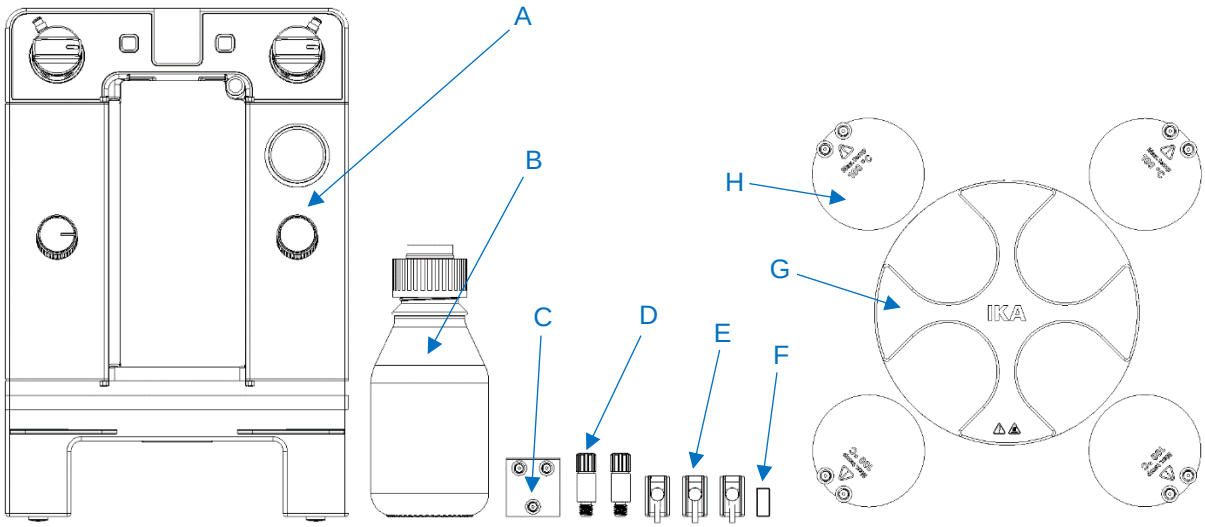
Betriebsanleitung IKA Flow //

Operating Instructions IKA Flow



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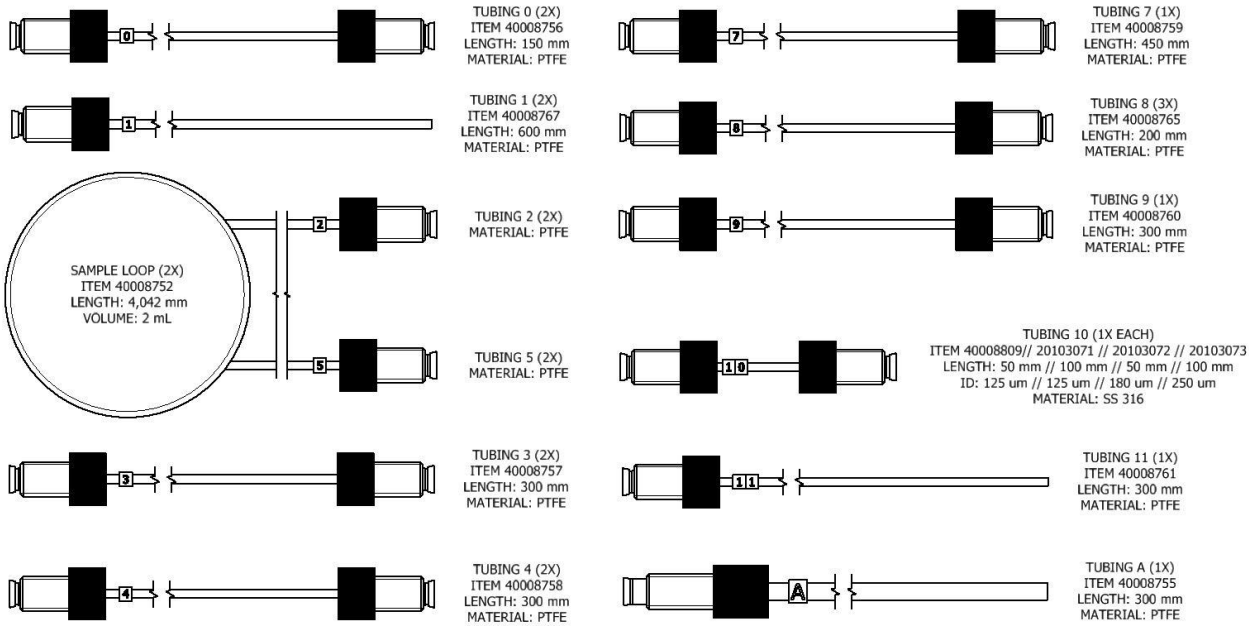

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Bestellnummer // Order Number

IKA FLOW	20100742

Lieferumfang // Scope of Delivery

A	Gehäuse // Main Housing
B	Glasflasche // Glass Bottle
C	Misch-Chip // Mixing Chip
D	Halteschraube // Support Screw
E	2-Wege-Ventil // On/Off-Valve
F	Verbindungsstück // Union
G	Heizblock f. Scheibenreaktoren // Heating Block for Disc Reactors
H	Scheibenreaktor // Disc Reactor
I	Schlauchset // Tubing Set

Allgemeine Informationen // General Information

Sicherheitshinweise // Safety Precautions

• Verwenden Sie das Gerät nicht in explosionsgefährdeten Bereichen, es ist nicht EX-geschützt. • Bei Stoffen, die ein zündfähiges Gemisch bilden können, müssen geeignete Schutzmaßnahmen, wie z.B. das Arbeiten unter einem Abzug, ergriffen werden. Zur Vermeidung von Personen- und Sachschäden beachten Sie bei der Bearbeitung von gefährlichen Stoffen die einschlägigen Schutz- und Unfallverhütungsmaßnahmen.	• Do not use the device in explosive atmospheres, it is not EX-protected. • With substances capable of forming an explosive mixture, appropriate safety measures must be applied, e.g. working under a fume hood. • To avoid body injury and property damage, observe the relevant safety and accident prevention measures when processing hazardous materials.
• Bitte beachten! Teile des Flussreaktors sind nicht Teil der IKA-Garantie, da es sich Reagenzien-berührende Kunststoffteile handelt, die abhängig von der Anwendung regelmäßig ersetzt werden müssen. Hierzu gehören: - Der Misch-Chip - Die Scheibenreaktoren - Alle im Schlauchset (I) enthaltenen Elemente	• Please observe! Parts of the flow reactor are not covered by the IKA warranty, since they are reagent-contacting consumables. These parts have to be replaced at regular intervals, depending on the application: These parts are: - The mixing chip - The disc reactors - All components of the tubing set.
• Die chemische Beständigkeit bzw. die chemische Verträglichkeit der einzelnen Reaktorkomponenten muss für jede Reaktion, in alleiniger Verantwortung vom Anwender untersucht und bestimmt werden. (siehe Appendix B)	• The user must verify compatibility between chemicals being used with the IKA Flow and the mixing chip (C), disc reactors (H), and tubing set (I). Information regarding chemical compatibility can be found (see Appendix B).
• Glasflaschen (B) müssen der DIN EN 1595 entsprechen. • Vor Verwendung der Flaschen, muss geprüft werden, ob diese frei von Beschädigungen	• Glass bottles (B) must conform to DIN EN 1595. • Glass bottles must be checked for any damage/ wear or surface marks before use by the user.

