Preparing the wet part

3.2.1. Installing the UV lamp

The UV lamp ***36*** is supplied as an accessory and must be installed in the wet part as follows (see *Fig. 3 – 5*):

1. If the wet part is already attached to the control unit, switch off control unit and disconnect mains cable from the mains socket ***15***.
2. If installed, remove sample vessel holder ***20*** with sample vessels ***34*** from the wet part.
3. Unscrew the two fastening screws ***21*** using a screwdriver and lift cover ***22*** off from the wet part.
4. Take UV lamp ***36*** out of its packaging (keep packaging in a safe place for return shipment).

   Warning: *Hold UV lamp only at its two* ***ends****. Touching the quartz tube with bare hands will leave fingermarks which will burn into the quartz glass during lamp operation.*
   Any marks caused by contact must be wiped off before startup of the UV lamp using a clean cloth soaked in alcohol.
5. Insert UV lamp ***36*** from above through the opening of support ***42*** into the bottom lamp mounting ***38***.
6. Replace cover ***22*** with the top lamp mounting on the wet part and fasten by tightening the two screws ***21***.

3.2.2. Mounting the protective cover

Mount protective cover ***19*** on the wet part and turn so that the eyes are protected against the UV light during lamp operation.

3.2.3. Cooling water connection

Connect the wet part of the 705 UV Digester to the cooling water with the aid of the 6.1801.120 PVC Tubing ($\varnothing_i$ = 4 mm, $\varnothing_e$ = 6 mm, length = 2 mm) in the accessories:

1. Cut 6.1801.120 PVC Tubing into two pieces of appropriate length. The tubing must be cut at right angles and the cut surfaces smooth.
2. Insert one end the cooling water tubing ***25*** up to the stop in the cooling water outlet ***24*** (self-sealing connection), route the other end to a drain. Make sure that the cooling water can flow out without any hindrance (max. counterpressure allowed: 0.2 bar)

3▸ Insert one end of the cooling water tubing ***28*** up to the stop in the cooling water inlet ***27*** (self-sealing connection) and connect the other end by means of a suitable adapter to tubing fixed to your cold water tap.

3.2.4. Electrical connection at control unit

Attach the wet part to the control unit using connecting cable ***29***:

1▸ Unscrew protective cap ***30*** from cable connector ***31***.

2▸ Insert cable connector ***31*** in connection socket ***18*** of the control unit and fasten tightly.

3.3. Mains connection of control unit

Note: *If the 705 UV Digester is connected to the power supply, neither the control unit nor the wet part may be opened nor parts removed from them, otherwise there is a danger of contact with live components. Before opening the control unit or wet part to replace components or perform maintenance or repair work, it is thus essential always to disconnect the mains cable from the mains socket **15** of the control unit.*

3.3.1. Mains frequency

The 705 UV Digester is supplied in two different versions 2.705.0017 (for mains frequency **50 Hz**) and 2.705.0016 (for mains frequency **60 Hz**). Before switching on the control unit for the first time, check that the mains frequency of the apparatus (visible on rating plate ***16***) matches the available mains frequency. If this is not the case, please inform METROHM service.

3.3.2. Mains voltage

The two versions of the 705 UV Digester can be operated directly with a mains voltage of **220 ... 240 V**. Ensure that the operating voltage corresponds to this mains voltage before you switch on the apparatus. For operation with mains voltages of **100 ... 117 V**, use an appropriate series transformer.

3.3.3. Fuses

Two fuses ***14*** (6.3 A, slow-blow) are installed in the fuse holder ***13*** of the control unit. If need be, the fuses can be changed as follows:

1▸ Disconnect mains cable from mains socket ***15***.

2▸ Press the flap at the bottom of the fuse holder upwards using a screwdriver and remove fuse holder ***13*** with fuses ***14***.

3▸ Replace fuses ***14***.

Warning: *Use only identical replacement fuses (6.3 A, slow-blow), otherwise the apparatus constitutes a fire hazard!*

4▸ Reinsert fuse holder ***13*** with fuses ***14*** until the flap at the bottom snaps in.

5▸ Plug mains cable into mains socket ***15***.

3.3.4. Mains cable

The required mains cable supplied with the instrument:

- 6.2122.020 with plug SEV 12 (Switzerland ...)
- 6.2122.040 with plug CEE(7), VII (Germany ...)
- 6.2122.070 with plug NEMA 5–15 (USA ...)

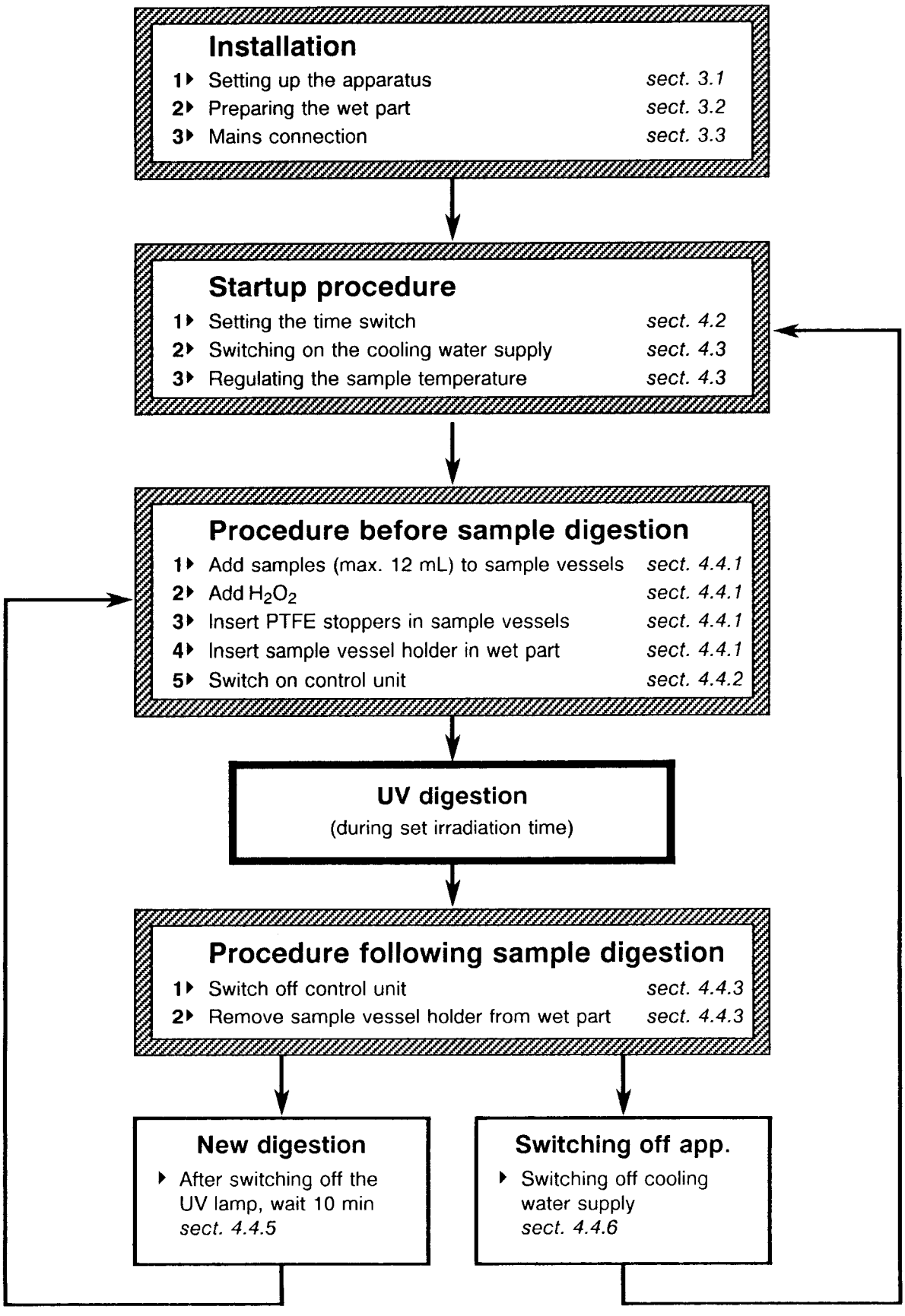
is three-cored and fitted with a connector with earthing pin. Should a different connector need to be fitted, the yellow/green lead (IEC standard) must be connected to the protective earth (appliance protection class 1). Each break in the earthing inside or outside the apparatus constitutes a hazard.

