Thermo
ELECTRON CORPORATION

C3i - CR3i

Jouan 4 x 280 mL Multifunction Centrifuges

User's Manual

Manual N°: 89003152-a

CAREFULLY READ THIS MANUAL BEFORE OPERATING YOUR INSTRUMENT.

THE VALIDITY OF THE GUARANTEE IS SUBJECT TO THE OBSERVATION OF THE INSTRUCTIONS AND PRECAUTIONS DESCRIBED IN THIS DOCUMENT

Revision Status

REV	DATE	AMENDED PAGES	NOTES
a	07/04		Initial release

Packing List

☐ **11175770 Centrifuge C3i 230V 50/60 Hz**
☐ **11175771 Centrifuge C3i 120V 60 Hz**

☐ **11175774 Centrifuge CR3i 230V 50/60 Hz**
☐ **11175775 Centrifuge CR3i 120V 60 Hz**

Item number		Quantity	Check
	Centrifuge	1	☐
	User manual	1	☐
	CE Declaration of compliance	1	☐
	Manual lid opening instructions	1	☐
	Mains cord	1	☐
	Toolbox :		
	- Rotor removal tool	1	☐
	- Emergency unlocking tool	1	☐
	- Spare fuses (C3i only)	2	☐

For missing parts call your nearest Thermo representative

Guarantee Terms

JOUAN guarantees that this unit is free from defects in materials and workmanship when it leaves the factory, and will replace or repair the unit if it proves defective in normal use or during service for a period of **ONE YEAR** from the delivery.

Our liability under this guarantee is limited to repairing the defective unit or any part of the unit providing it is sent, postage paid, to an authorized service center or the SAINT-HERBLAIN office.

This guarantee is invalid if the unit is incorrectly used, poorly serviced or neglected, mis-used or accidentally damaged.

There is no explicit guarantee other than as stated above.

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Contents

1 Use and Function

1.1. User Manual

The user manual is part of the centrifuge, and contains important information for your safety and for the best use of the equipment

Always keep the manual close to the appliance and in a safe place, so that it is always available. Thermo strongly recommends that all users read this manual carefully.

1.2. Warning Symbols

The following symbols are provided to help the operator take advantage of the protection afforded by the equipment and to warn of potential danger.

I On the main switch, allows centrifuge to operate.

O On the main switch, disconnects the centrifuge from the main power supply.

Only **authorized personnel** can touch the parts close to this symbol and, in any case, only after switching off the main power supply. **Coming in contact with high voltages could cause severe injuries.**

In this manual, this symbol means that you will find important **information for safety**, which if unobserved could result in damage to the appliance and/or harm to the operator.

In this manual, this symbol means that you will find **important information about minimizing biological risk**: if unobserved the result could be harm to the operator.

1.3. Description

The C3i and CR3i centrifuges are designed for laboratory use.

They will separate the components of fluids into layers of varying density by subjecting them to high forces.

Centrifugal force provided by the centrifuge can also be used to drive solvents and low molecular weight solutes through the membrane of a filtering device. Retained macrosolutes will therefore be found above the membrane.

Relative Centrifugal Force (RCF) generated by a rotor is directly proportional to its sedimentation useful radius and to the value of its speed squared.

A control system permits the user, through an extremely intuitive control panel, to set and control the speed, the g-force, the temperature (on the thermostated and refrigerated versions) and the run time, as well as to view different messages and warnings.

1.4. Refrigeration and Heating Systems

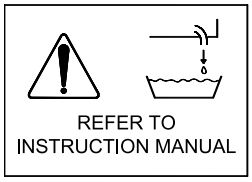
The C3i is a ventilated unit. A permanent air circulation reduces the heat level in the bowl.

However the temperature in the bowl can exceed 10 °C above the ambient temperature after hours of continuous operation.

The CR3i is equipped with a powerful refrigeration system that allows samples to be processed at low temperature. The refrigerant, R134a, is free of CFC (Chloro-Fluoro-Carbons) in accordance with the Montreal Protocol directions for preservation of the ozone layer in the atmosphere.

The actual temperature in the bowl is continuously displayed on the front panel of the centrifuge. Under certain conditions (high speed, long duration runs) the sample temperature can be higher than the bowl temperature on the display. In this case, the user may compensate manually after empirical determination of the temperature differential.

Condensation drain on refrigerated units



The lid should remain closed when the refrigeration system is in use to avoid condensation.

The centrifuge has a rubber hose that allows condensation to be drained from the bowl. The drain hose exits at the back of the machine. Near the drain hose you can find the following label:

To remove condensation, please follow this procedure:

- Switch off the centrifuge and disconnect the power.
- Put a small basin under the hose.
- Unplug the hose.
- Drain the centrifuge bowl.
- Insert the plug back into the hose.

ATTENTION: Do not remove the plug from the drain hose during centrifugation.

1.5. Drive System

A three phase brushless motor drives the rotating equipment. The rotor is contained in a sealed, armor plated centrifugation chamber.

The brushless motor requires **no maintenance**. A control system ensures the correct drive speed, which is continuously monitored.

1.6. Safety Interlock System

The C3i and CR3i centrifuges are equipped with an interlock system that assures two basic safety features:

- The run **cannot be started** if the lid is not correctly closed.
- The centrifuge lid **cannot be opened** if the rotor is running.

The centrifuge will not operate until the lid is closed and latched in place.

The lid remains latched until the rotor stops spinning. The lid access lamp indicates when the rotor has stopped: consequently the handle on the right hand side of the centrifuge can be used to open the lid.

If a power failure occurs, access to the samples in the centrifuge is possible via a manual lid opening procedure (see appropriate paragraph). For this operation a special tool (supplied with the centrifuge) is required.

Bypass the interlock system only under emergency conditions as the rotor could still be rotating.

1.7. Imbalance Detection System

The C3i centrifuge is equipped with a load imbalance detector.

In case of excessive imbalance, the load imbalance indicator LED is illuminated and the brake is applied immediately. The rotor will be decelerated to rest in few seconds.

As soon as the motor stops, open the centrifuge and redistribute the samples to produce an equal weight on diametrically opposite sides.

If the message persists, despite your efforts to balance the load, call your Thermo Service representative.

Note : Imbalance tolerance depends upon the rotor in use. The centrifuge will tolerate 10 gr. of imbalance with the 4 x 280 mL rotor equipped with standard buckets. Carefully balance the sample load to avoid actuating the imbalance detection system.

1.8. Relative Centrifugal Force

Relative Centrifugal Force (RCF), at the circumference of a rotor and bucket combination, is directly proportional to the speed (r.p.m.) and radius of the rotor. Therefore, a greater r.p.m. and/or a larger radius produces a greater RCF and improved faster separation of substances. The centrifuge control system carries out and displays the results of all calculations related to speed, radius and RCF.

Note : The value introduced for the radius can be adjusted to allow for position within the tube such as at a boundary. Maximum radii are quoted in the specifications tables. Use of improper radius will adjust the speed setting, automatically applying the wrong RCF.

Centrifugation formulae

Legend : R = radius (in millimetres)
N = speed (in r.p.m.) ÷ 1000
RCF = gravitational acceleration 'g'
M+ = add to memory
MR = memory recall

NOTE : To calculate actual results, press the keys on a pocket calculator in the order shown.

Primary calculations		Key sequence (not valid for CASIO, HP)
RCF (x g)	$= 1.118\ R\ N^2$	N x = x 1.118 x R =
Speed (r.p.m.)	$= 946\ \sqrt{\frac{RCF}{R}}$	RCF ÷ R = √ x 946 =
Radius (mm)	$= \frac{RCF}{1.118\ N^2}$	N x = x 1.118 = M+ RCF ÷ MR =

Transformations	Key sequence
To determine actual 'g' achieved at a different speed :	
$RCF2 = RCF1\ \left(\frac{N2}{N1}\right)^2$	N2 ÷ N1 = x = x RCF1 =
To determine actual speed required to achieve a different 'g' at the same radius :	
$N2 = N1\ \sqrt{\frac{RCF2}{RCF1}}$	RCF2 ÷ RCF1 = √ x N1 =
To determine actual speed required to achieve the same 'g' at a different radius :	
$N2 = N1\ \sqrt{\frac{R1}{R2}}$	R1 ÷ R2 = √ x N1 =

2 Specifications

2.1. Dimensions and Weight

Dimensions (H x W x D)	C3i : 372 x 400 x 502 mm	CR3i : 375 x 575 x 605 mm
Packed (H x W x D)	C3i : 600 x 610 x 540 mm	CR3i : 615 x 757 x 738 mm
Weight - uncrated / crated	C3i : 40 kg / 52 kg	CR3i : 72 kg / 85 kg

2.2. Electrical Specifications

Max power	C3i : 500 W	CR3i : 800 W
Average power	C3i : 350 W	CR3i : 550 W
Refrigeration		CR3i : 235 W

2.3. Performance

Max speed	Swing-out : 4 000 rpm (C3i) Swing-out : 4 100 rpm (CR3i)	Angle : 14 000 rpm
Max RCF	Swing-out : 3 934 x g (C3i) Swing-out : 3 082 x g (CR3i)	Angle : 18 407 x g
Max capacity	Swing-out : 4 x 280 ml	Angle : 6 x 100 ml
Microprocessor controlled		
Display	High visibility digital display	
Memory size	5 programs, direct access	
Program protection	Recall key lock	
Speed	Range 500 to 14 000 rpm Step 10 -100 rpm Accuracy ± 20 rpm	
Timer	Range 30 sec to 99 min + hold position Step 30 sec to 1 min	
Acceleration rates	5	
Braking rates	5	
Temperature (CR3i)	Range -9°C to +40°C Step 1°C Accuracy ± 1.5°C	
Typical performance	4°C at 4 000 rpm, (4 x 280 ml swing-out) 1°C at 14 000 rpm, (20 x 1.5 ml angle)	
Maximum density	1.2 g/cm^3	
Maximum energy	14 400 J	

3 Installation

3.1. Environmental Conditions

General conditions accepted for centrifuge **transport** and **storage** are:

- Ambient temperature -20°C to +50°C.
- Relative humidity up to 90%.