sind. Beschädigte Glasflaschen dürfen nicht verwendet werden.	Damaged glass bottles must not be used!
• Glasflaschen (B) unterliegen nicht der Garantie	• The glass bottle (B) is not covered under any warranty.
• Prüfen Sie vor jeder Verwendung Gerät und Zubehör auf Beschädigungen. Verwenden Sie keine beschädigten Teile.	• Check the device and accessories for damage before each use. Do not use damaged components.
• Sicheres Arbeiten ist nur mit Zubehör, das im Kapitel "Zubehör" beschrieben wird, gewährleistet.	• Safe operation is guaranteed only with the use of original IKA accessories.
• Beachten Sie die Betriebsanleitungen des Zubehörs.	• Observe the operating instructions of the accessories.
⚠ WARNING • Achtung: Erhitzen Sie die Reaktoren niemals über die von IKA angegebenen max. Anwendungstemperatur. Unterschiedliche Reaktoren können verschiedene zulässige maximale Temperaturen haben. Hinweis: Zulässige max. Temperaturen sind auf den Reaktoren aufgedruckt bzw. können im, von IKA zur Verfügung gestellten Datenblatt gefunden werden. • Wenn Sie verschiedene Reaktoren benutzen gilt die niedrigste angegebene max. Temperatur als Begrenzung. • Magnetrührer ohne Sicherheits-Temperatur-Regelkreis nach UL61010 dürfen nicht in Verbindung mit IKA-FLOW verwendet werden! • Stellen Sie den Sicherheitskreis Ihres Magnetrührers nicht über die vorgegebenen Reaktor-Maximalwerte ein, bevor Sie mit dem Heizvorgang beginnen. Beachten Sie ebenso den Flammpunkt der verwendeten Flüssigkeiten.	**⚠ WARNING** • Never heat-up reactors (H) beyond the max. allowed temperature defined by IKA. Each reactor-material might have different max. allowed temperatures. Note: max. allowed temperatures are printed directly on the reactors or can be found in the datasheets for the different reactors. If different combinations of reactors are used, make sure that the heating-temperature never exceeds the lowest, max. temperature from the different reactors. • Use of magnetic stirrers without safety circuit according to UL61010 are not allowed to be used in combination with IKA-FLOW ! • Adjust Safety Circuit of your magnetic stirrer to the lowest, max. temperature of the reactors before Heating up the Reactors (consult stirrer hotplate manual). Consider the flash-point temperatures of the used liquids.
⚠ WARNING • Der maximale Systemdruck betragt 1,5 bar (150 kPa). Schalten Sie das System sofort ab, wenn der Druck diesen Wert überschreitet,.	**⚠ WARNING** • Never exceed 1,5 bar (150 kPa) inside the system. If pressure exceeds this value, shut off the system immediately.
• Stellen Sie sicher, dass die Druckluft ölfrei ist.	• Ensure compressed air is oil free.

Beschreibung // Description

• IKA Flow kann mit vorhandenen IKA Magnetrührern (z.B.: IKA RCT Digital) zur Durchführung von strömungschemischen Experimenten verwendet werden. • Dank seiner kompakten Bauweise passt der IKA Flow in jeden Abzug und nutzt die Druckluft des Abzugs, um Flüssigkeit durch das System zu pumpen. • Einfach anzuschließende/abzunehmende Schlauchverschraubungen und modulare Komponenten ermöglichen eine schnelle Einrichtung und Anpassung des Geräts für verschiedene Anwendungen.	• The IKA Flow device can be used with existing IKA magnetic stirrers (ex: IKA RCT Digital) to perform flow chemistry experiments. • A compact design allows the IKA Flow to fit into any fume hood and uses the fume hood's compressed air to pump liquid through the system • Easy connect/disconnect tube fittings and modular components allow for quick setup and customization of the device for different applications.
• Leicht, einfach zu transportieren und von Abzugshaube zu Abzugshaube zu transferieren!	• Lightweight, easy to transport & transfer from fume hood to fume hood.

Bestimmungsgemäßer Gebrauch // Correct Use

Verwendungsgebiet Laborähnliche Umgebung im Innenbereich in Forschung, Lehre, Gewerbe oder Industrie.	Area of use Indoor environments similar to that a laboratory of research, teaching, trade or industry.
• IKA Flow ermöglicht die exakte Mischung zweier Probenflüssigkeiten (je 2 mL), diese werden über eine beheizte Oberfläche transportiert, auf der sie reagieren. Das entstandene Produkt wird in einem separaten kundenseitigen Gefäß aufgefangen.	• The IKA Flow allows two sample liquids (2 mL each) to be accurately mixed and transported by solvent flow across a heated surface upon which they can react and the product be collected.
• Verweilzeit und Flussrate können über ein integriertes pneumatisches System und modulare Scheibenreaktoren (H) leicht eingestellt werden	• Residence time and flow rate can be easily adjusted via the built in pneumatic system and modular disc reactors (H).
• Um die Flüssigkeit durch das System zu pumpen, wird die Glasflasche (B) über die Druckluft des Abzugs mit Druck beaufschlagt.	• Flow is achieved by pressurizing the glass bottle (B) via compressed air/nitrogen from any fume hood to force liquid through the system.