3.3.5 Mains connection

Plug the mains cable into connection socket ***15*** of the control unit.

4. Operation

4.1. Sequence of operations



4.2. Time switch

4.2.1. Function

Operation of the 705 UV Digester is controlled by time switch ***3***, i.e. the UV lamp is alight if an irradiation time >0 is set on time switch ***3***.

When the control unit is switched on by means of power switch ***1***, the UV lamp ***36*** is switched on. It stays lit up until the set irradiation time has elapsed, at the same time the operational status indicator ***4*** in the time switch is also alight. The remaining irradiation time is shown by the pointer ***5***. After elapse of the irradiation time, the UV lamp is automatically switched off and the operational status indicator ***4*** goes out. When the control unit is switched off with power switch ***1***, pointer ***5*** is automatically moved to the position of pointer ***7*** (set irradiation time).

4.2.2. Setting the time range

The set time range can be seen on display ***8***. The following settings are possible:

0 ... 12 h	0 ... 120 min	0 ... 120 s
	0 ... 12 min	0 ... 12 s

If you wish to change the displayed time range, proceed as follows:

1. Switch off control unit with power switch ***1***.

   Warning: *Never change the time range when the apparatus is switched on, otherwise the mechanical system of the time switch will be damaged!*

2. Remove protective cover ***12*** of the time switch.
3. Turn setscrew of time range ***9*** with a small screwdriver or Allen key until the desired time range appears in display ***8***.
4. Replace protective cover ***12*** of the time switch.

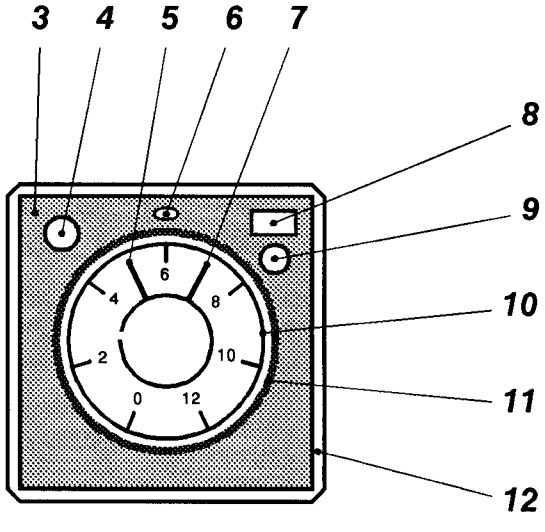
4.2.3. Setting the irradiation time

The set irradiation time is indicated by pointer ***7***. If you wish to change this time, turn control knob ***10*** and hence pointer ***7*** to the desired position.

The set irradiation time can be marked with the adjustment ring ***11***. If the time setting is changed during a digestion, the initial time can be reset exactly using this ring. It also prevents inadvertent alteration of the set time.

To mark a set irradiation time, proceed as follows:

1. Remove protective cover ***12*** of the time switch.
2. Set desired irradiation time with control knob ***10***.
3. Remove adjustment ring ***11*** from control knob ***10***.
4. Reposition adjustment ring ***11*** over control knob ***10*** so that the groove at the top of the ring engages in the trip dog ***6***.
5. Replace protective cover ***12*** of the time switch.



3 ***Time switch***
4 ***Operational status indicator***
5 ***Pointer for remaining irradiation time***
6 ***Trip dog for adjustment ring 11***
7 ***Pointer for irradiation time***
8 ***Display of selected time range***
9 ***Setscrew for setting the time range***
10 ***Control knob of time switch***
11 ***Adjustment ring***
12 ***Cover of time switch***

Fig. 6: Details of the time switch

4.3. Regulating the sample temperature

4.3.1. Cooling principle and general information

In addition to UV radiation, the UV lamp generates so much heat that the samples would rapidly boil without some form of cooling. In the 705 UV Digester, the samples are cooled by a combination of water and air cooling (see *Fig. 5*). The built-in fan ***39/40*** ensures sufficient air cooling of the samples, whereas the air is cooled in turn by heat sink ***37*** through which cooling water ***35*** flows. Thanks to the PTFE stoppers ***32***, which close the sample vessels ***34*** and at the same time act as cold fingers, loss of liquid is negligibly small (≤ 0.4% per h irradiation time at 95°C).

The sample temperature can be influenced by regulation of the cooling water flow. Here, the following basic rules must be observed:

- ***Guidelines for digestion temperature and irradiation time:***

Organic matrix	*Amalgam voltammetry*	*Adsorption voltammetry*
aliphatic	70 ... 80°C / 30 ... 45 min	70 ... 80°C / 45 ... 60 min
aromatic	70 ... 80°C / 30 ... 45 min	80 ... 90°C / 60 ... 90 min

- ***If the cooling water temperature changes by 1°C, the sample temperature also changes by ca. 1°C.***
  The cooling water temperature should therefore be as constant as possible. A wait time of ca. 30 min must normally be allowed to elapse before a constant cooling water temperature is attained, especially when the cooling water supply has just been switched on.

- ***Coloured samples absorb considerably more heat than uncoloured.***
  The maximum temperature difference between coloured and uncoloured samples can be up to 20°C with the same cooling power (e.g. difference between water and ink). If coloured samples have to be digested, either the operator should perform the regulation of the sample temperature described in *section 4.3.2* with the actual samples or a sufficiently large safety margin should be allowed for if regulation is carried out with distilled water.

4.3.2. Regulation of the cooling water flow

The cooling water flow (and hence the sample temperature) is regulated as follows:

Preparations

1▸ Set a sufficiently large irradiation time (procedure, see *section 4.2*) so that the UV lamp is not shut off during regulation of the cooling water.

2▸ Fill 12 sample vessels ***34*** each with 10 mL dist. water (or sample, see note in *section 4.3.1*) and place in the sample vessel holder ***20***.

3▸ Equip 1 sample vessel with the 6.1446.110 Thermometer Stopper and insert 6.2401.010 Thermometer through this stopper into the sample vessel ***34*** until the bulb of the thermometer is completely immersed (ca. 50 mm below the upper edge of the vessel).

4▸ Insert black PTFE stoppers ***32*** in the other sample vessels ***34***.

5▸ Place sample vessel holder ***20*** in wet part.

6▸ Switch on cooling water supply.

Setting the cooling water flow rate

7▸ Set cooling water flow rate with regulator ***26*** to the desired value:

*Turning screw **26** in a **clockwise direction lowers** the flow rate.*
*Turning screw **26** in an **anti-clockwise direction increases** the flow rate.*

The flow rate that should be set depends on the cooling water temperature and the desired sample temperature (see also *section 4.3.1*). *Fig. 7* shows the approximate relation between these two quantities for dist. water as samples and will give you an idea of what flow rate to select at the start. The flow rate can be determined by a flow meter connected in the outflow or by means of a measuring cylinder and a stop watch.