General conditions accepted for **operating** the centrifuge safely are:

- Indoor use.
- Temperature: 5 °C to 40 °C.
- Maximum relative humidity of 85%.
- Maximum altitude: 2000 m
- Installation category: II
- Polution degree: 2

3.2. Unpacking

Due to the weight of the machine, all lifting and transporting must be carried out using proper handling equipment (i.e. fork lift trolley) that complies with current regulations, and by people having undergone the necessary training.

⚠ ***Thermo strongly recommends that all operators comply with the local laws and regulations on safety and health in the workplace.***

The machine must be supported from underneath. If it has to be transported without its pallet, for example on a staircase, professional handling assistance is required.

- Unpack the centrifuge, carefully removing any possible accessories and the material supplied for ordinary operations and maintenance.
- Check the contents of the package using the packing list provided above.
- Keep the packaging until the centrifuge has been tested and found fully functional.

3.3. Positioning

The machine must be installed in a dust and corrosion free room.

⚠ ***Leave a 30 cm / 12 in. space free on each side of and behind the machine for safety reasons, proper ventilation and maximum cooling performances.***

Place the centrifuge on a bench top, which must be rigid, horizontal and sufficiently strong to support the centrifuge's weight and small vibrations.

3.4. Mains Supply

Check mains and frequency: they must correspond to the values shown on the instrument identification label.

Cat. No.	Content	Voltage	Frequency	Type
11175770 11175774	C3i CR3i	230V ± 10%	50/60 Hz	10 A single phase + ground
11175771 11175775	C3i CR3i	120V +5% -10%	60 Hz	16 A single phase + ground

⚠ ***For your safety, check that mains wiring is effectively grounded.***
Thermo declines all responsibility for any damages due to non-grounding of the machine.

Remember that in order to respect the electrical safety standards related to protection against indirect contact, the supply of power to the instrument must be via a power socket fitted with a protection device ensuring automatic cut-off in the case of an insulation fault. A supply fitted with a circuit breaker of the correct rating complies with this requirement.

3.5. Lid Opening and Rotor Checking

Ensure that the centrifuge has been switched ON. Pull the handle on the centrifuge right side towards the front of the unit : the lid is automatically unlocked and opens.

In the case of a mains power outage, opening of the lid is prevented by the lid lock safety device. It is recommended to wait for the mains power to be switched back on so that this safety device enables the lid to be unlocked (refer to 3.6 for manual lid opening).

⚠ ***Carefully clean the inside of the centrifugation chamber removing any packing residues.***
In fact, due to air turbulence, solid particles accidentally left in the centrifugation chamber create excessive wear of the chamber itself and of the outer rotating equipment surface.

To install the rotor:

Carefully lower the rotor onto the drive shaft. Press down on the rotor until a click is heard. Try to lift the rotor. When correctly placed, it will not move, being automatically locked onto the drive.

It is not necessary to orientate the rotor relative to the drive shaft in order to achieve locking. The AUTO-LOCK rotor mounting system allows rotors to be placed in any orientation.

3.6. Manual Lid Unlocking Procedure

In the event of mains non-availability or power failure, opening of the lid is prevented by the lid locking safety device. It is recommended that the user waits for the mains to be switched back on so that this safety device enables the lid to be unlocked.

Manual lid unlocking must only be done by someone informed of the possible danger and of the necessary precautions.

⚠ ***Rotating parts are a risk as they could come in contact with the user or be ejected. There is particularly high risk of injury if:***

- The user attempts to manually stop the rotor

- Any object falls inside the centrifugation chamber while the rotor is running.

Manual lid unlocking may be necessary under a very limited number of conditions, such as the urgent recovery of critical samples that could be damaged if left in the centrifuge rotor.

In this case the lid can be opened by using the special tool supplied with the centrifuge.

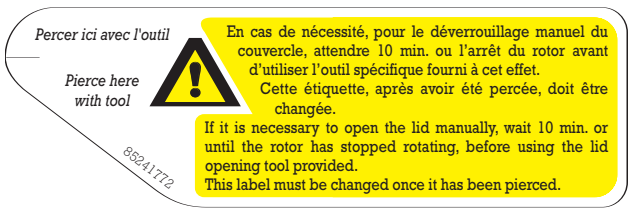
⚠ ***Always set the power switch to the OFF position before performing this manual procedure, even in the case of a mains power outage.***

Should the emergency occur due to power failure during centrifugation wait at least 10 minutes for the end of the rotor rotation. In spite of the absence of noise, the rotor could still be rotating when you need to open the lid manually. Upon opening, lift the lid by hand and observe the rotor (be careful in this operation): if it is still rotating, close the lid and wait.

Insert the unlocking tool horizontally into the hole on the right hand side of the instrument.

While pressing up with your finger, to press down with the unlocking tool, pull the lid lever toward you: the lid opens upwards.

The protection sticker must be replaced after it has been pierced (item N° 85241772).



3.7. Performance and Accessories

NOTE : The performance figures indicated below are those of the rotors. Their use at these speeds necessitates that the sample containers can support the corresponding forces.

The maximum speed attainable by a given rotor depends upon the model of centrifuge which is driving it.

Rotor selection table

Catalogue number	Rotor	Description	Capacity (each)	Tube dim. mm	Rad. mm	Max speed r.p.m	Max RCF (x g)	Angle deg.
11175710	T40	Swing-out rotor	4 x 280 ml	Ø 77	164	C3i : 4000 CR3i : 4100	C3i : 2934 CR3i : 3082	90
11175711		Set of 4 buckets	280 ml nominal	Ø 77		4100	3082	
11175712		4 sealing lids						
11175763		Set of 4 buckets	15 x 5/7 ml	Ø 13.5	165	4100	3100	
11175752		Set of 4 buckets	4 x 50 ml con*	33 x 120	169	4100	3176	
11175759		Set of 4 buckets	3 x 50 ml con self-standing*	33 x 120	169	4100	3176	
11175713		Set of 4 inserts	1 x 280 ml	64 x 113	161	4100	3026	
11175714		Set of 4 inserts	1 x 250 ml flat	61 x 112	161	4100	3026	
11175715		Set of 4 inserts	1 x 200 ml flat	55 x 110	156	4100	2932	
11175716		Set of 4 inserts	1 x 175 ml conical	60 x 120	178	4100	2969	
11175717		Set of 4 inserts	1 x 135 ml	43 x 121	161	4100	3025	
11175718		Set of 4 inserts	1 x 110 ml	40 x 122	158	4100	2969	
11175719		Set of 4 inserts	1 x 100 ml	38 x 123	161	4100	3026	
11175720		Set of 4 inserts	2 x 65 ml	34 x 104	156	4100	2932	
11175721		Set of 4 inserts	4 x 50 ml	28.5 x 106	132	4100	2481	
11175722		Set of 4 inserts	2 x 50 ml conical	29 x 114	134	4100	2518	
11175723		Set of 4 inserts	5 x 38 ml	25.5 x 102	157	4100	2950	
11175724		Set of 4 inserts	5 x 25 ml	24 x 104	155	4100	2917	
11175725		Set of 4 inserts	4 x 25 ml Corex	24 x 107	155	4100	2913	
11175726		Set of 4 inserts	9 x 16 ml	18 x 107	160	4100	3007	
11175727		Set of 4 inserts	12 x 15 ml Corex/10 ml vacu	17 x 107	160	4100	3007	
11175729		Set of 4 inserts	7 x 15 ml conical	17 x 108	161	4100	3026	
11175730		Set of 4 inserts	4 x 15 ml conical	17 x 119	163	4100	3063	
11175731		Set of 4 inserts	5 x 15 ml conical*	17 x 116	163	4100	3063	
11175747		Set of 4 inserts	4 x 14 ml Corning	15.5 x 121	163	4100	3063	
11175732		Set of 4 inserts	12 x 13 ml	16 x 115	160	4100	3007	
11175728		Set of 4 inserts	9 x 10 ml LP	16 x 112	160	4100	3007	
11175733		Set of 4 inserts	19 x 8 ml	12 x 104	161	4100	3026	
11175734		Set of 4 inserts	19 x 5 ml RIA	13 x 104	161	4100	3026	
11175735		Set of 4 inserts	19 x 3 ml	11 x 106	161	4100	3026	
11175736		Set of 4 inserts	13 x epp.1.5/2 ml	10 x 42	159	4100	2988	
11175738		Set of 4 inserts	4 x 15 ml vacu*	16 x 124	163	4100	3063	

Note : the RCF applied to tubes in T40 inserts is about 5% lower for the C3i.