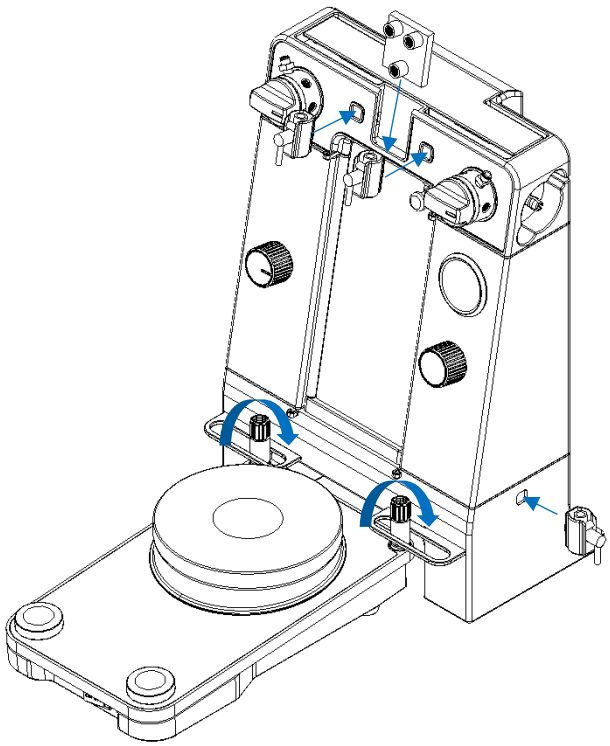
Technische Daten // Technical Data

Glasflasche // Glass Bottle (B)				
Gemäß Norm	//	According to Standard		DIN EN 1595
Max. Volumen Lösungsmittel	//	Max. Solvent Volume	ml	500
Schläuche // Tubing (I)				
Anschlusstyp	//	Connection Type		Push-to-Connect // Screw Fittings
Außen-Durchmesser Einlassschlauch	//	Inlet Tubing Outer Diameter	mm	6,35
Schlauch A Außen-Durchmesser	//	Tubing A Outer Diameter	mm	3,2
Schlauch A Innen-Durchmesser	//	Tubing A Inner Diameter	mm	1,6
Schläuche 0-11 Außen-Durchmesser	//	Tubing 0-11 Outer Diameter	mm	1,6
Schläuche 0-9 & 11 Innen-Durchmesser	//	Tubing 0-9 & 11 Inner Diameter	mm	0,8
Schlauch 10 Innen-Durchmesser	//	Tubing 10 Inner Diameter	mm	0,127
System ggf. Allgemeine Daten// System				
Material Hauptgehäuse (A)	//	Main Housing (A) Material		304 Stainless Steel // Nylon (PA)
Abmessungen Hauptgehäuse (A) (B x H x T)	//	Main Housing (A) Dimensions (w x h x d)	mm	250 x 375 x 140
Gewicht Hauptgehäuse (A)	//	Main Housing (A) Weight	kg	2,7
Material Heizblock (G)	//	Heating Block (G) Material		Aluminum
Abmessungen Heizblock (G) (dia x h)	//	Heating Block (G) Dimensions (dia x h)	mm	175 x 25,5
Gewicht Heizblock (G)	//	Heating Block (G) Weight	kg	0,65
Material Scheibenreaktor (H)	//	Disc Reactor (H) Material		Polypropylene (PP)
Max. Eingangsdruck	//	Max. Input Pressure*	kPa	150
Max. Betriebsdruck	//	Max. Working Pressure**	kPa	137
Max. Betriebstemperatur	//	Max. Working Temperature	°C	100

* Eingangsdruck: Druck des Gases aus dem Abzug / Input pressure: pressure of the gas from fume hood
** Arbeitsdruck: Druck des Gases in der Lösungsmittelflasche/Working pressure: pressure of the gas in solvent bottle

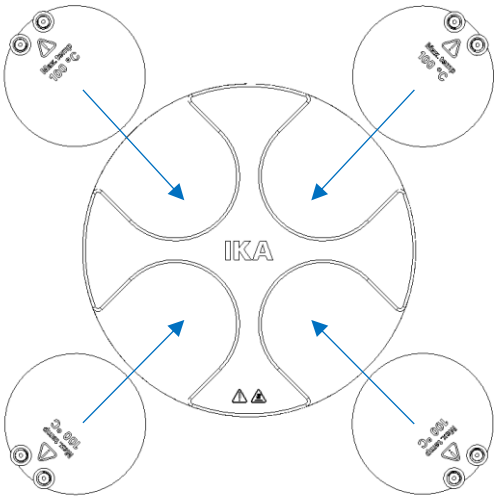
Montage // Assembly

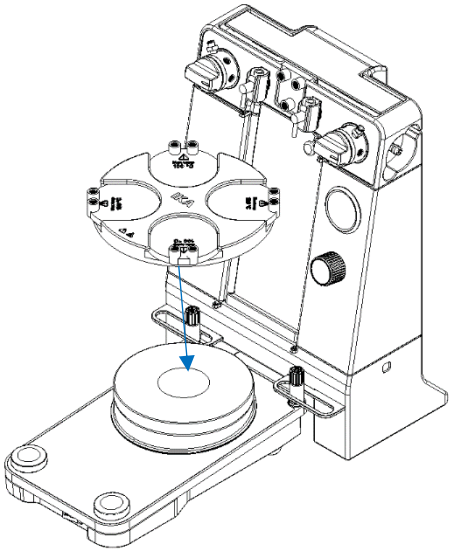
Halteschrauben (D) // Support Screws (D)	
• Installieren Sie IKA FLOW mit Halteschrauben (D) auf einem IKA Magnetrührer (z.B. IKA RCT Digital).	• Install IKA Flow device onto IKA magnetic stirrer (ex: IKA RCT Digital) using support screws (D).
Ventile (E) und Misch-Chips (C) // Valves (E) and Mixing Chip (C)	
• Ventile (E) und Misch-Chips (C) auf das Gerät setzen.	• Place valves (E) and mixing chip (C) onto device.



Heizblock (G) und Scheibenreaktoren (H) // Heating Block (G) and Disc Reactors (H)

• Installieren Sie bis zu (4) Scheibenreaktoren (H) in den Heizblock (G). • Heizblock (G) auf Magnetrührer (nicht im Lieferumfang enthalten) aufsetzen.	• Install up to (4) disc reactors (H) into heating block (G). • Place heating block (G) onto IKA magnetic stirrer (not included with delivery).