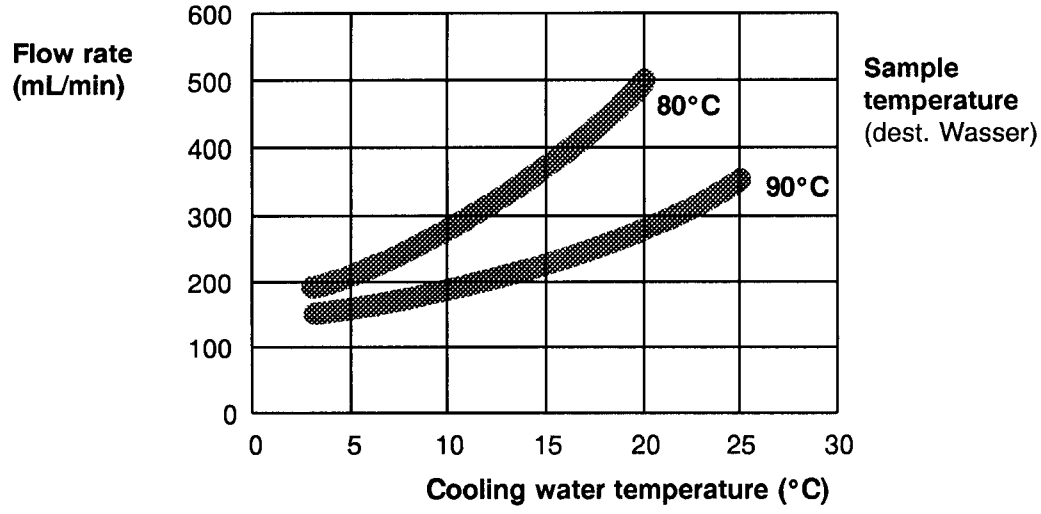


Fig. 7: **Influence of flow rate and temperature of the cooling water on the sample temperature**

8▸ Mount protective shield ***19*** on the wet part and turn so that the eyes are protected against UV light.

9▸ Switch on apparatus with power switch ***1*** and wait ca. 30 min.

Regulating the cooling water flow

10▸ Read off sample temperature on thermometer and readjust cooling water flow rate using screw ***26*** in steps of one-quarter turn until the desired sample temperature is reached.

Warning: *After every new adjustment of the flow rate, wait at least 15 min for the temperature to equilibrate.*

11▸ Switch off apparatus with power switch ***1***.

4.4. Performing the sample digestion

4.4.1. Preparations

Before a sample digestion with the 705 UV Digester is started, the following conditions must be fulfilled:

- 705 UV Digester correctly installed (see *section 3*)
- Irradiation time set on the time switch (see *section 4.2*)
- **Cooling water supply switched on**
- Sample temperature regulated (see *section 4.3*)
- **UV lamp switched off for at least 10 min**

The samples are prepared for the sample digestion as follows:

1▸ **Add samples (max. 10 ... 12 mL) to sample vessels**
Use only the supplied quartz 6.2414.000 Sample Vessels. Normal test tubes are not sufficiently transparent to UV light to guarantee a complete digestion. Clean the outside of the sample vessels before insertion in the sample vessel holder with a lint-free cloth.

2▸ **Add H_2O_2**
In general, 50...100 µL H_2O_2 puriss. suffice at the start of the digestion. If need be, you can add more H_2O_2 during irradiation.

3▸ **Insert PTFE stoppers in sample vessels**
These stoppers act as a protection against external contamination, At the same time, they function as cold fingers and prevent loss of liquid.

4▸ **Insert sample vessel holder in wet part**
The sample vessel holder ***20*** must be fully loaded with sample vessels. If you wish to digest fewer than 12 samples, fill the remaining sample vessels with dist. water. For insertion in the wet part, you have to turn the sample vessel holder to the correct position (the opening in the bottom ring must be above the bar of the cover support ***42***).

4.4.2. Starting a sample digestion

The sample digestion is started as follows:

1▸ **Switch on control unit with power switch *1***
After the control unit has been switched on, time switch ***3*** is started automatically and the UV lamp started. During the irradiation time, the operational status indicator ***4*** of time switch ***3*** is alight. The remaining irradiation time is shown by pointer **5.**

2▸ **Turn protective cover *19* so that the eyes are protected against UV light**
This protection is particularly important if you add more H_2O_2 when the lamp is switched on or take the sample vessel holder out of the wet part for a short time.

4.4.3. Procedure following a sample digestion

The sample digestion is ended automatically after the set irradiation time has elapsed. The UV lamp and the operational status indicator ***4*** of time switch ***3*** are switched off. Pointer **5** is in position 0. Then proceed as follows:

1▸ **Switch off control unit with power switch *1***
Pointer **5** is automatically moved to the position of pointer **7** (set irradiation time).

2▸ **Remove sample vessel holder from wet part**
Warning: *The sample vessels may still be hot!*
The PTFE stoppers are left in the vessels until the samples are processed further. To avoid loss of liquid, when removing the stoppers wipe off any drops hanging from a stopper on the inside edge of the sample vessel.

4.4.4. Terminating a sample digestion

If you wish to terminate the sample digestion prematurely before the set irradiation time has elapsed, proceed as follows:

1▸ **Switch off control unit with power switch *1***
The UV lamp and the operational status indicator ***4*** of time switch ***3*** go out. Pointer **5** is moved back to the position of pointer **7** (set irradiation time).

2▸ **Remove sample vessel holder from wet part**
Warning: *The sample vessels may still be hot!*
The PTFE stoppers are left in the vessels until the samples are processed further. To avoid loss of liquid, when removing the stoppers wipe off any drops hanging from a stopper on the inside edge of the sample vessel.

4.4.5. Starting a new sample digestion

A new sample digestion can be started only when the **UV lamp has been switched off for at least 10 min.** Proceed according to the directions in *sections 4.4.1* and *4.4.2.*

4.4.6. Switching off 705 UV Digester completely

If you do not wish to start a new sample digestion, the **cooling water supply** must also be **shut off** after the control unit has been switched off (*sections 4.4.3* and *4.4.4*).

4.5. Useful hints for the UV digestion

4.5.1. Reaction mechanism

The UV photolysis to destroy dissolved organic matter is based on a radical mechanism. It is not the actual UV radiation, but the OH radicals formed by the radiation that result in the degradation of the organic substances. The greater the number of OH radicals formed, the faster the UV photolysis rate. OH radicals are formed from water and from the hydrogen peroxide added at the start:

$$H_2O + h\nu \rightarrow H^* + OH^*$$
$$H_2O_2 + h\nu \rightarrow 2\ OH^*$$

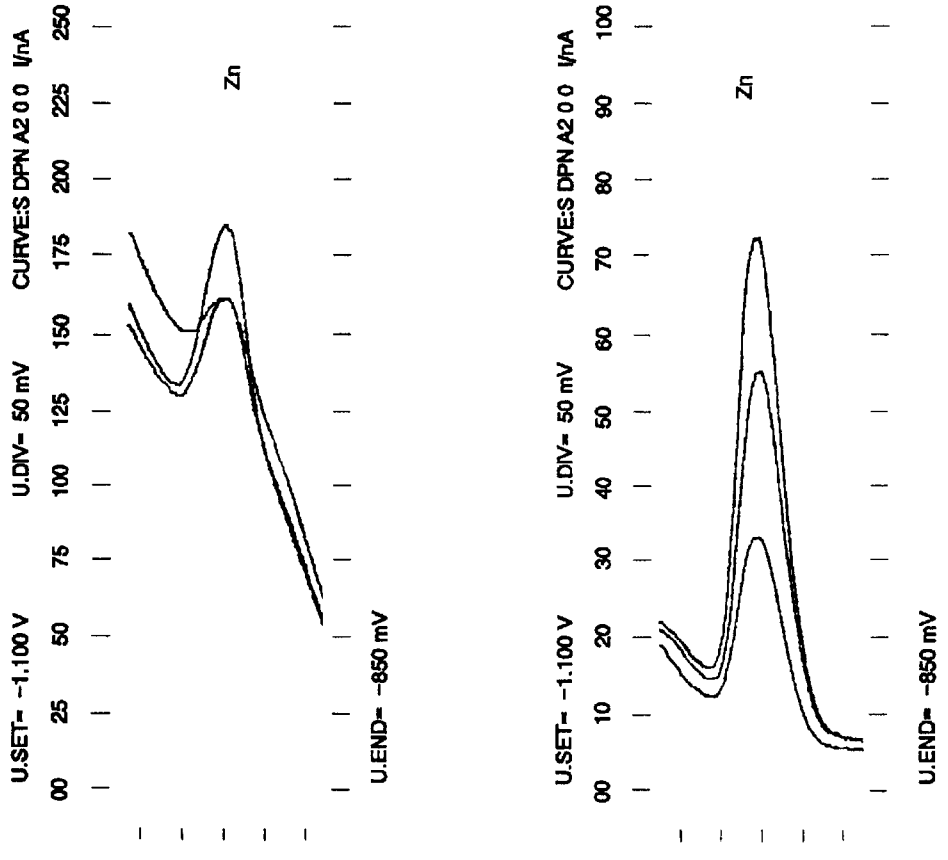
Hydrogen peroxide acts as an initiator of the radical reaction. At a sufficiently high temperature (70...90°C), sufficient OH radicals are formed from water to make further addition of H_2O_2 generally unnecessary.