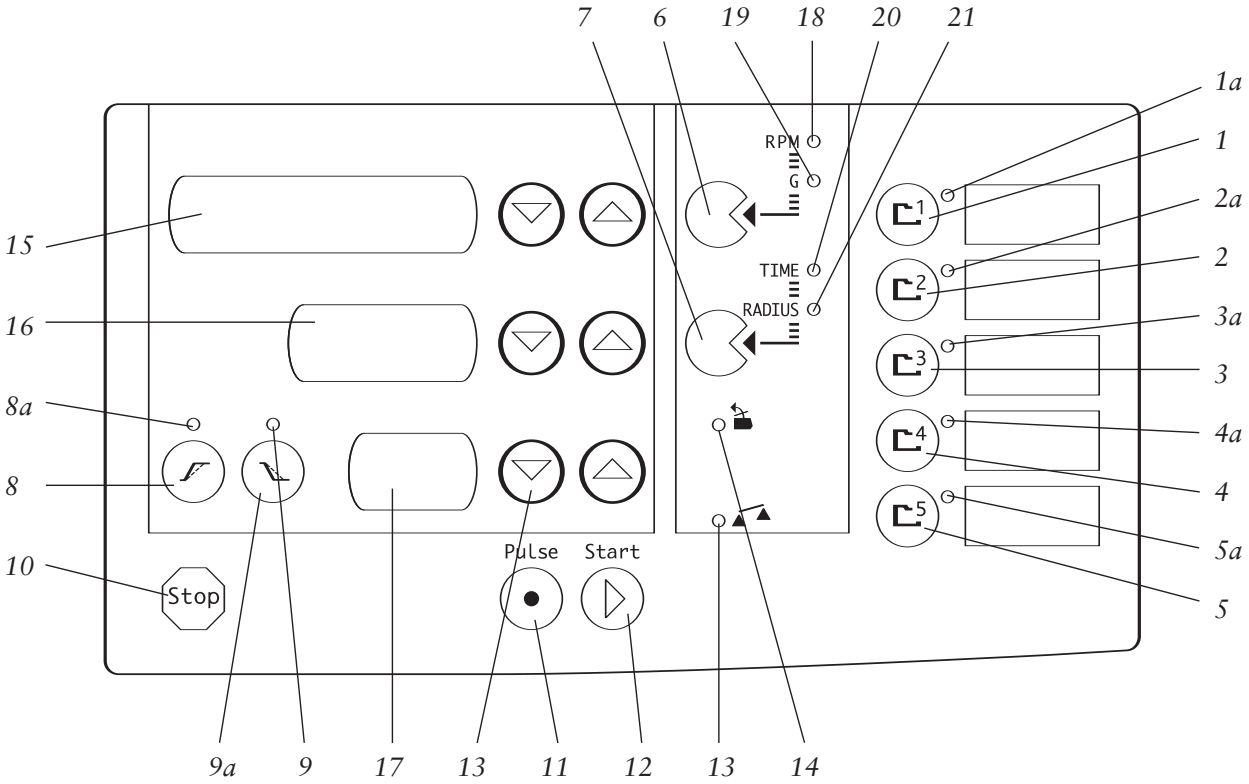
* In open buckets only

Catalogue number	Rotor	Description	Capacity (each)	Tube dim. mm	Rad. mm	Max speed r.p.m	Max RCF (x g)	Angle deg.
11175749		Set of 4 inserts	12 x 7 ml vacu	12.5 x 106	160	4100	3007	
11175740		Set of 4 inserts	12 x 5 ml vacu	12.5 x 75	160	4100	3007	
11175742		Set of 4 inserts	1 x AMICON Centripep	28 x 135	160	4100	3007	
11175753		Set of 2 cytobuckets	3 cyto samples per cytobucket		108	4100	2030	90
11175750	T20	Swing-out rotor with carriers	6 x microplates or 2 x blocs		115	3000	1157	90
11175631		2 sealed carriers	2 x 2 microplates					
11174207		Rubber cushion for flexible microtitre plates						
11175755	AC 15.4	Angle rotor	30 x 15 ml	17.5 x 100	135	C3i : 4000 CR3i : 4100	C3i : 2415 CR3i : 2537	37
11175756	AC 100.10	Angle rotor	6 x 100 ml	38 x 101	99	9000	8965	25
11174713		Set of 6 adaptors	1 x 50 ml	29 x 103	93	9000	8422	
11174714		Set of 6 adaptors	1 x 50 ml conical	30 x 116	93	9000	8422	
11174724		Set of 6 adaptors	1 x 30 ml Corex	24 x 106	93	9000	8422	
11174725		Set of 6 adaptors	1 x 25 ml Corex	24 x 102	93	9000	8422	
11174726		Set of 6 adaptors	1 x 15 ml Corex/16 ml	18 x 102	92	9000	8331	
11174715		Set of 6 adaptors	1 x 30 - 38 ml	25.5 x 92	88	9000	7969	
11174716		Set of 6 adaptors	1 x 15 ml conical	17 x 122	93	9000	8422	
11174717		Set of 6 adaptors	2 x 10 ml	16 x 80	83	9000	7516	
11174718		Set of 6 adaptors	4 x 1.5 - 2 ml	11 x 39	79	9000	7154	
11175754	AC 50.10	Angle rotor	6 x 50 ml con./round	29.5 x 118	112	10000	12520	40
11174606		Set of 4 adaptors	1 x 15 ml conique	17,5 x 122	112	10000	12520	
11177378		Set of 4 adaptors	1 x 10 ml	16 x 80	91	10000	10174	
11174599		Set of 8 adaptors	1 x 30 / 32 ml	Ø 26	105	10000	11738	
11175737	AC 10.12	Sealed angle rotor	10 x 10 ml	16 x 80	85	12000	13684	40
11175757		Spare sealing lid						
11174607		Set of 10 adaptors	1 x 6 ml	13 x 100	80	12000	12879	
11174603		Set of 10 adaptors	1 x 1.5 - 2 ml	11 x 39	64	12000	10303	
11175739	AC 1.14	Angle rotor + lid	20 x 1.5 ml	11 x 39	78	14000	17092	45
11175741	AC 2.14	Sealed angle rotor	24 x 1.5 ml	11 x 39	84	14000	18407	45
41174928		Set of 20 adaptors	1 x 500 - 800 µl	Ø 8				
11174631		Set of 20 adaptors	1 x 200 µl PCR	Ø 6.5				
41174938		Set of 20 adaptors	1 x 250 / 400 / 700 µl	Ø 6				
11175743	DC 6.11	Drum rotor	6 racks		72	10000	8050	90
11174561		1 rack	10 x 1.5 - 2 ml	Ø 11				
11174573		1 rack	20 x 500 - 800 µl	Ø 8				
11174574		1 rack	20 x 700 µl	Ø 6				
11174563		1 rack	21 x 600 µl	Ø 6				
11174562		1 rack	32 x 250 - 400 µl	Ø 6				

4 Instructions for Use

4.1. Controls and Indicators

All the controls are located on the front panel. The front panel is an intuitive interface: no previous operational knowledge is necessary; every parameter can be set by pressing the cursor key continuously, from the minimum to the maximum and viceversa. All parameters can be accessed and changed both during operation and while the machine is at rest.



Buttons

1 - 5	Program Keys
6	Speed/RCF Toggle
7	Time/Radius Toggle
8	Acceleration rate set
9	Deceleration rate set
10	Stop Run
11	Pulse Run
12	Start Run
13	Temperature set (R only)

Display Screens

15	Upper Screen: speed / RCF
16	Middle Screen: time / raduis
17	Lower Screen: accel. / decel. rates / temp. (R models)

LED Lights

1a	Program 1 Indicator
2a	Program 2 Indicator
3a	Program 3 Indicator
4a	Program 4 Indicator
5a	Program 5 Indicator
8a	Acceleration Indicator
9a	Deceleration Indicator
13	Imbalance Indicator
14	Lid Opening allowed Indicator
18	Speed Indicator
19	RCF Indicator
20	Time Indicator
21	Radius Input Indicator

4.2. Display Screens

Screen	Description
Upper screen (15)	This screen displays the set speed (rpm) or RCF (x g) for the given program when the centrifuge is at rest, depending on which parameter is selected During a run, this screen displays actual speed or RCF.
Middle screen (16)	This screen displays either the set run time or the centrifugal radius when the centrifuge is at rest, depending on which parameter is selected. During a run, this display shows only time remaining (timed runs) or time elapsed (during deceleration, 'hold' runs and 'pulse' runs).
Lower screen (17) on the C3i	This screen displays either the acceleration or the deceleration profile selected for the given program. The value of the acceleration profile is displayed either during acceleration or when the acceleration set button (8) is pressed. The value of the deceleration profile is displayed either during deceleration or when the deceleration set button (9) is pressed.
Lower screen (17) on the R units	This screen displays either the acceleration or the deceleration profile selected for the given program. The value of the acceleration profile is displayed either during acceleration or when the acceleration set button (8) is pressed. The value of the deceleration profile is displayed either during deceleration or when the deceleration set button (9) is pressed. In addition, it shows the temperature in the bowl of the centrifuge. When the centrifuge is at rest, the set bowl temperature is displayed (°C). During a run, the actual bowl temperature is displayed (°C).

4.3. Control Panel Functions

Function	Keystroke sequence and description
Start cycle	Press the start button (12).
Stop cycle, immediate	Press the stop button (10)
Pulse	Press the pulse button (11) and hold. The centrifuge will accelerate the rotor to the speed setting of the active program. When the button is released, the rotor will be decelerated to rest.
Set speed	When the LED next to 'RPM' (18) is illuminated, the upper display shows speed values. To increase/decrease the speed values, press on the corresponding up/down arrows.
Set RCF	When the LED next to 'G' (19) is illuminated, the upper display shows RCF values. To increase/decrease the RCF values, press on the corresponding up/down arrows. **When using RCF as a control/display value, make sure the correct centrifugal radius is entered into the control system (see below). If an incorrect radius value is in the control system, the RCF value displayed will not be accurate.**
Set run time	When the LED next to 'TIME' (20) is illuminated, the middle display shows time values. To increase/decrease the run time values, press on the corresponding up/down arrows.

Function	Keystroke sequence and description
Set centrifugal radius	When the LED next to 'RADIUS' (21) is illuminated, the middle display shows the value of the centrifugal radius in millimeters. To increase/decrease the centrifugal radius, press on the corresponding up/down arrows. This parameter can only be viewed and set while the centrifuge is at rest. It is essential that this value be correct for the RCF control/display function to be accurate. The correct value of the centrifugal radius depends on the combination of rotor/buckets/adapters being used.
Set acceleration profile	When the button (8) is pressed, the lower display (17) shows the number corresponding to the acceleration profile currently registered (1 to 5 : 5 being the fastest). To change the value, press the corresponding up/down arrows.
Set deceleration profile	When the button (9) is pressed, the lower display (17) shows the number corresponding to the deceleration profile currently registered (1 to 5 : 5 being the fastest). To change the value, press the corresponding up/down arrows.
Set temperature (R only)	To increase/decrease the temperature set values, press on the corresponding up/down arrows.
To pre-program the centrifuge	There are five available memory locations for pre-programmed protocols. Each corresponds to one of the five memory buttons (1-5). To enter/save a program into one of the locations, press the memory button corresponding to the desired program position. The corresponding LED (1a-5a) will be illuminated. While the LED is illuminated, enter the desired parameter values. These values are automatically saved in memory.
To lock a program	To lock a program, press and hold the corresponding button for several seconds until the corresponding LED begins to flash. Release the button, and the program is locked. Parameters of the program cannot be changed.
To unlock a program	To unlock a program (when a program is locked, the associated LED flashes), press and hold the corresponding button for several seconds until the associated LED stops flashing. Release the button, and the program is unlocked.