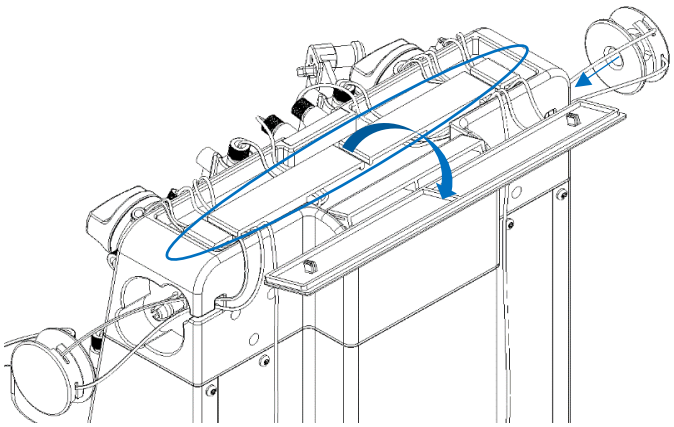


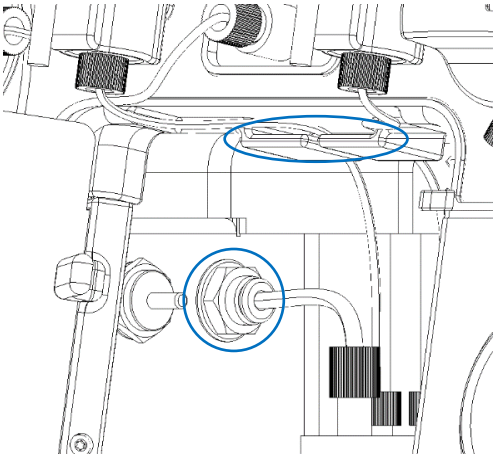
Hauptgehäuse (A) und Glasflasche (B) // Main Housing (A) and Glass Bottle (B)

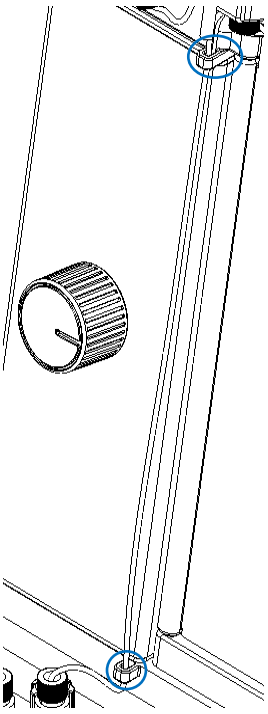
• Füllen Sie die Glasflasche (B) mit Lösungsmittel und verschließen Sie sie. • Stellen Sie sicher, dass die Schlauchenden beinahe den Boden der Glasflasche berühren. • Öffnen Sie die Tür und stellen Sie die Glasflasche (B) in das Gehäuse (A).	• Fill glass bottle (B) with solvent and close cap. • Ensure that tubes inside bottle reach close to the bottom of the flask. • Push to open door and insert glass bottle (B) into main housing (A).

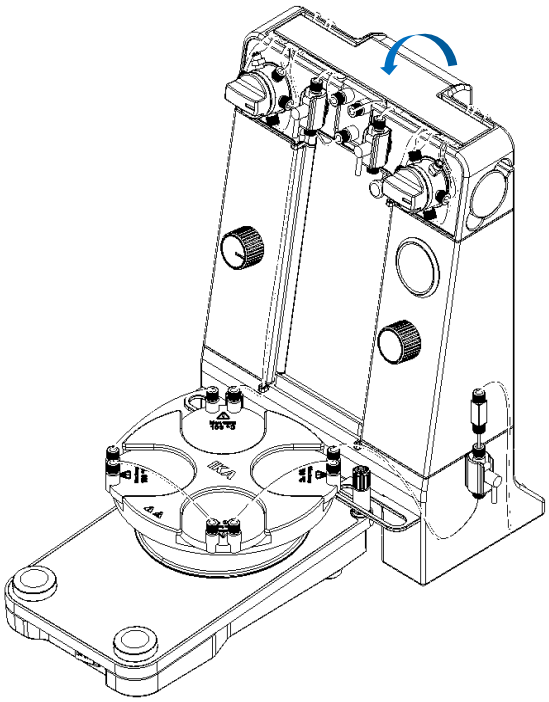
Schläuche // Tubing

• Öffnen Sie den Deckel, oben • Montieren Sie Schlauch A und die Schläuche 0 - 11 (I) gemäß Fließplan. Bringen Sie die Ventile (E) an den vorgesehenen Position, seitlich an (magnetisch), verwenden Sie Kapillare (F) um den Flüssigkeitsstrom zu glätten • Schlauch A führt vom Luftauslass in den Flaschendeckel, jedoch ohne den Boden der Glasflasche zu erreichen (B). • Führen Sie Schlauch 1 in ein Auffanggefäß um überschüssiges Material beim Befüllen beim Reinigen/Spülen des Probenspeichers aufzufangen. • Führen Sie Schlauch 11 in das Gefäß für das Produkt. • Lassen Sie Probenspeicher an der Seite des Hauptgehäuses (A) einrasten. • Legen Sie die Schläuche gemäß Zeichnung ein. • Schließen Sie den Deckel, oben und die Tür.	• Open lid on top of main housing (A). • Install tube A & tubes 0 - 11 (I) according to wiring diagram. Note the positions of valves (E) and union (F). • Tube A installs into air outlet as indicated and into bottle cap port without tubes extending to bottom of glass bottle (B). • Place tube 1 into vessel for sample-loop-overflow collection, in order to collect excessive liquid while loading or cleaning/flushing the sample loops. • Place tube 11 into vessel for product collection. • Snap sample loops onto side of main housing (A). • Route tubing through indicated features for organization. • Close lid on top of main housing (A) and close door.