4.5.2. Interference by nitrite formation

If samples contain nitrate, this is reduced to nitrite by UV radiation. The voltammetrically active nitrite then leads to a relatively broad peak which can interfere with the analyses of other substances (e.g. zinc).

High nitrate concentrations appear primarily when samples are acidified with conc. nitric acid. If it is not possible to switch to another acid for acidification or if nitrate is already present at the start, the resulting nitrite can be reduced to nitrogen with sulphamic acid NH_2SO_3H. The following procedure is recommended for this: Immediately following completion of photolysis, add 25 µL $\rho(NH_2SO_3H) = 40$ g/L per 10 mL sample to the hot sample.

The following example of a zinc analysis convincingly demonstrates how the interference by nitrate (left) disappears after treatment with sulphamic acid (right).



5. Application example: Determination of Cd, Pb, Ni and Co in model water

5.1. Introduction

The analysis of 4 heavy metals with specific organic interfering substances described in what follows is eminently suitable to check the proper functioning of the 705 UV Digester. We advise you to test each new UV lamp by this method.

If you notice signs that the digestion efficiency is becoming less after the UV lamp has been in use for a considerable time, retest the lamp under the same conditions and compare the results. This will make it easier for you to decide whether the cause of the incomplete digestion lies with the lamp or in the sample matrix and whether or not a lamp change is necessary. Should you wish to shorten this procedure, we advise determining only the two critical metals nickel and cobalt.

Other examples and detailed information on digestion by UV photolysis can be found in the following references:

- DIN 38406, Teil 16 (1990)
  Determination of 7 metals (zinc, cadmium, lead, copper, thallium, nickel, cobalt) by means of voltammetry (E16) (in German)
- M. Kolb, P. Rach, J. Schäfer, A. Wild
  Investigations of Oxidative UV Photolysis
  Fresenius, J. Anal. Chem., in preparation

5.2. Instruments

- 646 VA Processor and 647 VA Stand
  Working electrode: Multi-Mode Electrode (MME)
  Reference elektrode: Ag/AgCl/c(KCl) = 3 mol/L
  Auxiliary electrode: Platinum rod
- UV Digester 705

5.3. Reagents

All reagents used must be at least of puriss p.a. grade. The solutions are made up with ultrapure water (conductivity ≤ 0.1 µS/cm 20°C).

- **Model water**
  10 µg Pb
  2 µg each of Cd, Ni, Co
  10 mg each of EDTA, Triton-X100, picric acid
  Dissolve in 900 mL ultrapure water, adjust pH of the solution to 2 with conc. HCl and make up to 1 L with ultrapure water.
- **H_2O_2**
  w = 0.3 (30%) suprapur
- **Potassium chloride sodium acetate sol.**
  c(KCl) = 1.5 mol/L; c(sodium acetate) = 0.5 mol/L
  Dissolve 55.9 g potassium chloride and 20.5 g sodium acetate in ultrapure water in a 500 mL volumetric flask and fill to the mark.
- **NH_3/NH_4Cl buffer**
  c(NH_4Cl) = 1 mol/L; c(NH_3) = 2 mol/L
  Dissolve 26.8 g NH_4Cl and 75 mL rho(NH_3) = 0.91 g/L in ultrapure water in a 500 mL volumetric flask and fill to the mark.
- **Dimethylglyoxime**
  2,3-butanedione dioxime (dimethylglyoxime) solution
  c($C_4H_8N_2O_2$) = 0.1 mol/L
  Dissolve 0.29 g dimethylglyoxime in ethanol in a 25 mL volumetric flask and fill to the mark.
- **Standard solutions**
  Solutions weaker than ρ(Me) = 100 mg/L are stored in plastic bottles and should be freshly prepared once a week as follows: The concentrated standard solution is diluted with ultrapure water and acidified with 0.4 mL/100 mL HNO_3.

5.4. Sample digestion

The sample is digested in the 705 UV Digester under the following conditions:

- Digestion temperature 90°C ± 3°C
- Irradiation time 90 min
  (or 30 min if only Cd and Pb are being determined)
- H_2O_2 addition 100 µL

Proceed as follows:

1▸ **Install 705 UV Digester** (see *section 3*)

2▸ **Set sample temperature to 90°C** (see *section 4.3.2*)

3▸ **Set irradiation time to 90 min** (see *section 4.2*)
If only Cd and Pb are being determined, an irradiation time of 30 min suffices.

4▸ **Prepare sample digestion** (see *section 4.4.1*):
- Add 10 mL model water to each sample vessel
- Add 100 µL H_2O_2 suprapur
- Insert PTFE stoppers in sample vessels
- Insert sample vessel holder in wet part
  (if less than 12 samples are being analysed, fill the remaining sample vessels with dist. water)

5▸ **Start sample digestion** (see *section 4.4.2*):
- Switch on control unit with power switch ***1***
- Turn protective shield ***19*** so that the eyes are protected against UV light

6▸ **After elapse of the irradiation time** (see *section 4.4.3*):
- Switch off control unit using power switch ***1***
- Remove sample vessel holder from wet part

5.5. Determination of Cd and Pb

5.5.1. Procedure

The metals cadmium and lead are determined simultaneously at pH≈4.6 by the DPASV method.

1▸ Add 10 mL model water to polarographic vessel

2▸ Add 1 mL potassium chloride sodium acetate solution

3▸ Determination of Cd and Pb each with 2 replications and two standard additions (see below for conditions, for 646 VA Processor program, see *section 5.5.2*)

Conditions	Cd, Pb
Method	DPASV
Electrode	HMDE
Measurement technique	DPN
Pulse amplitude	+50 mV
Enrichment potential	–800 mV
Enrichment time	60 s
Rest time	5 s
Final potential	–200 mV
Peak potential	–570 mV (Cd) –370 mV (Pb)

5.5.2. Program for 646 VA Processor

```
 1  Cd and Pb in model water                              METHOD 10  PAGE 2
 2  MPL 1          EL.TYPE MME                            GEN.SPECIFICATIONS

    PARAMETERS
 3  iR.MODE              N
 4  SPEED                5
 5  D.SIZE               5
 6  N.DROPS              5

    RECOGNITION
 7  SPIKE THRESH         7
 8  H.THRESH             7
 9  U.TOL                7
10  W.TOL                9
11  ASYM.TOL             7
```

```
 1  Cd and Pb in model water                              METHOD 10  PAGE 3
    MPL 1          EL.TYPE MME                            OPERATION SEQENCE

    OPERATIONS/PARAMETERS                                 OPERATIONS/PARAMETERS
 1  PURGE ;STIR  ;         300  s        12  BEEP  ;
 2  [ADDL ;                              13  ADD1]2;
 3  (REP  ;                              14  OPURGE;OSTIR ;
 4  PURGE ;STIR  ;         20  s         15  BEEP  ;END   ;
 5  OPURGE;                3  s
 6  HMDE  ;
 7  MEAS  ;                60  s
 7a    M.MODE       DPN    50  mV
 7b    T.STEP              600  ms
 7c    U.SET              -800  mV
 8  OSTIR ;                5  s
 9  SWP 0 ;                60  s
 9a    U.END              -200  mV
 9b    U.STEP              6  mV
       SW.RATE             10.0 mV/ s
10  REP) 2;
11  PURGE ;STIR  ;
```

```
 1  Cd and Pb in model water                                  METHOD 10  PAGE 4
    MPL 1          EL.TYPE MME                                ALLOCATIONS
    a              b              c          d          e              f
    SOLUTE         U.VERIF        DOS        V.SOLN     m.CONC         m.BLANK
    Subst          Ux             Soln       c, v       rho.x          bx
 1  Pb           -370  mV        1        c 100  uL     1.000 mg/L     0.000 g
 2  Cd           -570  mV        1        c 100  uL     200.0 ug/L     0.000 g
 3
 4
 5
 6
 7
 8

 9  SUPP.ELEC    DIN 38406
10  V.MEAS       11.000 mL
11  ALIQUOT      1.000
12  DATE         91-11-19
13  TIME         08:37
```