4.4. Control Panel Indicators

Indicator	Description
	When the lid interlock indicator LED (14) is illuminated, the lid interlock is not active. The lid can be opened. The indicator will only be illuminated when the rotor is at rest and it is safe to open the lid. When the lid interlock indicator LED is not illuminated, the lid cannot be opened. The rotor is still in motion. This feature is in accordance with international safety standards.
	When the load imbalance indicator LED (13) is illuminated, the centrifuge run has been automatically ended due to excessive load imbalance. The rotor will be decelerated to rest, at which time the lid can be opened and the load can be re-balanced. When the lid is opened this indicator will go off.

4.5. Description of Certain Events with Respect to the Control System

Start and acceleration phase

When the start button is pressed, the centrifuge will begin to accelerate the rotor. At this point the run timer will start and the middle display will begin to show remaining run time. The upper display will show either actual speed or actual maximum RCF values, whichever is currently selected. The lower display shows the given acceleration profile, and the LED corresponding to the acceleration button is illuminated.

Set error

During acceleration, the centrifuge automatically detects the rotor type and, therefore, its maximum allowed speed. If the operator sets a speed exceeding this, the centrifuge stops acceleration when the maximum allowed speed is reached, ensuring the operator's safety. The display will blink and an audible alarm will invite the operator to correct the speed setting to a proper value.

During the run

During the run, the upper display will show either actual speed or actual maximum RCF values, whichever is currently selected. The middle display will show either remaining time (timed run) or elapsed time ('hold' and 'pulse' runs).

During a run, the middle display will always show time. The user cannot change the display to show the given 'radius' value during a run.

Most set parameters can be changed during a run when the selected program is not locked. Set speed can be changed by selecting speed as the control parameter for the upper display, then by pushing the up or down arrow. Set run time can be changed by pressing the up or down arrow corresponding to the middle display. Set deceleration profile can be changed by first selecting the deceleration profile and then using the up/down arrows.

Stop and braking (deceleration) phase

When the stop button is pressed (or when the run timer reaches zero), the centrifuge will begin to decelerate the rotor. At this point the run timer will stop and the middle display will begin to show elapsed braking time. The upper display will show either actual speed or actual maximum RCF values, whichever is currently selected. The lower display shows the given deceleration profile, and the LED corresponding to the acceleration button is illuminated.

End of run

At the end of a run, after the rotor has been decelerated to rest, the centrifuge will produce an audible 'beep' and the middle display will show the word 'End'. Pressing any button or opening the lid will bring the displays back to their normal 'at rest' configuration (display of set parameters).

4.6. Preparing the First Run of the Day

Before installation, the rotor should be thoroughly inspected for evidence of corrosion or other damage and for cleanliness.

Chemical and stress corrosion of metallic parts will eventually lead to disruption of the rotor with potential severe damage to the centrifuge.

Particles stuck inside the pockets can cause breakage of tubes and lead to major imbalance and / or loss of sample and contamination.

The central hole of the rotor and the drive spindle should also be clean and undamaged. These parts should be wiped clean before each use.

The centrifuge also should be observed to verify proper appearance of screws, lid hooks, latches and for evidence of corrosion.

In case of problems contact your Thermo Service representative, because any deviation from the above mentioned advice may have serious consequences for the safety of the appliance and of the operators.

Normal use of the centrifuge could require the manipulation of biohazards. Users and service personnel must have specific training for each substance they use, according to the "Laboratory Biosafety Manual" from the World Health Organization.

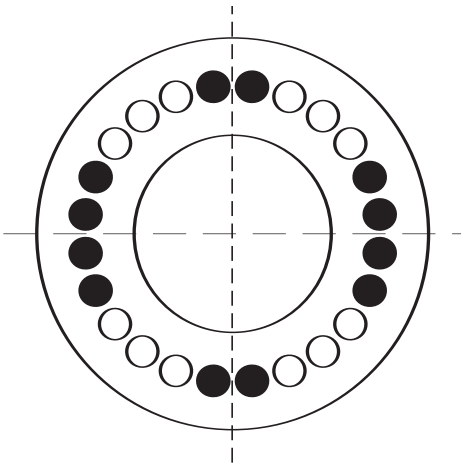
4.7. Sample Loading

The contents of each rotor pocket including sample, tube, cap and adapter (where used) must be of the same weight as the one diametrically opposite.

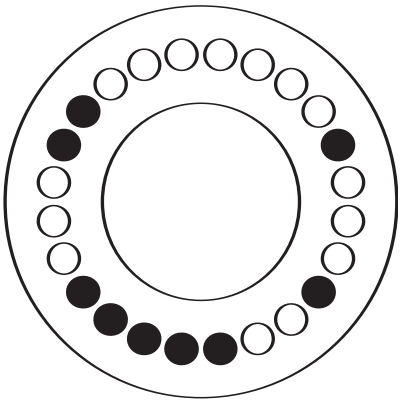
Imbalance of the rotor may cause major damage to the rotor and centrifuge.
Do not attempt to introduce liquids into rotor pockets or into tubes already in the pockets.

Distribute the load correctly. Loads should be inserted two by two, samples of equal weight, at 180 degrees from the rotation axis and at equal distance (radius) from the center of rotation (see pictures)

When using fixed angle rotor, weight deviation between the tubes must not exceed ±5 grams.



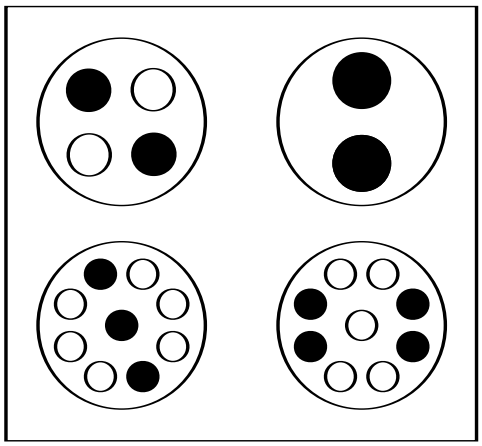
CORRECT



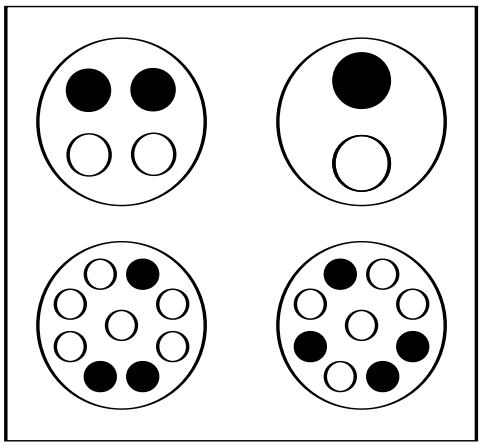
INCORRECT

When using a swing-out rotor, the samples are placed in plastic inserts. The load must be statically and dynamically balanced:

- **Static balancing** consists of balancing the weight of the 2 inserts which are in opposite locations in the rotor (±8 to 10 grams).
- **Dynamic balancing** consists of placing the tubes in each insert symmetrically according to the axis of the trunnions.



DYNAMIC BALANCING : CORRECT



⚠ *INCORRECT*

If less than the maximum complement of samples is loaded, the tubes must be placed in opposite pockets.

An odd number of tubes requires an additional blank, water-filled tube of identical total weight to balance.

Significant vibrations can damage the accessories, the unit and the samples. Most vibration is caused by incorrect loading of the tubes. For this reason, the centrifuge is equipped with an imbalance detector.

In case of excessive imbalance, the load imbalance indicator LED is illuminated and the brake is applied immediately. The rotor will be decelerated to rest in few seconds.

As soon as the motor stops, open the centrifuge and redistribute the samples to produce an equal weight on diametrically opposite sides.

Also remember that the pins must be softly lubricated. Inadaquate lubrication of the pins may cause incorrect swinging of the buckets resulting in imbalance phenomen. See chapter 6.6 for details.

If the message persists, despite your efforts to balance the load, call your Thermo Service representative.

5 Hazards, Precautions and Limitations of Use

5.1. IEC 1010-2-020

This centrifuge conforms to the IEC 1010-2-020 international standard, which specifies particular safety requirements for laboratory centrifuges.

According to the standard warnings, the operator must respect the following precautions :

- Mark a boundary area of 30 cm around the centrifuge.
- No person or hazardous material can stay within this boundary longer than necessary for operational reasons, while the centrifuge is operating.
- An emergency switch for disconnection of the mains, in case of malfunction, has to be available and familiar to all the persons operating the centrifuge. This switch has to be remote from the laboratory centrifuge, preferably outside the room in which the centrifuge is located, or adjacent to the exit from that room.

5.2. Cautions

- *Moving or shifting the machine during centrifugation is dangerous.*
- *Using the centrifuge with rotating equipment showing evidence of corrosion and wear marks, manipulating and/or tampering with the electronic and mechanical parts are dangerous operations.*
- *Never try to bypass the lid lock safety while the rotor is spinning.*
- *Do not try to open the lid until the display returns to the stand-by mode.*
- *Only use a correctly grounded power source.*
- *Use only rotors and accessories designed for use in these centrifuges.*

Pay special attention to the following:

- Installation of the unit: proper ventilation, leveling of the centrifuge, rigidity and stability of the support.
- Rotor installation: verify that the rotor is locked in position before use.
- Cleaning of the accessories and of the rotor chamber is particularly necessary when corrosive products are present in the samples (saline, acids, bases).
- Load balancing.