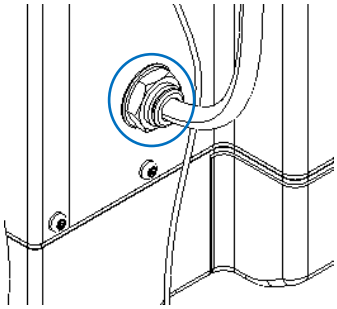




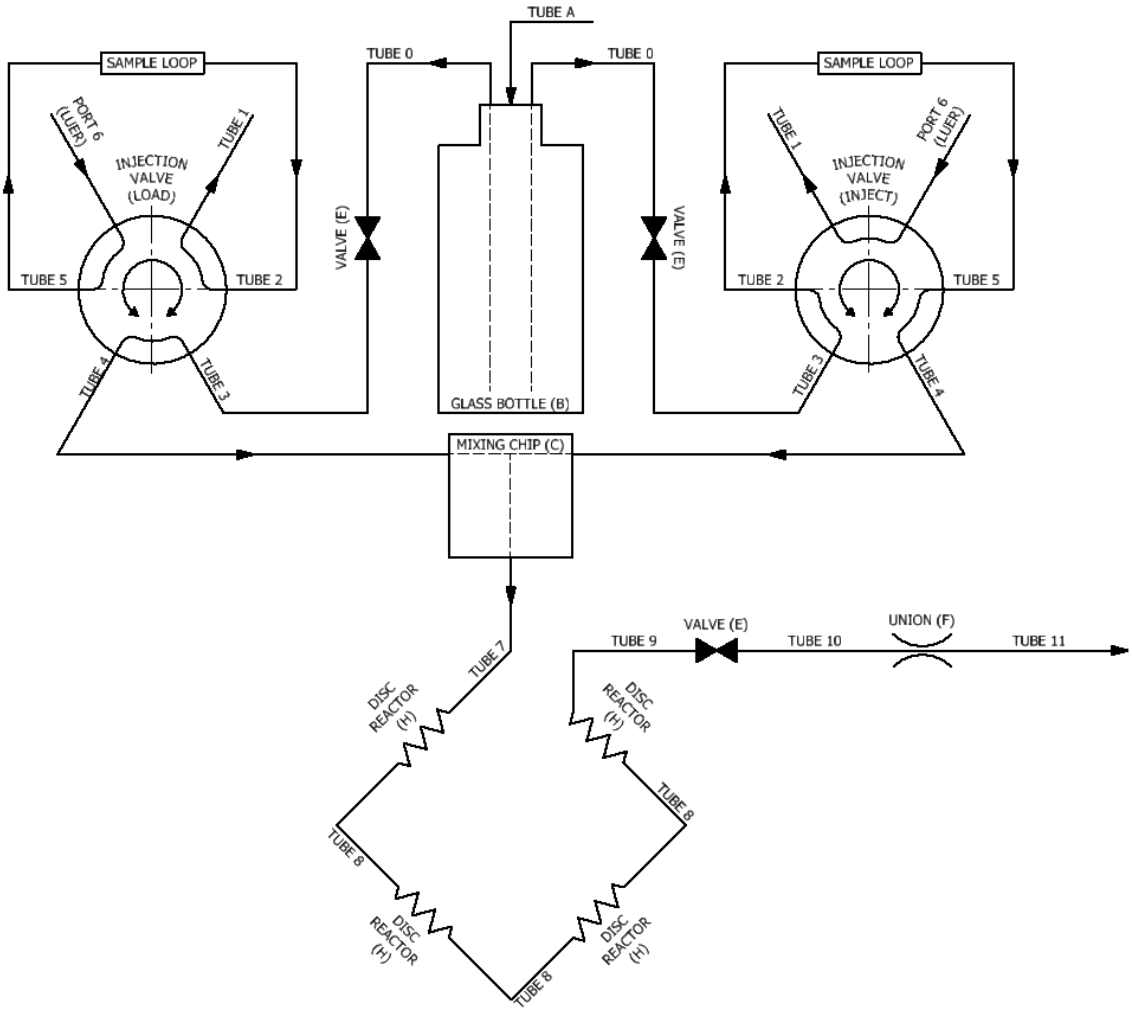


Luftanschluss // Air Connection

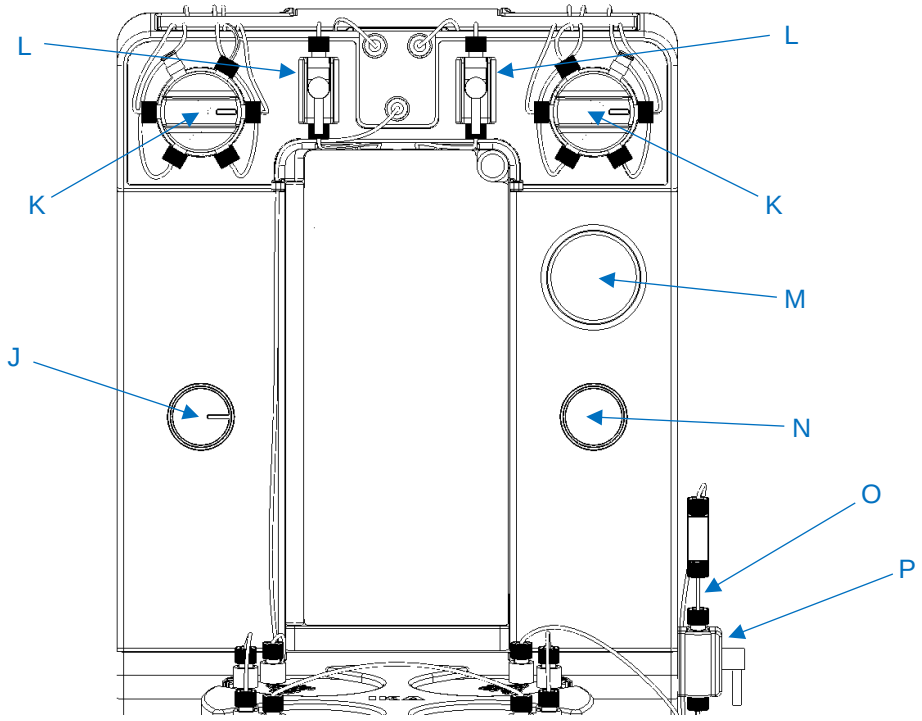
• Schließen Sie die Druckluftquelle über den Steckanschluss Lufteinlass an das Hauptgehäuse (A) via Steckanschluss Lufteinlass. • Die Druckluft und der Schlauch (Außendurchmesser 6.35 mm) sind kundenseitig bereitzustellen.	• Connect compressed air source to main housing (A) via push-to-connect "Air Inlet" port. • User must supply compressed air source and tubing (6.35 mm outer diameter) for connection.