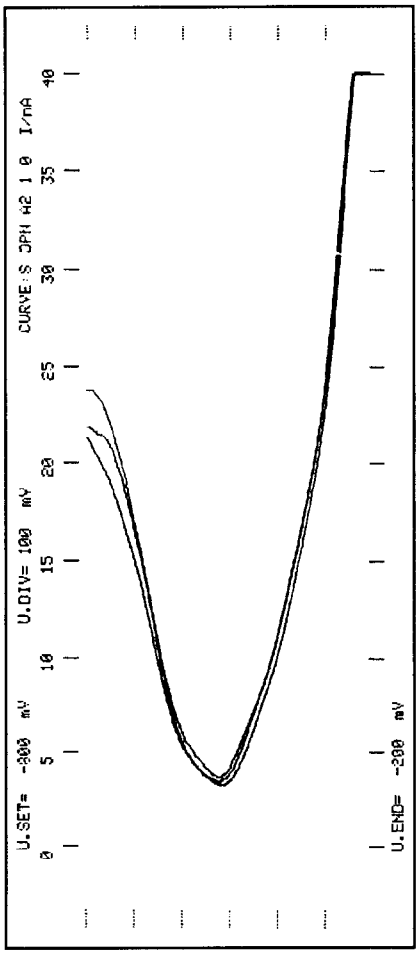
```
    Cd and Pb in model water                                  METHOD 10  PAGE 5
    MPL 1          EL.TYPE MME                                DATA OUTPUT
                   a              b              c              d          e
    SEGMT          Y.AXIS/L       Y.AXIS/R       X.AXIS/DIV
 1  SWP 0          0.00 A         40.0 nA        100  mV
 2
 3
 4
 5
 6
 7
 8

 9  RECORD         FR             SXXX
10
11  SEND
12
```

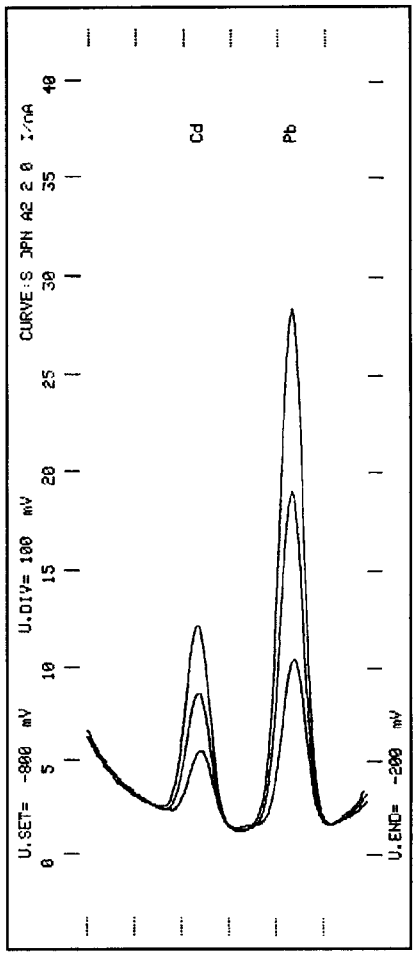
	Cd and Pb in model water			METHOD 10 PAGE 6
	MPL 1	EL.TYPE MME		RES.CALCULATION
		a	b	c	d
	ANALYTE	EVAL	R.QUANT	R.UNIT	SIGNIF.DIG
1	Pb	N	rho(Pb)	ug/L	4
2	Cd	N	rho(Cd)	ug/L	4
3					
4					
5					
6					
7					
8					
		(EV.QUANT | + ADDEND)	* FACTOR	/ DIVISOR
11	Pb	A	0.00000	1.00000 E+ 6	1.00000
12	Cd	A	0.00000	1.00000 E+ 6	1.00000
13					
14					
15					
16					
17					
18					

5.5.3. Results with and without UV digestion

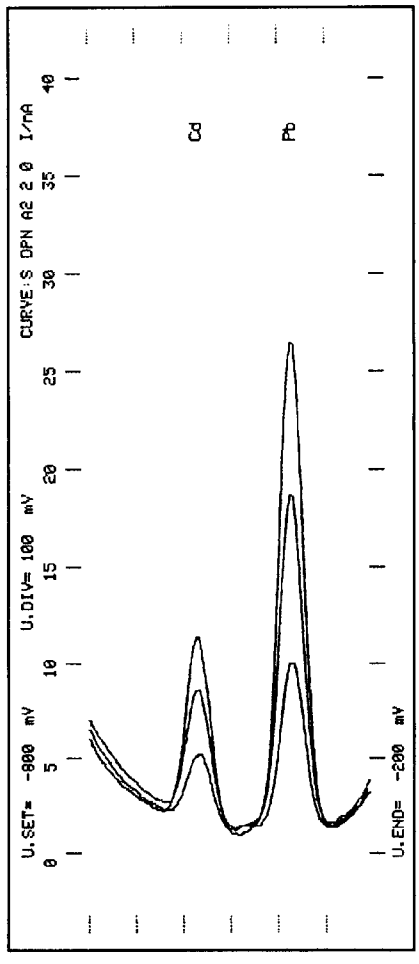
With a proper functioning UV lamp, the interference due to the organic substances in the model water in the determination of Cd and Pb should disappear completely after an irradiation time of 30 min (see below). Continued irradiation should then have no further influence on the measured peak heights.



without UV irradiation



after 30 min UV radiation



after 90 min UV irradiation

5.6. Determination of Ni and Co

5.6.1. Procedure

The metals nickel and cobalt are determined simultaneously at pH≈9.5 by the DPCSV method.

1▶ Add 10 mL model water to polarographic vessel

2▶ Add 1 mL NH_3/NH_4Cl buffer

3▶ Determination of Ni and Co each with 2 replications and two standard additions (see below for conditions, for 646 VA Processor program, see *section 5.6.2*)

Conditions	Ni, Co
Method	DPCSV
Electrode	HMDE
Measurement technique	DPN
Pulse amplitude	–25 mV
Enrichment potential	–700 mV
Enrichment time	60 s
Rest time	5 s
Final potential	–1300 mV
Peak potential	– 934 mV (Ni) –1100 mV (Co)