IF ANY DANGEROUS EVENT OCCURS, KEEP YOURSELF FAR AWAY FROM THE INSTRUMENT AND SWITCH OFF THE MAIN POWER SOURCE

5.3. Speed Control

A view port located on the lid allows the measurement of the actual speed by a phototachometer.

Once a year, check for correct r.p.m. readout and speed control setting which should be within 100 r.p.m. of the actual.

5.4. Operational Limitations

The C3i centrifuge and its associated rotors offer a high level of RCF performance. In some cases the maximum possible RCF will exceed the one sustainable by the sample container.

The rotor RCF performance displayed is the maximum available in the rotor pockets. Depending on the sample containers or on other application needs, the maximum RCF which must be used is to be determined by the operator.

The centrifuge is not explosion proof.
Using this centrifuge with explosive samples is entirely at the user's own risk. Do not under any circumstances use the centrifuge in an explosive environment.

5.5. Aerosol Risks

Due to the action of the turbulence created in the bowl, a centrifuge is an aerosol generator.

A ventilated centrifuge (like the C3i) exhausts, into the room, air which has passed through its bowl. Thus the risk of the spread of aerosols is significant in a ventilated centrifuge.

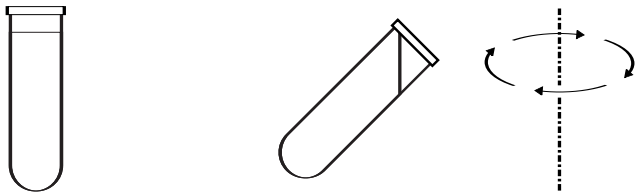
In the case of samples presenting a biological or chemical risk, the operator must take suitable precautions to prevent or reduce this risk.

Thermo recommends the use of its sealed buckets, which are certified for bio-containment through worldwide recognized testing procedures performed in recognized external laboratories.

Aerosols are produced naturally when using uncapped tubes or bottles. They are also produced when a container deforms or breaks provoking a small or large sample leak.

We draw your attention to the use of tubes in angle rotors. Even if the liquid level does not touch the cap when in a static state, it could do so during centrifugation and leak. You should therefore follow the instructions of the tube supplier concerning the fill level and sealing of the tube.

Once a biological risk is known or suspected, samples should be placed in a sealed container. Should such containers not be available, sealed accessories should be used, such as angle rotors with sealed lids.



Duration of aerosol presence

When aerosols are created in a centrifuge bowl, they persist in the air for a period of 3-5 minutes after the rotor stops moving. Indeed, the action of opening the lid itself causes the dispersion of aerosols into the environment.

When an elevated risk of aerosols or of breakage is perceived the accessories should be handled using gloves and opened in an environment ensuring the protection of the operator (safety cabinet, glove chamber, wearing a mask ...), even if they are apparently sealed.

6 Service and Maintenance

All cleaning operations should be performed with the centrifuge disconnected from the power outlet.

6.1. Periodic Cleaning

Daily

No daily cleaning is required, except in the case of accidental tube breakage, or when there is a large amount of spillage in the bowl.

Weekly

Clean the bowl and the accessories with a cotton wool pad dipped in 70% alcohol.

Never use metallic brushes to clean accessories.

- After cleaning the accessories, rinse them in running water, preferably distilled water.
- Dry the rotor with a soft absorbent non-woven cloth or tissue. Drying may be finished off with a warm air jet (e.g. a hair dryer).
- **Make sure that the pockets are well dried.**
- Ideally, spray with Anti-Corrosion Spray (Cat N° 11175399)
- Store unused buckets upside down on a non-metallic grid to allow free passage of air.

6.2. Contamination Hazards

The centrifuge is likely to be used in medical research where hazardous substances, including radioactive chemicals, are frequently found.

ALWAYS USE THE APPROPRIATE DECONTAMINATION PROCEDURES WHEN THE ROTOR IS EXPOSED TO THESE CHEMICALS.

Examples of commonly used techniques are outlined below. The information is given as a guideline only.

It is the responsibility of the owner to use the most suitable procedure.

If decontamination procedures require the use of warming (i.e. autoclave) the rotating equipment should always be completely disassembled before being subjected to heat and after external chemical cleaning. Seals should be decontaminated with the method most suitable for them.

6.3. Disinfection

Alcohol (70% ethanol or isopropanol) applied for 10 minutes is ideal for bacteria and viruses.

Autoclave for 20 minutes at 120°C to destroy micro-organisms.

Polypropylene components are autoclaveable.

Rotor lids must be disassembled from rotor bodies. 'O' rings, autoclaved separately, should be replaced when deformed.

Any part which has been subjected to temperatures above 130 °C must be discarded.

Hypochlorite "bleach" used at 0.1% concentration with 10 minutes immersion is effective against bacteria, spores and viruses but, as an oxidizing agent, is corrosive to metal alloys and must be thoroughly rinsed off of metal parts and the parts dried. It should never be used if there is surface damage to the rotor.

Formalin (37% formaldehyde in water) in contact for 10 minutes has a similar effect to chlorine bleaches.

Rotors should be thoroughly rinsed under running water for 5 minutes to remove all traces of formalin then dried completely.

⚠ *Formaldehyde is toxic.*

Gluteraldehyde 2%, sold under many brand names such as Cidex and Glutarex, requires total immersion for 10 minutes to ensure sterility. Thorough rinsing and drying is essential to protect users.

⚠ *Gluteraldehyde builds up to a toxic level in the fatty tissues of the body.*
Phenols are very corrosive and should never be used.

6.4. Radioactive Decontamination

We recommend that all radioactive contamination be referred to your Radioactivity Safety Officer.

Rotors may be decontaminated by a mixture of equal volumes of :

- Distilled water,
- SDS diluted to 10%,
- Ethanol diluted to 70%.

The rotor should then be rinsed with ethanol followed by distilled water and then dried completely.

Thermo makes no claims as to the effectiveness of proprietary brands of decontaminating solutions.

6.5. Power Supply Circuit Breaker

If the main circuit breaker of the centrifuge cuts off the power to the instrument, **do not attempt to switch it on** before a Thermo Service representative has checked over the unit.

6.6. Rotor Removal

To remove the rotor from the motor shaft :

Press the unlocking device (stored in the clip on the side of the centrifuge) into the centre of the rotor and then lift out the rotor using both hands. Replace the device in the clip.

Sealed rotors may be removed with the lids still in position and moved to a safety cabinet for manipulation of hazardous material.

6.7. Trunnion Lubrication

This operation is necessary to allow the buckets to swing freely. Clean the trunnions regularly with a dry wipe (as well as the part of the bucket that rotates on the trunnions). Then, put a very small quantity of grease on the curved face of the trunnion. Do not apply too much grease because it will eventually coat the bowl of the centrifuge as centrifugal force pulls the grease from the trunnions.

⚠ ***If the centrifuge is having imbalance problems, try this operation before calling Thermo service. In many cases, imbalance problems arise due to the fact that poorly maintained bucket-trunnion interfaces prevent the buckets from swinging freely.***

6.8. Chemical Compatibility Table for Rotors, Tubes and Accessories

S = Satisfactory
D = Discoloration but OK
P = Pure chemical OK
M = Moderate resistance
U = Unsatisfactory
X = Explosion risk !!!
O = No information
d = Less resistance if T > 50°C
t = Unsatisfactory if T >50°C

AL = Aluminum
CAB = Cellulose acetate butyrate
DL = Delrin
NO = Noryl
PA = Polyallomer (= PPCO)
PE = Polyethylene
PPCO = Polypropylene Copolymer
SS = Stainless steel
TZ = Tefzel
VA = Viton A

BN = Buna N
CN = Cellulose Nitrate
KY = Kynar
NY = Nylon
PC = Polycarbonate
PP = Polypropylene
PS = Polysulfone
TF = Teflon
TI = Titanium
VX = Velox