Fließplan // Flow diagram

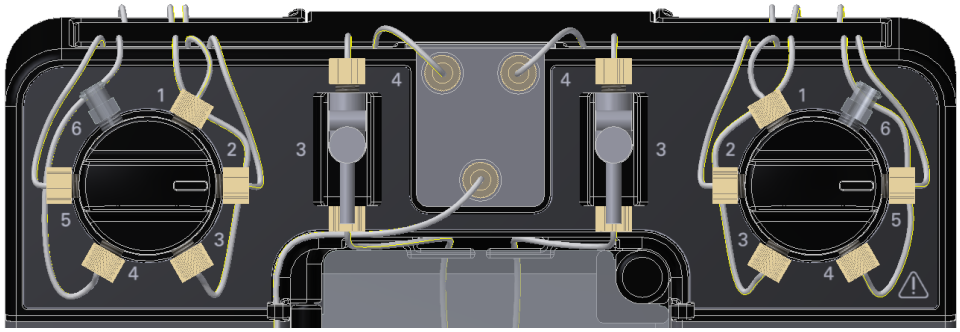


Bedieneinrichtungen // User Controls



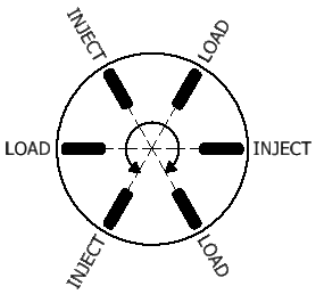
J	Luftventil // Air Valve Horizontale Anzeige: Druckluftzufuhr AUS // Horizontal Indicator: Air-Supply OFF Vertikale Anzeige Druckluftzufuhr EIN // Vertical Indicator: Air-Supply ON	Stoppt den Luftstrom und schaltet das System druckfrei.	Stops air flow and relieves system of pressure.
K	Einspritzventil // Injection Valve	Lädt Reaktionsflüssigkeit in Probenschleifen und injiziert Flüssigkeit in den Lösungsmittelstrom.	Loads reaction liquid into sample loops and injects liquid into solvent stream.
L	Ventil // Valve Horizontale Anzeige: Durchfluss AUS // Horizontal Indicator: Flow OFF Vertikale Anzeige: Durchfluss EIN // Vertical Indicator: Flow ON	Unterbricht den Flüssigkeitsstrom zwischen der Glasflasche und dem zugehörigen Injektionsventil.	Interrupts liquid flow between glass bottle (B) and associated injection valve (K).
M	Manometer // Pressure Gauge	Anzeige Systemdruck.	Displays pressure inside system.
N	Druckregler // Pressure Regulator Im Uhrzeigersinn: erhöhen // Clockwise: Increase Gegen Uhrzeigersinn: senken // Anti-Clockwise: Decrease	Einstellung Systemdruck.	Adjusts pressure inside system.
O	Kappilare / capillary	Reduziert die Durchflussrate.	Reduces liquid flow rate.
P	Ventil // Valve Horizontale Anzeige AUS // Horizontal Indicator: OFF Vertikale Anzeige EIN // Vertical Indicator: ON	Stoppt Flüssigkeitsstrom aus dem Scheibenreaktor, bevor er in die Kapillare eintritt.	Interrupts liquid flow between disc reactor (H) and capillary (O).

Anschlüsse: Mischventil // Ports: Injection Valve

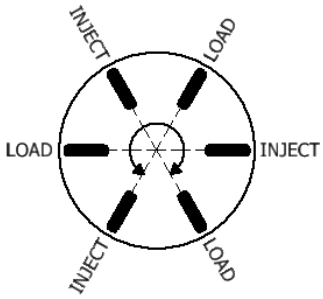


1	Überlauf // Overflow
2+5	Probenspeicher // Sample Loop
3	Lösemittelzufuhr // Solvent Supply
4	Misch-Chip // Mixing Chip
6	Anschluss Probenspeicher (Luer Lock) // Loading port for Sample Loop (Luer Lock)

Bedienung: Mischventil // Operating: Injection Valve



LOAD/INJECT POSITIONS
FOR LEFT VALVE



LOAD/INJECT POSITIONS
FOR RIGHT VALVE

• Beachten Sie auch das auch das IKA FLOW tutorial Video für weitere Hinweise.	• Refer to IKA Flow video tutorial for additional information on operating injection valves.
• Mischventile können in beide Richtungen gedreht werden, um zwischen den Positionen "load" und "inject" und umzuschalten.	• Injection valves (K) can be rotated in either direction to switch between the "load" and "inject" states (determined by indicator on knob).
• load: Befüllen der Probenspeicher mit einer Spritze oder Spülen und Reinigen des Speichers. • inject: Einschleusen des Probespeicherinhaltes in die Flussreaktion mit Lösemittel.	• Load: fill Sample Loop (2+5) or flush and clean sample loop (2+5). • Inject: get Sample Loop (2+5) volume added into flow-reaction with solvent.

Bedienung // Operation

• Stellen Sie die Ein-/Aus-Ventile (E) und das Luftventil (J) in Position "Aus". • Stellen Sie beide Einspritzventile (K) in Position "Laden". • Probenspeicher mit Flüssigkeit unter Verwendung einer Luer-Lock-Spritze (6) laden. • Schalten Sie die Druckluft ein. • Stellen Sie den gewünschten Arbeitsdruck mit dem Regler (N) ein. • Stellen Sie das Luftventil (J) und die 2-Wege-Ventile (E) in Position "Ein". • Stellen Sie den Magnetrührer (nicht im Lieferumfang enthalten) auf die gewünschte Temperatur (max. 100°C) ein und lassen Sie Lösungsmittel durch das System fließen, bis es durch Schlauch 11 austritt. • Stellen Sie beide Einspritzventile gleichzeitig in Position "inject" und warten Sie, bis das Produkt aus Schlauch 11 austritt.	• Set on/off valves (E) and air valve (J) to off position. • Set both injection valves (K) to "load" state. • Load sample loops with liquid using Luer lock syringe (6). • Turn on compressed air source. • Set desired working pressure using regulator (N). • Set air valve (J) and on/off valves (E) to on position. • Set magnetic stirrer (not included in delivery) to desired temperature (max. 100°C) and allow solvent to flow through system until it exits through tube 11. • Simultaneously turn both injection valves to "inject" state and wait for product to exit tube 11 for collection.