5.6.2. Program for 646 VA Processor

```
 1  Ni and Co in model water                          METHOD 11  PAGE 2
 2  MPL 1          EL.TYPE MME                        GEN.SPECIFICATIONS

    PARAMETERS
 3  iR.MODE              N
 4  SPEED                5
 5  D.SIZE               5
 6  N.DROPS              5

    RECOGNITION
 7  SPIKE THRESH         5
 8  H.THRESH             5
 9  U.TOL                9
10  W.TOL                5
11  ASYM.TOL             5
```

```
 1  Ni and Co in model water                          METHOD 11  PAGE 3
    MPL 1          EL.TYPE MME                        OPERATION SEQENCE

    OPERATIONS/PARAMETERS                 OPERATIONS/PARAMETERS
 1  PURGE ;STIR  ;        300  s     12  DOS1  ;ADD2]2;
 2  [ADDL ;                          13  OMEAS ;
 3  (REP  ;                          14  OPURGE;OSTIR ;
 4  PURGE ;STIR  ;         30  s     15  BEEP  ;END   ;
 5  OPURGE;                5  s
 6  HMDE  ;
 7  MEAS  ;               60  s
 7a    M.MODE      DPN   -25  mV
 7b    T.STEP             600  ms
 7c    U.SET             -700  mV
 8  OSTIR ;                5  s
 9  SWP 0 ;               90  s
 9a    U.END             -1.300 V
 9b    U.STEP             4  mV
       SW.RATE            6.6 mV/  s
10  REP) 2;
11  BEEP  ;PURGE ;STIR  ;
```

```
 1  Ni and Co in model water                                  METHOD 11  PAGE 4
    MPL 1          EL.TYPE MME                               ALLOCATIONS
    a              b              c              d           e              f
    SOLUTE         U.VERIF        DOS            V.SOLN      m.CONC         m.BLANK
    Subst          Ux             Soln           c, v        rho.x          bx
 1  Ni             -934  mV       1         c 50  uL        1.000 mg/L     0.000 g
 2  Co             -1.100 V       2         c 50  uL        1.000 mg/L     0.000 g
 3
 4
 5
 6
 7
 8

 9  SUPP.ELEC      NH3/NH4Cl buffer
10  V.MEAS         11.000 mL
11  ALIQUOT        1.000
12  DATE           91-11-19
13  TIME           08:30
```

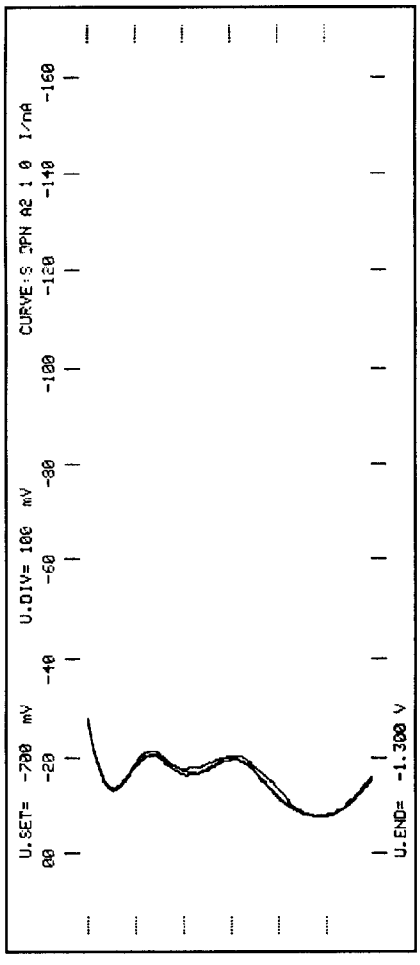
```
    Ni and Co in model water                                  METHOD 11  PAGE 5
    MPL 1          EL.TYPE MME                               DATA OUTPUT
                   a              b              c           d              e
    SEGMT          Y.AXIS/L       Y.AXIS/R       X.AXIS/DIV
 1  SWP 0          0.00 A        -160  nA       100  mV
 2
 3
 4
 5
 6
 7
 8

 9  RECORD         FR             SXXX
10
11  SEND
12
```

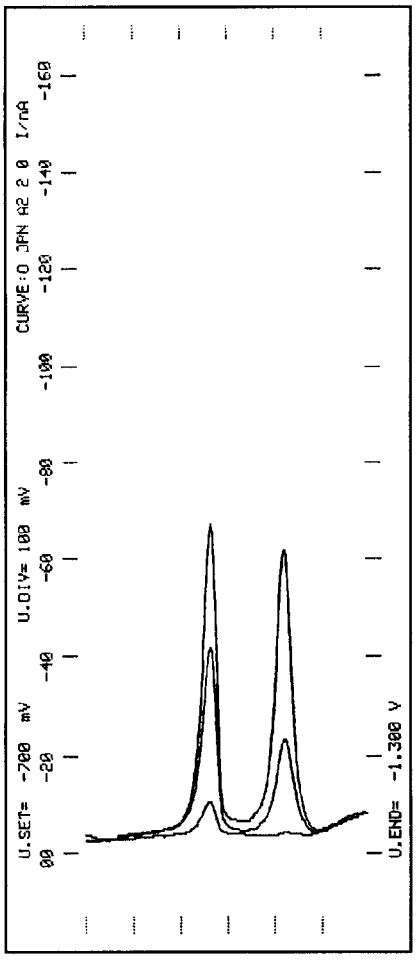
```
    Ni and Co in model water                                  METHOD 11  PAGE 6
    MPL 1          EL.TYPE MME                               RES.CALCULATION
                   a              b              c           d
    ANALYTE        EVAL           R.QUANT        R.UNIT      SIGNIF.DIG
 1  Ni             N              rho(Ni)        ug/L        4
 2  Co             N              rho(Co)        ug/L        4
 3
 4
 5
 6
 7
 8
                   (EV.QUANT    + ADDEND)      * FACTOR      / DIVISOR
11  Ni             A              0.00000        1.00000 E+ 6  1.00000
12  Co             A              0.00000        1.00000 E+ 6  1.00000
13
14
15
16
17
18
```

5.6.3. Results with and without UV digestion

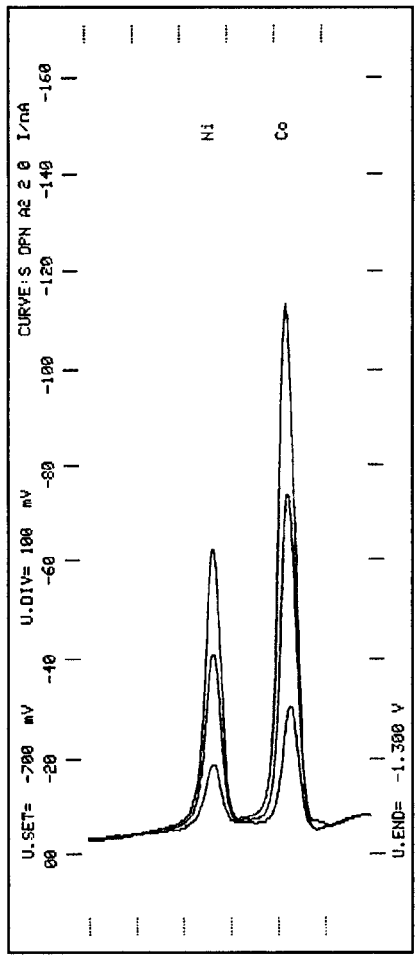
With a proper functioning UV lamp, the interference due to the organic substances in the model water in the determination of Ni and Co should disappear completely after an irradiation time of 90 min.



without UV irradiation



after 30 min UV radiation



after 90 min UV irradiation

6. Safety, malfunctions, maintenance

6.1. Safety information for work with the 705 UV Digester

6.1.1. Electrical safety

Electrical safety of the 705 UV Digester has been designed to comply with the regulations of IEC publication 348 (appliance protection class 1). Attention should be paid to the following two points:

- The mains connection and the replacement of fuses must be carried out in compliance with the directions in *section 3.3.*
- If the 705 UV Digester is attached to the power supply, neither the control unit nor the wet part may be opened nor parts of them removed, otherwise there is a danger of contact with live components. Before opening the control unit or the wet part to replace parts (e.g. UV lamp, see *section 6.2*) or carry out maintenance or repair work, the mains cable must always be disconnected from the mains socket ***15*** of the control unit.