Material / Chemical	AL	BN	CAB	CN	DL	KY	NO	NY	PA PPCO	PC	PE	PP	PS	SS	TF	TZ	TI	VA	VX
Acetaldehyde	S	U	U	U	O	O	O	O	M	U	M	M	O	S	S	M	S	U	O
Acetamide	O	O	O	O	O	O	O	O	S	U	S	S	S	O	O	O	O	O	O
Acetic Acid (5%)	S	M	S	S	M	S	S	S	S	S	S	D	S	S	S	S	S	M	S
Acetic Acid (20 %)	S	O	O	O	O	O	O	O	S	M	S	S	S	O	O	O	O	O	O
Acetic Acid (60%)	S	U	U	U	U	S	S	M	S	U	M	D	S	S	S	S	S	U	S
Acetic Acid (80 %)	S	O	O	O	O	O	O	O	S	U	St	S	M	O	O	O	O	O	O
Acetic Acid (Glacial)	S	U	U	U	U	S	O	O	S	U	M	D	M	S	S	S	S	U	S
Acetic Anhydride	S	O	O	O	O	O	O	O	Sd	U	U	Sd	U	O	O	O	O	O	O
Acetone	S	U	U	U	M	M	O	U	S	U	S	M	U	S	S	M	S	U	M
Acetonitrile	O	O	O	O	O	O	O	O	Mt	U	S	Mt	U	O	O	O	O	O	O
Acetylene	S	O	O	O	O	O	O	O	S	O	S	S	U	O	O	O	O	O	O
Adipic Acid	O	O	O	O	O	O	O	O	S	S	St	S	S	O	O	O	O	O	O
Alanine	S	O	O	O	O	O	O	O	S	S	U	S	U	O	O	O	O	O	O
Allyl Alcohol	O	O	U	O	S	O	O	U	O	S	S	S	O	O	S	S	S	O	S
Aluminum Chloride	O	O	S	S	O	S	O	S	S	S	S	S	O	U	S	S	S	O	O
Aluminum Fluoride	O	O	O	O	O	S	O	S	S	U	S	S	O	O	S	O	S	O	O
Aluminum Hydroxide	S	O	O	O	O	O	O	O	S	Mt	Sd	S	S	O	O	O	O	O	O
Aluminum Nitrate	M	O	O	O	O	O	O	O	S	O	O	S	O	O	O	O	O	O	O
Aluminum Sulphate	S	O	O	O	O	O	O	O	Sd	O	S	Sd	O	O	O	O	O	O	O
Amino Acids	S	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Ammonia	S	O	O	O	O	O	O	O	S	U	S	S	Sd	O	O	O	O	O	O
Ammonium Acetate	O	O	O	O	O	O	O	O	S	S	S	S	O	O	S	S	S	O	O
Ammonium Carbonate	S	U	S	S	O	S	O	S	S	U	S	S	S	S	S	S	S	O	S
Ammonium Chloride	M	O	O	O	O	O	O	O	St	O	St	St	O	O	O	O	O	O	O
Ammonium Hydroxide (10%)	O	S	U	O	O	O	O	S	D	U	S	D	S	S	S	S	S	S	S
Ammonium Hydroxide (conc)	O	U	U	O	O	O	O	S	D	U	S	D	O	S	S	S	S	U	U
Ammonium Oxalate	O	O	O	O	O	O	O	O	Sd	S	S	Sd	S	O	O	O	O	O	O
Ammonium Phosphate	U	O	O	O	O	O	O	O	S	M	S	S	O	O	O	O	O	O	O
Ammonium Sulphate	S	S	O	O	U	O	O	S	S	S	S	S	O	S	S	S	S	O	O
Ammonium Sulphide	O	O	O	O	O	S	O	O	S	U	O	S	O	O	S	O	O	O	O
n-Amyl Acetate	S	O	O	O	O	O	O	O	Sd	U	Sd	Sd	U	O	O	O	O	O	O
Amyl Alcohol	S	M	U	O	S	O	O	S	S	S	S	S	O	O	S	S	S	M	S
Amyl Chloride	S	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Aniline	S	O	O	O	O	S	O	O	U	O	S	M	O	O	S	S	S	O	O
Aqua Regia	U	U	U	O	U	O	O	O	U	U	U	U	O	O	S	S	S	M	M
Barium Chloride	U	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Barium Hydroxide	U	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Barium Sulphate	S	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Benzaldehyde	S	O	O	O	O	O	O	O	Sd	Mt	S	Sd	M	O	O	O	O	O	O
Benzene	S	U	P	O	M	O	O	S	U	U	U	U	U	S	S	S	S	S	M
Benzoic Acid, Sat	St	O	O	O	O	O	O	O	Sd	Sd	S	Sd	M	O	O	O	O	O	O
Benzyl Acetate	O	O	O	O	O	O	O	O	Sd	Mt	S	Sd	U	O	O	O	O	O	O
Benzyl Alcohol	S	U	U	O	M	O	O	U	U	U	U	U	O	O	S	S	S	S	O
Boric Acid	U	O	O	O	O	O	O	O	S	U	Sd	S	U	O	O	O	O	O	O
Bromine	U	O	O	O	O	O	O	O	U	Mt	U	U	U	O	O	O	O	O	O
Bromobenzene	U	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O

Chemical \ Material	AL	BN	CAB	CN	DL	KY	NO	NY	PA PPCO	PC	PE	PP	PS	SS	TF	TZ	TI	VA	VX
Bromoform	U	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Butadiene	S	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Butane	S	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
n-Butanol	S	S	U	O	S	O	O	U	O	M	S	S	M	O	S	S	S	S	S
n-Butyl Acetate	S	O	O	O	O	O	O	O	S	U	S	S	U	O	O	O	O	O	O
Butylene	S	O	O	O	O	O	O	O	O	O	S	O	O	O	O	O	O	O	O
Butyl Chloride	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Butyric Acid	S	O	O	O	O	O	O	O	U	Mt	U	U	S	O	O	O	O	O	O
Caesium Acetate	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Caesium Bromide	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Caesium Chloride	M	O	S	S	O	O	O	O	S	S	S	S	S	S	S	S	S	O	O
Caesium Formiate	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Caesium Iodide	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Caesium Sulphate	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Caesium Trifluoracetate	M	O	M	U	O	O	O	O	S	S	S	S	S	M	S	O	O	O	O
Calcium Carbonate	U	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Calcium Chloride	M	S	S	O	S	O	O	S	S	M	O	D	S	S	S	O	S	S	S
Calcium Hypochlorite	M	U	O	O	M	S	O	S	S	M	S	S	S	U	S	O	S	S	S
Calcium Sulphate	M	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Carbazole	O	O	O	O	O	O	O	O	S	U	S	S	U	O	O	O	O	O	O
Carbon Sulphide	S	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Carbon Tetrachloride	X	U	S	S	M	S	O	S	U	U	U	U	S	M	S	S	S	S	S
Cedarwood Essence	O	O	O	O	O	O	O	O	U	St	U	U	M	O	O	O	O	O	O
Chlorine, dry	M	O	O	O	O	O	O	O	St	Sd	St	St	O	O	O	O	O	O	O
Chlorine, moist	U	O	O	O	O	O	O	O	Mt	Sd	St	Mt	O	O	O	O	O	O	O
Chloroacetic Acid	U	O	O	O	O	O	O	O	Sd	Mt	S	Sd	U	O	O	O	O	O	O
p-Chloroacetophenone	O	O	O	O	O	O	O	O	S	U	S	S	U	O	O	O	O	O	O
Chlorobenzene	O	O	U	U	O	S	O	O	U	U	U	U	O	O	S	O	S	O	O
Chloroform	X	U	M	S	M	S	O	U	U	U	U	U	U	S	S	M	S	S	S
Chlorosulphonic	M	O	O	O	O	O	O	O	M	O	M	M	O	O	O	O	O	O	O
Chromic Acid (5 %)	U	O	O	O	O	O	O	O	S	M	S	S	U	O	O	O	O	O	O
Chromic Acid (10%)	M	U	U	U	U	S	S	O	S	M	S	S	U	U	S	S	S	S	M
Chromic Acid (50%)	U	U	U	S	U	S	O	O	D	U	S	S	U	U	S	S	M	S	M
Cinnamon Essence	O	O	O	O	O	O	O	O	U	St	U	U	M	O	O	O	O	O	O
Citric Acid (10%)	S	S	S	O	M	S	S	M	S	S	S	S	S	S	S	S	S	S	S
Copper Nitrate	U	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Copper Sulphate	U	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Croesol	S	O	O	O	O	S	O	U	S	U	S	S	O	O	S	M	S	O	O
Cyclohexane	S	O	O	O	O	O	O	O	Mt	Sd	Mt	Mt	U	O	O	O	O	O	O
Cyclohexanol	S	O	U	O	O	O	O	S	S	M	S	S	O	O	S	O	S	O	O
Cyclohexanone	O	O	O	O	O	O	O	O	Mt	U	U	U	U	U	O	O	O	O	O
Cyclopentane	O	O	O	O	O	O	O	O	Mt	U	U	U	U	U	O	O	O	O	O
Decane	O	O	O	O	O	O	O	O	Mt	Mt	Mt	Mt	Sd	O	O	O	O	O	O
Dextran Sulphate	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Diacetone	S	O	U	O	O	O	O	O	S	O	S	S	O	O	S	O	S	O	O
Diacetone Alcohol	S	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
o-Dichlorobenzene	O	O	O	O	O	O	O	O	Mt	U	Mt	Mt	U	O	O	O	O	O	O
p-Dichlorobenzene	O	O	O	O	O	O	O	O	Mt	U	Mt	Mt	U	O	O	O	O	O	O
Dichloroethane	O	U	U	U	S	O	S	S	U	U	U	U	O	O	S	S	S	S	M
Dichlorophenol	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Diethylamine	S	O	O	O	O	O	O	O	St	U	U	St	Sd	O	O	O	O	O	O
Diethyl Benzene	O	O	O	O	O	O	O	O	U	Mt	U	U	U	O	O	O	O	O	O
Diethylene Glycol	S	S	S	S	S	S	O	U	S	S	S	S	S	O	S	S	S	S	S
Diethylene Glycol Ethyl Ether	O	O	O	O	O	O	O	O	S	Mt	S	S	M	O	O	O	O	O	O
Diethyl Ether	S	O	O	O	O	O	O	O	U	U	O	U	O	O	O	O	O	O	O
Diethyl Ketone	S	O	U	U	M	O	O	U	U	U	M	M	O	O	S	M	S	O	M
Dimethylacetamide	O	O	O	O	O	O	O	O	S	U	St	S	U	O	O	O	O	O	O
Dimethylformamide	S	O	O	O	O	O	O	O	S	U	S	S	O	O	S	M	S	O	O
Dimethylsulphoxide	S	O	O	O	O	O	O	O	S	U	O	S	O	S	S	M	S	O	O
Dioxane	S	U	U	O	M	S	O	O	M	U	M	M	O	O	S	S	S	U	O