Reinigung & Wartung // Cleaning & maintenance

• Empfohlene Reinigngungsmittel: IPA/Methanol zum Spülen der Kapillaren. • Die Reaktoren können i.d.R. für mehrere Durchläufe verwendet werden und müssen nur dann gewechselt werden, wenn eine Verfärbung erkennbar ist oder wenn die Schraubengewinde bei zu starkem Anziehen undicht werden. • Ein Anschwellen der Reaktoren, z.B. wenn sie aggressiven Reagenzien oder übermäßigem Druck ausgesetzt sind ,ist möglich. In diesem Fall wird empfohlen, die Reaktoren nicht mehr zu verwenden um Leckagen zu vermeiden.	• Recommended cleaning agent: IPA/ methanol for the flushing of capillaries. • The reactors can be used for multiple runs and need only be changed when discoloration is apparent or leakage around the screw threads if overtightened. • Swelling of reactors can occur, e.g. if exposed to aggressive reagents or excessive pressures. In order to avoid leakage is it suggested to not to use the reactors any further in such a case and to seek replacements.
• Füllen Sie die Glasflasche (B) mit Wasser oder Lösungsmittel und bedienen Sie das Gerät wie im Abschnitt "Bedienung" beschrieben, um das System zu spülen. • Stellen Sie die Injektionsventile (K) zwischen den Positionen "load" und "inject" um, dadurch wird sichergestellt, dass das gesamte System gespült wird. • Falls Sie mit dem Ergebnis der Reinigung nicht zufrieden sind, empfehlen wir den Austausch eines Scheibenreaktors (H) oder einer Schlauchbaugruppe (I). • Das Tablett kann aus dem Hauptgehäuse (A) entfernt werden, falls Flüssigkeit aus der Glasflasche (B) ausläuft.	• Fill glass bottle (B) with water or solvent and operate the device following the procedure in the "Operation" section to flush the system. • Switch the injection valves (K) between "load" and "inject" states to ensure entire system is flushed. • If the system fails to become sufficiently clean, a disc reactor (H) or tubing assembly (I) may need to be replaced. • The tray can be removed from the main housing (A) in the event that liquid spills out of the glass bottle (B).

Entsorgung - Ersatzteilbestellung - Reparaturfall // Disposal - Ordering spare parts - Repairs

/// Entsorgungshinweise

- Die Entsorgung von Geräten, Verpackungen, Zubehörteilen hat in Übereinstimmung mit den nationalen Vorschriften zu erfolgen.

/// Ersatzteilbestellung

- Bei Ersatzteilbestellungen geben Sie bitte Folgendes an:
  - › Gerätetyp.
  - › Fabrikationsnummer des Gerätes, siehe Typenschild.
  - › Positionsnummer und Bezeichnung des Ersatzteiles, siehe www.ika.com.

- Zusätzliches Zubehör kann bei IKA bestellt werde. Please refer to the item numbers below:
  - › (1x) Misch-Chip, Polypropylen: 20102639
  - › (1x) Misch-Chip, PVDF: 20102640
  - › (1x) Scheiben-Reaktor, Polypropylen: 20102637
  - › (1x) Scheiben-Reaktor, PVDF: 20102638
  - › (1x) Schlauch-Set: 20102614

/// Reparaturfall

- Bitte senden Sie nur Geräte zur Reparatur ein, die gereinigt und frei von gesundheitsgefährdenden Stoffen sind.
- Fordern Sie hierzu das Formular "Unbedenklichkeitsbescheinigung" bei IKA an, oder verwenden Sie den download Ausdruck des Formulares auf der IKA Website www.ika.com.
- Senden Sie im Reparaturfall das Gerät in der Originalverpackung zurück. Lagerverpackungen sind für den Rückversand nicht ausreichend. Verwenden Sie zusätzlich eine geeignete Transportverpackung.

/// Disposal

- Devices must be fully disassembled and the materials removed and disposed of separately in accordance with applicable regulations (e.g. separate disposal of oils, plastics, metal and electronic industrial waste).

/// Ordering spare parts:

- When ordering spare parts, please indicate:
  - › device type.
  - › serial number, see product label (bottom of product).
  - › line item and description of spare part, see: www.ika.com.

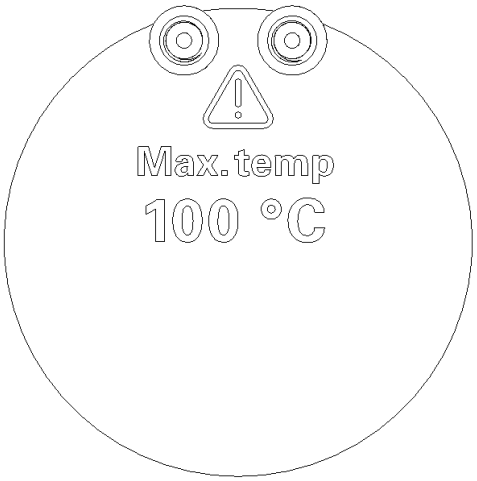
- Additional accessories can be purchased through IKA. Please refer to the item numbers below:
  - › (1x) Mixing Chip, Polypropylene: 20102639
  - › (1x) Mixing Chip, PVDF: 20102640
  - › (1x) Disc Reactor, Polypropylene: 20102637
  - › (1x) Disc Reactor, PVDF: 20102638
  - › (1x) Tubing Set: 20102614

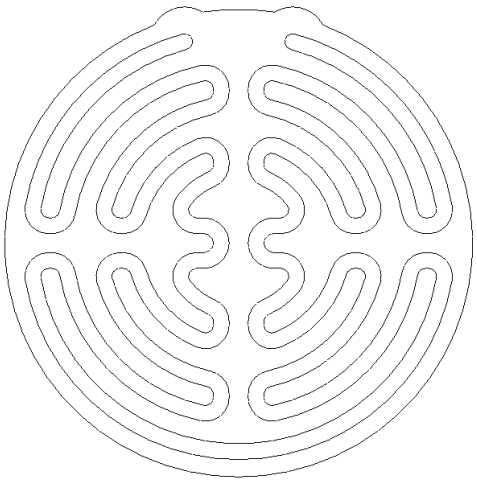
/// Repairs:

- Please only send devices in for repair that have been cleaned and are free of materials which might present health hazards.
- For this, use the “certificate of compliance” form which you can obtain from IKA or can download a version for printing from the IKA website at www.ika.com.
- If your appliance requires repair, return it in its original packaging. Storage packaging is not sufficient when sending the device - also use appropriate transport packaging

Anhänge // Appendices

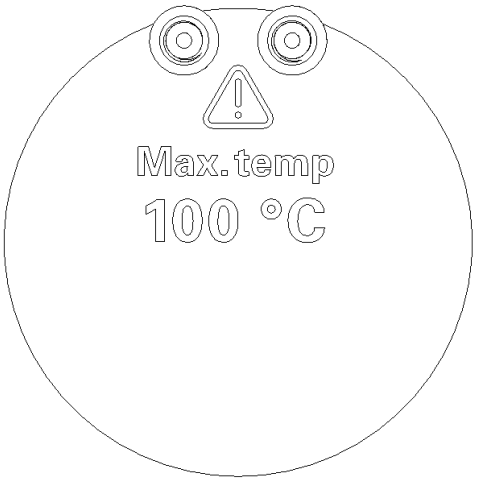
Scheibenreaktor 1 // Disc Reactor 1

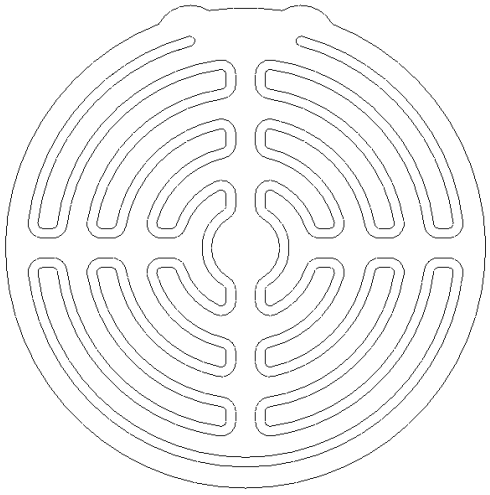




Bestellnummer // Order Number	20102637
Werkstoff // Material	Polypropylene (PP)
Hersteller // Manufacturer	Ultimaker
Pfadlänge // Path Length	654.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Reaktorinhalt // Reactor Volume	4,092 mm^3