6.1.2. Protection against heat effects

The wet part of the 705 UV Digester develops not only UV radiation but also a great deal of heat, which must be dissipated by the cooling system (see *section 4.3.1*). If the cooling fails, the wet part is protected against overheating by an overtemperature protection and automatically shut down. Protection against heat effects is necessary only with the following components:

- Avoid touching the cover ***22***; it can become hot after lengthy operation of the 705 UV Digester.
- If the sample vessel holder ***20*** is removed from the wet part while the UV lamp is on or immediately following completion of UV irradiation, the lower part of the sample vessel holder ***20*** and the sample vessels ***34*** may still be hot. Avoid touching these parts until they have cooled down sufficiently.

6.1.3. Protection against UV radiation

The Hg high-pressure lamp built into the wet part of the 705 UV Digester radiates type UV A and UV B radiation in the short-wave region. The power density of the UV radiation emanating from the wet part is below the threshold limit value of 10^{-7} W/cm^2 at a distance of 70 cm. A prerequisite for this is that sample vessel holder ***20*** is installed, that it is fully loaded with sample vessels ***34*** and that these are closed by PTFE stoppers ***32***. In general, the following measures are recommended to protect against UV radiation:

- Before switching on the 705 UV Digester, mount the protective shield ***19*** on the wet part and turn it so that the eyes are protected against UV light during lamp operation.
- The UV lamp may be operated without installed sample vessel holder ***20*** only briefly (e.g. to change the sample vessel holder).
- Sample vessel holder ***20*** must always be fully loaded with 12 sample vessels ***34***. If you wish to digest fewer than 12 samples, fill the remaining sample vessels with dist. water.
- The sample vessels ***34*** must all be closed by PTFE stoppers ***32***. If further addition of H_2O_2 is needed when the UV lamp is on, wear gloves.

6.1.4. Protection against ozone

Ozone is released from the air in the wet part of the 705 UV Digester as a result of UV radiation. Normally, i.e. with inserted, fully loaded sample vessel holder, the **measurable ozone concentration** in the immediate vicinity (≤ 10 cm) of the wet part is **≤0.025 ppm** or **≤50 µg/m^3** (measured with a Dräger detector tube). In lengthy operation without sample vessel holder, however, higher ozone concentrations can appear. To protect against undesired ozone levels in the laboratory atmosphere, the following measures are necessary:

- Operate the 705 UV Digester in a fume hood (cupboard).
- Operate the UV lamp only for a brief period (e.g. to change the sample vessel holder) if the sample vessel holder ***20*** is not installed.
- Sample vessel holder ***20*** must always be fully loaded with 12 sample vessels ***34***. If you wish to digest fewer than 12 samples, fill the remaining sample vessels with dist. water.

6.2. How to avoid malfunctions

6.2.1. Cooling system

A requirement for trouble-free operation of the cooling system is proper installation of the inlet and outlet tubing for the cooling water. All tubing connections from the cold water tap up to the inlet nipple ***27*** must be **tight**. Hence, secure all tubing ends to the connectors and at the cooling water connection with hose clips.

Before switching on the cooling water, make sure that it can flow out in the outlet tubing **without any hindrance** (max. counterpressure allowed: 0.2 bar).

Ensure that the **samples are sufficiently cooled** and do not start to boil (see *section 4.3.2*). The resulting loss of liquid would make accurate content determinations impossible. In addition, drying out of acidic solution on the wet part can lead to permanent surface damage (procedure in the case of boiling samples, see *section 6.3*).

6.2.2. UV lamp

The service life of a UV lamp is normally ≥ 500 h. However, this greatly depends on the number of times it is switched on and off. Hence avoid unnecessary on/off switching of the UV lamp. Each time the lamp is switched off, wait at least 10 min before switching on again.

6.3. Procedure in the case of malfunctions

Several of the possible malfunctions in operation of the 705 UV Digester are listed in the following Table with details of possible causes and countermeasures. When troubleshooting, follow the order given below.

Malfunction	Cause	Rectification
Control unit can not be operated (red lamp in switch ***1*** does not light up)	• Control unit is not attached to power supply	• Attach control unit to power supply (see *section 3.3*)
	• Fuse(s) defective	• Check fuse(s) and replace if necessary (see *section 3.3.3*)
	• Control unit is defective	• Inform METROHM service
Fault display *2* lights up	• Wet part is not attached to control unit	• Attach wet part to control unit (see *section 3.2.4*)
	• UV lamp has been automatically switched off owing to overheating. Possible reasons:	
	▸ Interrupted or insufficient cooling water supply	▸ Check cooling water tubing and make leakproof if need be
	▸ Insufficient cooling power (cooling water temperature too high and/or cooling water flow rate too low)	▸ Increase cooling water flow (see *section 4.3.2*)
	▸ Fan in wet part defective	▸ Inform METROHM service
	• UV lamp defective	• Change UV lamp (see *section 6.4.2*)

Malfunction	Cause	Rectification
Inadequate digestion	• Wrong sample vessels used (not quartz glass)	• Use only original 6.2414.000 Sample Vessels
	• Irradiation time too short	• Prolong irradiation time (see *section 4.2.3*)
	• Sample temperature too low	• See under "**Sample temperature too low**"
	• Insufficient H_2O_2 added	• Add more H_2O_2 at start or H_2O_2 during the digestion (see *section 4.4.1*)
	• Insufficient power of UV lamp	• Change UV lamp (see *section 6.4.2*)
	• Matrix can not be digested by UV photolysis	• Use another digestion method
Sample temperature too low	• Cooling altered by liquid in interior	• Dry interior of wet part
	• Excessive cooling water flow or cooling water temperature too low	• Reduce cooling water flow (see *section 4.3.2*)
Sample temperature too high	• Reduced cooling water supply	• Check cooling water tubing and make leakproof if need be
	• Insufficient cooling power (cooling water temperature too high and/or cooling water flow too low)	• Increase cooling water flow (see *section 4.3.2*)
Samples boil	• Sample temperature too high	• Switch off UV lamp (switch off power switch ***1*** on control unit) • Immediately remove escaped sample liquid from wet part (drying out of acidic solution can lead to surface damage) • Further corrective measures, see under "**Sample temperature too high**"
Solution in interior of wet part	• Broken sample vessel • Spilt liquid	• Switch off UV lamp (switch off power switch ***1*** at control unit) • Remove UV lamp (see *section 6.4.2*) • Rinse out interior with dist. water, turn wet part upside down and allow to dry • Reinstall UV lamp (see *section 6.4.2*)

6.4. Maintenance

6.4.1. Changing the cooling water tubing

The 6.1801.120 Cooling Water Tubing ($\varnothing_i$ = 4 mm, $\varnothing_e$ = 6 mm, length = 2 m) attached to the wet part can become brittle with time and hence start to leak. In such a case, proceed as follows:

1. Press the black ring at the cooling water outlet ***24*** (or cooling water inlet ***27***) against the connector and withdraw cooling water tubing ***25*** (or ***28***).
2. Cut new 6.1801.120 PVC tubing into two pieces of appropriate length or cut off ca. 3 cm from old cooling water tubing ***25*** (or ***28***). The tubing must be cut at right angles and the cut surfaces smooth.
3. Insert one end of the cooling water tubing ***25*** (or ***28***) up to the stop in the cooling water outlet ***24*** (or cooling water inlet ***27***) (self-sealing connection), and route the other end to a drain.
4. Switch on cooling water supply and test for leaks (the higher the cooling water flow rate, the better the seal).

6.4.2. Changing the UV lamp

If UV lamp ***36*** is defective or its digestion efficiency has become too weak owing to its age (lamp test, see *section 5*), it must be replaced, Proceed as follows in this case (see *Fig. 3 – 5*):

1. Switch off control unit and disconnect mains cable from mains socket ***15***.
2. If installed, remove sample vessel holder ***20*** with sample vessels ***34*** from the wet part.
3. Unscrew the two fastening screws ***21*** using a screwdriver and remove cover ***22*** from wet part.
4. Remove old UV lamp ***36*** from wet part.
5. Unpack new UV lamp ***36***.