Chemical / Material	AL	BN	CAB	CN	DL	KY	NO	NY	PA PPCO	PC	PE	PP	PS	SS	TF	TZ	TI	VA	VX
Diphenyloxide	S	O	O	O	O	O	O	O	U	O	O	U	O	O	O	O	O	O	O
Dipropylene Glycol	O	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Distilled Water	S	S	S	S	S	O	S	S	S	S	S	S	S	S	S	S	S	S	S
Ethanol (50%)	S	S	S	S	M	S	S	U	S	M	S	S	S	S	S	S	S	S	S
Ethanol (95%)	S	S	U	U	M	S	S	U	S	U	S	S	S	S	S	S	S	S	S
Ethyl Acetate	M	U	U	U	M	S	O	U	M	U	S	U	U	O	S	S	S	U	M
Ethyl Benzene	O	O	O	O	O	O	O	O	Mt	U	St	Mt	U	O	O	O	O	O	O
Ethyl Benzoate	O	O	O	O	O	O	O	O	Sd	M	S	Sd	U	O	O	O	O	O	O
Ethyl Butyrate	O	O	O	O	O	O	O	O	St	U	St	St	U	O	O	O	O	O	O
Ethyl Chloride	S	O	O	O	O	O	O	O	St	U	St	St	U	O	O	O	O	O	O
Ethylene Chloride	S	O	O	O	O	O	O	O	St	U	St	St	U	O	O	O	O	O	O
Ethylene Glycol	S	S	S	S	S	S	O	U	S	S	S	S	S	O	S	S	S	S	S
Ethylene Oxide	O	O	O	O	O	O	O	O	M	Mt	M	M	S	O	O	O	O	O	O
Ethyl Ether	S	O	U	U	O	O	O	O	M	U	M	M	O	O	S	M	S	O	O
Ethyl Lactate	O	O	O	O	O	O	O	O	O	S	St	S	S	M	O	O	O	O	O
Ethyl Malonate	O	O	O	O	O	O	O	O	O	S	Mt	S	S	M	O	O	O	O	O
Fatty Acids	S	O	O	O	O	O	O	O	Sd	Sd	Sd	Sd	S	O	O	O	O	O	O
Ferric Chloride	U	S	O	O	M	S	S	S	S	O	S	S	O	U	S	S	S	S	S
Ferric Nitrate	M	O	O	O	O	O	O	O	S	O	St	S	M	O	O	O	O	O	O
Ferric Sulphate	S	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Ficoll Paque	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Fluorine	S	O	O	O	O	O	O	O	Mt	Sd	St	Mt	U	O	O	O	O	O	O
Fluorhydric Acid (10%)	U	U	M	M	U	S	O	S	S	M	S	S	S	U	S	S	U	O	S
Fluorhydric Acid (50%)	U	U	U	U	U	S	O	O	S	U	S	S	M	U	S	S	U	M	U
Formaldehyde (20%)	S	O	O	O	O	O	O	O	S	Sd	S	S	Sd	O	O	O	O	O	O
Formaldehyde (40%)	M	M	O	S	O	S	S	S	S	S	S	D	S	S	S	S	S	S	M
Formaldehyde (50%)	S	O	O	O	O	O	O	O	S	Sd	S	S	Sd	O	O	O	O	O	O
Formic Acid (100%)	S	M	U	O	U	S	S	U	S	M	S	S	O	U	S	S	S	U	S
Freon TF	U	O	O	O	O	O	O	O	Sd	Sd	Sd	Sd	Sd	O	O	O	O	O	O
Fuel Oil	O	O	O	O	O	O	O	O	Sd	Sd	Mt	Sd	Sd	O	O	O	O	O	O
Glucose	S	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Glutaraldehyde	O	O	O	O	O	O	O	O	Sd	Sd	S	Sd	Sd	O	O	O	O	O	O
Glycerine	S	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Glycerol	S	O	O	S	O	S	S	O	S	S	S	S	S	S	S	S	S	O	O
Heptane	S	O	O	O	O	O	O	O	M	O	S	M	O	O	O	O	O	O	O
Hexane	S	O	O	O	O	O	O	O	S	O	M	S	O	O	O	O	O	O	O
Hydrazine	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Hydrochloric Acid (5%)	U	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Hydrochloric Acid (37 %)	U	O	O	O	O	O	O	O	Sd	U	S	Sd	S	O	O	O	O	O	O
Hydrochloric Acid (50%)	U	U	U	U	U	S	S	O	M	U	S	M	O	U	S	S	S	M	S
Hydrochloric Acid (conc).	U	U	U	O	U	O	O	O	S	U	O	S	O	U	S	S	S	O	S
Hydrofluoric Acid (10%)	U	U	M	M	U	S	O	S	S	M	S	S	S	U	S	S	U	O	S
Hydrofluoric Acid (50%)	U	U	U	U	U	S	O	O	S	U	S	S	M	U	S	S	U	M	U
Hydrogen Peroxide (3%)	S	M	S	S	S	O	S	S	S	S	S	D	S	S	S	S	S	S	S
Hydrogen Peroxide (100%)	S	U	S	S	U	O	S	O	S	S	S	D	S	S	S	S	U	M	M
Iodine, Crystals	S	O	O	O	O	O	O	O	Mt	U	U	Mt	U	O	O	O	O	O	O
Isobutyl Alcohol	O	M	U	O	S	O	O	U	S	S	S	S	O	O	S	S	S	S	S
Isopropyl Alcohol	U	M	U	U	S	O	S	U	S	M	S	S	M	O	S	S	S	S	S
Isopropylbenzene	O	O	O	O	O	O	O	O	Mt	U	Mt	Mt	U	O	O	O	O	O	O
Kerosene	S	O	O	O	O	O	O	O	Sd	S	Mt	Sd	St	O	O	O	O	O	O
Lactic Acid (20%)	O	S	O	O	O	O	S	O	S	S	S	S	S	S	S	S	S	S	S
Lactic Acid (100%)	O	S	O	O	O	O	O	O	S	S	S	S	O	S	S	S	S	S	S
Lead Acetate (aq.)	U	O	O	O	O	O	O	O	S	S	St	S	O	O	O	O	O	O	O
Lemon Essence	U	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Lime, (conc).	M	O	O	O	O	O	O	O	S	U	S	S	S	O	O	O	O	O	O
Magnesium Chloride	M	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Magnesium Hydroxide	U	O	U	O	O	S	S	O	S	U	S	S	O	O	S	O	S	O	O
Magnesium Nitrate	M	O	O	O	O	O	O	O	S	O	Sd	S	O	O	O	O	O	O	O
Magnesium Sulphate	S	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Manganese Salts	M	O	S	O	O	O	O	O	S	O	S	S	O	O	S	O	S	O	O

Chemical / Material	AL	BN	CAB	CN	DL	KY	NO	NY	PA PPCO	PC	PE	PP	PS	SS	TF	TZ	TI	VA	VX
Mercury	O	O	O	O	O	O	O	O	S	U	S	S	S	O	O	O	O	O	O
Methanol (100%)	S	S	U	U	M	S	O	U	S	M	S	D	S	S	S	S	S	U	S
Methyl Acetate	S	O	O	O	O	O	O	O	M	U	M	M	U	O	O	O	O	O	O
Methyl Alcohol (100%)	S	S	U	U	M	S	O	U	S	M	S	D	S	S	S	S	S	U	S
Methyl Butyl Ketone	O	O	O	O	O	O	O	O	U	O	O	O	O	O	O	O	O	O	O
Methyl Ethyl Ketone	S	U	U	U	M	M	O	U	S	U	S	S	U	O	S	M	S	U	M
Methyl Isobutyl Ketone	St	O	O	O	O	O	O	O	S	U	S	S	U	O	O	O	O	O	O
Methyl Isopropyl Ketone	O	O	O	O	O	O	O	O	U	U	S	U	U	O	O	O	O	O	O
Methylene Chloride	X	U	U	U	S	S	O	U	U	U	M	U	U	S	S	S	S	M	U
Mineral Oil	O	O	O	O	O	O	O	O	Mt	U	Mt	Mt	Mt	O	O	O	O	O	O
Nickel Chloride	U	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Nickel Salts	M	S	S	O	O	O	O	S	S	S	S	S	O	S	S	S	S	S	S
Nickel Sulphate	U	O	O	O	O	O	O	O	S	S	St	S	O	O	O	O	O	O	O
Nitric Acid (10%)	M	U	S	S	U	S	S	M	D	S	S	S	S	D	S	S	S	S	S
Nitric Acid (20%)	U	O	O	O	O	O	O	O	S	Sd	S	S	St	O	O	O	O	O	O
Nitric Acid (50%)	M	U	M	M	U	S	S	M	D	M	M	M	O	D	S	S	S	S	M
Nitric Acid (95%)	M	U	U	O	U	O	O	U	M	U	U	M	U	S	S	S	S	S	U
Nitric Acid (conc.)	St	O	O	O	O	O	O	O	U	U	Mt	U	U	O	O	O	O	O	O
Nitrobenzene	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Octane	O	O	O	O	O	O	O	O	S	Sd	S	S	Sd	O	O	O	O	O	O
Octyl Alcohol	S	O	O	O	O	O	O	O	O	O	S	O	O	O	O	O	O	O	O
Oleic Acid	S	U	S	S	S	S	O	S	S	S	S	S	S	S	S	S	S	M	S
Orange Essence	S	O	O	O	O	O	O	O	Mt	M	Mt	Mt	M	O	O	O	O	O	O
Oxalic Acid	M	M	S	S	O	S	O	S	S	S	S	S	S	S	S	S	M	S	S
Oxygenated Water (20%)	S	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Oxygenated Water (50%)	S	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Oxygenated Water (90%)	S	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Ozone	O	O	O	O	O	O	O	O	Sd	Sd	S	Sd	S	O	O	O	O	O	O
Paraffin	S	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Pentane	S	O	O	O	O	O	O	O	U	O	U	U	O	O	O	O	O	O	O
Perchlorethylene	S	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Perchloric Acid	X	O	O	O	O	O	O	O	St	U	St	St	U	O	O	O	O	O	O
Perchloric Acid (10%)	U	O	O	O	U	S	O	O	S	U	M	M	O	U	S	S	S	S	S
Perchloric Acid (70%)	X	O	O	O	O	O	O	O	M	U	M	M	U	O	S	S	O	O	O
Petrol	S	O	O	O	O	O	O	O	St	M	St	St	M	O	O	O	O	O	O
Phenol (5%)	S	U	O	O	U	S	O	U	M	U	S	M	U	S	S	S	U	S	U
Phenol (50%)	U	O	O	O	O	O	O	O	U	U	U	U	U	O	S	M	O	O	O
Phenol, crystals	U	O	O	O	O	O	O	O	St	U	St	St	U	O	O	O	O	O	O
Phenol, liquid	U	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Phenyl Ethyl Alcohol	O	O	U	O	O	O	O	S	S	O	S	S	O	O	S	O	S	O	O
Phosphoric Acid (10%)	O	M	S	S	U	S	S	O	S	S	S	S	S	S	S	S	O	S	S
Phosphoric Acid (conc.)	O	U	M	M	U	S	O	O	S	U	S	S	S	M	S	S	M	S	U
Picric Acid	S	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Pine Oil	O	O	O	O	O	O	O	O	Sd	St	St	Sd	M	O	O	O	O	O	O
Potash, conc.	U	O	O	O	O	O	O	O	S	U	S	S	S	O	O	O	O	O	O
Potassium Bromide	U	O	O	O	O	O	O	O	S	S	S	S	O	O	O	O	O	O	O
Potassium Carbonate	M	O	S	S	O	S	S	S	S	U	S	S	O	S	S	S	S	O	O
Potassium Chlorate	M	O	S	S	O	S	S	S	S	S	S	S	O	S	S	O	S	O	O
Potassium Chloride	U	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Potassium Hydroxide (5%)	U	M	S	M	U	O	O	S	S	U	S	S	S	S	S	S	M	S	S
Potassium Hydroxide (conc.)	U	M	U	U	U	O	O	O	S	U	S	S	O	S	S	S	U	M	U
Potassium Nitrate	S	O	O	O	O	O	O	O	S	O	S	S	O	O	O	O	O	O	O
Potassium Permanganate	S	O	O	O	O	O	O	O	S	S	S	S	D	O	S	S	O	O	O
Propane Gas	S	O	O	O	O	O	O	O	U	St	U	U	M	O	O	O	O	O	O
Propionic Acid	O	O	O	O	O	O	O	O	Sd	U	M	Sd	S	O	O	O	O	O	O
Propyl Alcohol	S	O	O	O	O	O	O	O	S	O	St	S	O	O	O	O	O	O	O
Propylene Glycol	S	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Propylene Oxide	O	O	O	O	O	O	O	O	S	St	S	S	S	O	O	O	O	O	O
Pyridine	U	O	O	O	O	O	O	O	M	U	S	M	O	O	O	O	O	O	O
Resorcinol, Sat'd., Sol	O	O	O	O	O	O	O	O	S	Sd	S	S	U	O	O	O	O	O	O