   Warning: *Hold UV lamp only at its two* ***ends****. Touching the quartz tube with your bare hands will result in fingermarks which will burn into the quartz glass during lamp operation.*
   Any marks caused by contact must be wiped off before startup of the UV lamp using a clean cloth soaked in alcohol.
6. Insert UV lamp ***36*** from above through the opening in support ***42*** into the bottom lamp mounting ***38***.
7. Replace cover ***22*** with the top lamp mounting on the wet part and fasten by tightening the two screws ***21***.
8. Plug mains cable into mains socket ***15*** of the control unit.

As the UV lamps contain mercury, they must be **disposed of in a proper manner**. Return the old lamps (preferably in their original packaging) to your METROHM agency.

6.4.3. Cleaning the sample vessels

The sample vessels are best cleaned as follows:

1. Rinse out sample vessels thoroughly with twice-dist. water.
2. Place sample vessels overnight or until needed in dilute nitric acid.
3. Rinse out sample vessels thoroughly with twice-dist. water.

7. Technical data

7.1. 705.0016/705.0017 Control Unit

- **Housing** — PUR (polyurethane) rigid foam with flame protection for fire class UL94VO, CFC-free

- **Time switch**

Function	Timing relay with synchronous motor for irradiation time (switches UV lamp off after elapse of irradiation time)
Setting	With transparent adjustment knob
Displays	Set irradiation time (pointer) Remaining irradiation time (pointer) Operational status indicator (red LED lamp) Time range (window)
Adjustable time ranges	0...12 s, 0...120 s, 0...12 min, 0...120 min, 0...12 h

- **Ambient temperature**

Nominal operational range	+5 ... +40 °C
Storage, transport	–10 ... +70 °C

- **Mains connection**

	Version 705.0016	*Version 705.0017*
Mains voltage	220, 240 V ± 10 % (100...117 V with series transformator)	220, 240 V ± 10 %
Mains frequency	60 Hz	50 Hz
Power consumption	600 VA	600 VA
Fusing	5 mm Ø, length 20 mm 6.3 A (slow-blow)	5 mm Ø, length 20 mm 6.3 A (slow-blow)

- **Safety regulations** — Construction and testing in compliance with IEC publication 348, appliance protection class 1. These instructions for use contain information and warnings which must be complied with by the user if safe operation of the apparatus is to be assured.

- **Dimensions**

Width	250 mm
Height	125 mm
Depth	350 mm

- **Weight** (incl. standard equipment) 11.5 kg

7.2. 705.0020 Wet Part

- **Construction** — UV lamp
Cooling equipment
Sample vessel holder for 12 samples

- **Cooling**

Principle	Combined air-water cooling
Regulation	Continuously adjustable valve for cooling water flow rate (max. counterpressure in the outlet tube: 0.2 bar)
Overheating protection	Automatic shutdown of the UV lamp on overheating due to cooling water failure, valve malfunction, etc.
Loss of sample liquid	≤0.4% per h irradiation time (at 95°C)

- **Materials**

Housing	Light metal, polyester coated
Heat sink	Light metal

- **Power supply** — From 705.0016/705.0017 Control Unit

- **Dimensions**
  - *Diameter* — 158 mm
  - *Height* — 263 mm (460 mm with mounted protective shield)

- **Weight** (incl. standard equipment) — 5.5 kg

- **Sample vessel holder**
  - *Designation* — 6.2041.040 Sample Vessel Holder
  - *Capacity* — 12 sample vessels
  - *Material* — Stainless steel
  - *Diameter* — 100 mm
  - *Height* — 145 mm
  - *Weight* — 137 g

- **Sample vessels**
  - *Designation* — 6.2414.000 Sample vessel
  - *Material* — Quartz
  - *Max. volume* — 12 mL
  - *Diameter* — 15.6 ± 0.15 mm
  - *Height* — 125 mm
  - *Weight* — 15.2 g

- **Sample vessel stoppers**
  - *Designation* — 6.1446.100 PTFE Stopper
  - *Material* — PTFE with 25% carbon
  - *Diameter* — 20 mm
  - *Height* — 35 mm
  - *Weight* — 4.6 g

- **UV lamp**
  - *Designation* — 6.2804.030 Hg lamp
  - *Material* — Quartz
  - *Radiator type* — High-pressure mercury lamp
  - *Filament length* — 72 mm
  - *Radiation source power* — 500 W
  - *Radiation source voltage* — 135 ± 15 V
  - *Radiation source current* — 4.3 A
  - *Short-circuit current* — ≤ 8 A
  - *Starting voltage* — 3...5 kVs
  - *Temperature of lamp tube* — 650...950°C
  - *Radiant flux* — 50 W at 200...280 nm
  - *Service life* — ≥ 500 h
  - *Diameter* — 16.4 mm
  - *Height* — 132 mm
  - *Weight* — 14.8 g

8. Scope of delivery and ordering designations

8.1. 705 UV Digester

705 UV Digester for 50 Hz, 220...240 V **2.705.0017**

Digestion apparatus for the UV photolysis of water samples with moderate amounts of organic matter. Comprises a control unit and a separate wet part with UV lamp, cooling device and holder for 12 sample vessels.

including the following accessories:

12	×	Sample vessels of quartz glass	6.2414.000
12	×	Stoppers of PTFE for the sample vessels	6.1446.100
1	×	Sample vessel holder	6.2041.040
1	×	Thermometer	6.2401.010
1	×	Stopper for the thermometer	6.1446.110
1	×	Protective shield of red polymethyl methacrylate	6.2745.000
1	×	UV lamp (high pressure mercury lamp)	6.2804.030
1	×	Cooling water tubing of PVC, $\varnothing_i = 4$ mm, $\varnothing_a = 6$ mm, length = 2 m	6.1801.120
1	×	Mains cable according to customer's specifications:	
		Cable socket / Cable plug	
		Type IEC 320/C 13 / Type SEV 12 (Switzerland ...)	6.2122.020
		Type IEC 320/C 13 / Type CEE (7), VII (Germany ...)	6.2122.040
		Type CEE (22), V / Type NEMA 5–15 (USA ...)	6.2122.070
1	×	Instructions for Use (English)	8.705.1003

705 UV Digester for 60 Hz, 220...240 V **2.705.0016**

Accessories as for 2.705.0017 UV-Digester

To operate the 705 UV Digester at power voltages of 100, 110 or 117 V, a series transformer must be used.

8.2. Options

Additional equipment set comprising:

12	×	Sample vessels of quartz glass	6.2414.000
1	×	Sample vessel holder	6.2041.040
12	×	Stoppers of PTFE for the sample vessels	6.1446.100

Spare lamp:

1	×	UV lamp (high pressure mercury lamp)	6.2804.030

Subject to modifications!

9. Warranty

The warranty regarding our products is limited to rectification free of charge in our workshops of defects that can be proved to be due to material, design or manufacturing faults which appear within 12 months from the day of delivery. Transport costs are chargeable to the orderer.

For day and night operation, the warranty is valid for 6 months.

Glass breakage in the case of electrodes or other glass parts is not covered by the warranty. Checks which are not a result of material or manufacturing faults are also charged during the warranty period. For parts of outside manufacture insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.

With regard to the guarantee of accuracy, the technical specifications in the Instructions for Use are authoritative.

Concerning defects in material, construction or design as well as the absence of guaranteed features, the orderer has no rights or claims except those mentioned above.

If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. Lack of an official damage report releases METROHM from any liability to pay compensation.

If any instruments and parts have to be returned, the original packaging should be used if at all possible. This applies above all to instruments, electrodes, burette cylinders and PTFE pistons. Before embedment in wood shavings or similar material, the parts must be packed in a dustproof package (for instruments, use of a plastic bag is imperative). If open assemblies are enclosed in the scope of delivery that are sensitive to electromagnetic voltages (e.g. data interfaces etc.) these must be returned in the associated original protective packaging (e.g. conductive protective bag). (Exception: assemblies with built-in voltage source belong in a non-conductive protective packaging). For damage which arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by METROHM.

10. Index

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