Chemical \ Material	AL	BN	CAB	CN	DL	KY	NO	NY	PA PPCO	PC	PE	PP	PS	SS	TF	TZ	TI	VA	VX
Rubidium Bromide	M	O	O	O	O	O	O	O	S	S	O	S	O	O	O	O	O	O	O
Saccharose	U	O	O	O	O	O	O	O	S	S	S	S	S	O	O	O	O	O	O
Salycylic Acid, Sat	O	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Serum	S	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Silver Acetate	O	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Silver Nitrate	U	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Sodium Acetate	S	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Sodium Bisulphate	M	O	S	S	O	S	S	S	S	S	S	S	O	S	S	O	S	O	O
Sodium Borate	M	O	O	O	O	O	O	O	S	S	Sd	S	O	O	O	O	O	O	O
Sodium Bromide	U	O	O	O	O	O	O	O	S	S	O	S	O	O	O	O	O	O	O
Sodium Carbonate (2%)	M	S	S	S	S	S	S	S	S	S	S	D	O	S	S	S	S	S	S
Sodium Chloride (10%)	S	S	S	S	S	O	O	S	S	S	S	S	S	S	S	S	M	S	S
Sodium Chloride (Sat'd.)	S	S	O	O	S	O	O	S	S	O	S	S	O	S	S	S	S	S	S
Sodium Hydroxide (>1%)	U	M	S	S	U	S	O	S	S	U	S	S	S	S	S	S	S	S	S
Sodium Hydroxide (10%)	U	M	U	U	U	S	O	S	S	U	S	S	S	S	S	S	S	S	S
Sodium Hydroxide (conc.)	U	M	U	U	U	O	O	O	M	U	S	M	O	S	S	S	M	U	U
Sodium Hypochlorite (5%)	M	M	S	S	U	S	S	S	D	S	S	S	S	M	S	S	S	S	S
Sodium Iodide	M	O	O	O	O	O	O	O	S	S	O	S	O	O	O	O	O	O	O
Sodium Nitrate	S	O	O	O	O	O	O	O	S	O	Sd	S	O	O	O	O	O	O	O
Sodium Sulfate	S	O	O	O	O	O	O	O	Sd	O	Sd	Sd	O	O	O	O	O	O	O
Sodium Sulphide	S	S	S	O	O	S	O	S	S	U	S	S	O	S	S	S	M	S	S
Stearic Acid	S	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Sulphuric Acid (10%)	M	U	S	S	U	S	S	S	S	M	S	S	S	U	S	S	S	S	S
Sulphuric Acid (20%)	U	O	O	O	O	O	O	O	Sd	Sd	S	Sd	S	O	O	O	O	O	O
Sulphuric Acid (50%)	U	U	U	U	U	S	S	U	S	S	S	S	S	U	S	S	M	S	M
Sulphuric Acid (conc.)	U	U	U	U	U	S	O	U	D	U	M	D	U	M	S	S	U	S	U
Sulphuric Anhydride, dry or moist	S	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Tetrachloroethane	M	O	O	O	O	O	O	O	M	O	O	M	O	O	O	O	O	O	O
Tetrachlorethylene	O	O	O	O	O	O	O	O	U	O	S	U	O	O	O	O	O	O	O
Tannic Acid	M	O	O	O	O	O	O	O	S	O	Sd	S	O	O	O	O	O	O	O
Tartaric Acid	M	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Tetrahydrofuran	S	O	O	O	O	O	O	O	U	U	U	U	U	O	S	S	O	O	O
Thionyl Chloride	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Toluene	S	U	P	S	M	S	O	U	U	U	U	U	U	S	S	S	M	M	S
Trichlorethylene	S	U	O	O	O	S	O	U	U	U	U	U	U	U	S	S	M	S	M
Trichloroacetic Acid	U	O	O	O	O	O	O	O	Mt	Mt	Mt	Mt	S	O	O	O	O	O	O
1,2,4 - Trichlorobenzen	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Trichloroethane	S	U	S	O	M	S	O	S	U	U	U	U	M	O	S	S	S	S	S
Triethylamine	O	O	O	O	O	O	O	O	U	O	O	U	O	O	O	O	O	O	O
Triethylene Glycol	O	O	O	O	O	O	O	O	S	Sd	S	S	S	O	O	O	O	O	O
Tris Buffer (neutral)	S	O	O	O	O	O	O	O	S	S	S	S	S	O	S	S	O	O	O
Trisodium Phosphate	O	O	S	O	M	O	O	S	S	O	S	S	O	O	S	S	S	S	O
Triton X-100	S	O	O	O	O	O	O	O	S	S	S	S	S	O	S	M	O	O	O
Turpentine	S	O	O	O	O	O	O	O	Sd	Mt	St	Sd	U	O	O	O	O	O	O
Undecyl Alcohol	O	O	O	O	O	O	O	O	Sd	Sd	St	Sd	M	O	O	O	O	O	O
Urea	M	O	S	S	S	O	O	S	S	S	S	S	S	S	S	S	S	O	O
Urine	O	O	S	O	S	O	O	S	S	S	S	S	O	O	S	S	S	O	O
Vinylidene chloride	O	O	O	O	O	O	O	O	U	U	U	U	U	O	O	O	O	O	O
Xylene	S	U	P	O	M	S	O	U	U	U	U	U	U	S	S	S	S	S	M
Zinc Chloride	M	S	S	O	O	O	O	S	S	S	S	S	S	M	S	S	S	S	S
Zinc Hydrosulphite	U	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Zinc Sulphate	U	O	O	O	O	O	O	O	Sd	O	S	Sd	O	O	O	O	O	O	O

* This table is intended as a guide only because of the difficulty in quantifying, cross-checking and monitoring the results under different conditions of temperature, pressure and purity relating to the solvents and samples dissolved therein. It is strongly recommended that you carry out your own trials, particularly before protracted work periods.

7 Disposal of Product

The following disposal recommendations are valid for the machine (or its accessories) at the end of its useful life, or the parts that must be disposed of because they are worn out or degraded during use.

Prior to disposal, the machine and accessories must be decontaminated. In this respect the user is required to submit the enclosed decontamination certificate, completed and signed, to the company or persons who are in charge of disposal.

The elements of the product that may become noxious during the life of the product are the following:

- Electric batteries and accumulators situated in the front panel of the machine among the other electrical and electronic components,
- Oil in the compressor of the refrigeration system,
- Refrigerant.

Disposal of these elements must be in accordance with applicable regulations and recommendations defined by the relevant regulatory bodies. In addition, these elements must be disposed of differently based on the different noxious substances they contain (possibly by a specialized disposal company).

Certificate of Decontamination and Cleaning

⚠ *Read carefully the instructions below before sending an instrument, or parts of it, to Thermo Service Dept. (Jouan S.A.) or to any Authorized Technical Assistance Service*

Mr / Mrs (name) ..... Establishment .....

Department .....

Address..... Post / Zip code .....

City ..... State / Country .....

Declares the cleaning and decontamination of the following:

Product type ..... Serial N° .....

Rotor ..... Serial N° .....

Rotor ..... Serial N° .....

Accessory - Description..... Serial N° .....

Accessory - Description..... Serial N° .....

Nature of contamination

.....

.....

Decontamination Procedure used

.....

.....

Decontamination certified by:

Mr / Mrs ..... Institution .....

Date ..... Signature .....

When an instrument, or parts of it, requires servicing by Thermo SAT or CSAT personnel, the following procedure must be accomplished to ensure personnel safety:
- Clean the instrument and proceed to its decontamination from any kind of dangerous products.
- Compile this Decontamination Certificate with all the information required.
- Attach this Certificate to the instrument (or part) before sending it to Thermo Service or other authorized technical service.

SAT and CSAT personnel **will not accept** to work on instruments deprived of this Decontamination Certificate.
If an instrument is received at our Service facilities and, in our opinion, is a radioactive or biological hazard, the item will be **refused** and **resent** to the Customer. Disposition costs will be borne by the sender.
Instructions for decontamination and cleaning are explained in the User Manual. Additional certificates are available from your local technical or Customer Service representative. In the event these certificates are not available, a written statement certifying that the instrument or part has been properly decontaminated and outlining the procedures used will be acceptable.

For your convenience, use a copy of this page