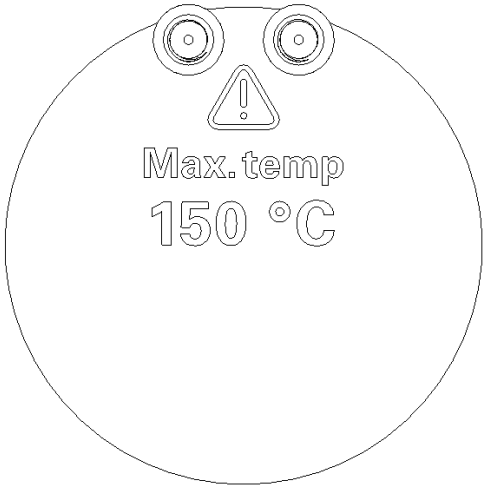
Scheibenreaktor 2 // Disc Reactor 2

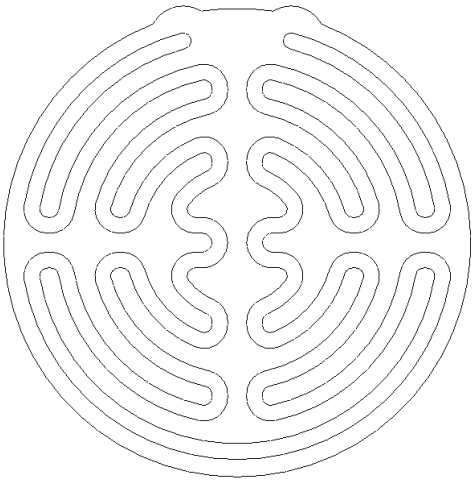




Bestellnummer // Order Number	20102705
Werkstoff // Material	Polypropylene (PP)
Hersteller // Manufacturer	Ultimaker
Pfadlänge // Path Length	809.8 mm
Pfadprofil // Path Profile	Square (1.5 mm x 1.5 mm)
Reaktorinhalt // Reactor Volume	1,822 mm^3

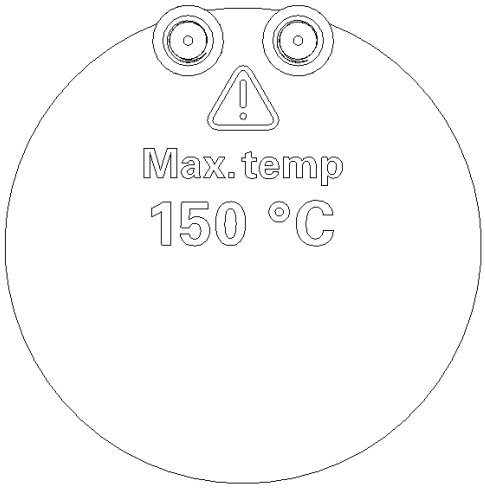
Scheibenreaktor 3 // Disc Reactor 3

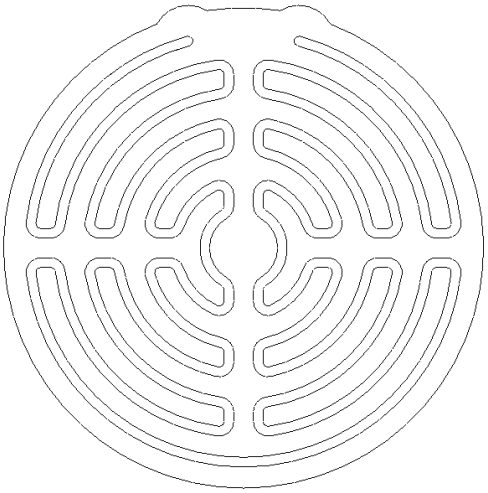




Bestellnummer // Order Number	20102638
Werkstoff // Material	Polyvinylidene Fluoride (PVDF)
Hersteller // Manufacturer	Arkema
Pfadlänge // Path Length	654.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Reaktorinhalt // Reactor Volume	4,092 mm^3

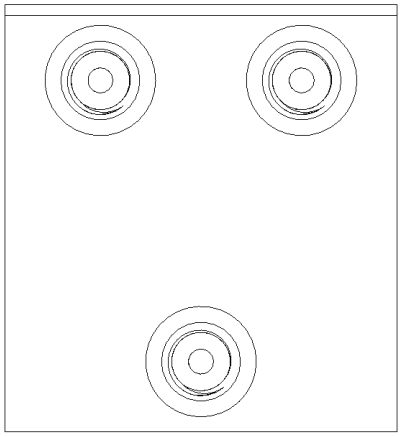
Scheibenreaktor 4 // Disc Reactor 4

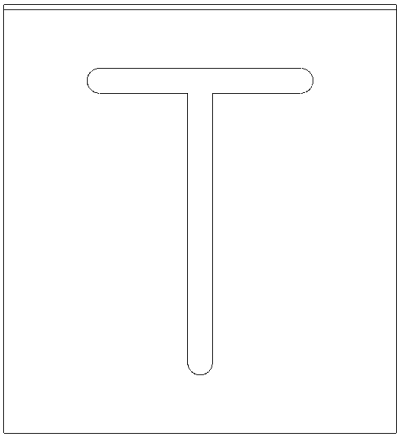




Bestellnummer // Order Number	20102706
Werkstoff // Material	Polyvinylidene Fluoride (PVDF)
Hersteller // Manufacturer	Arkema
Pfadlänge // Path Length	809.8 mm
Pfadprofil // Path Profile	Square (1.5 mm x 1.5 mm)
Reaktorinhalt // Reactor Volume	1,822 mm^3

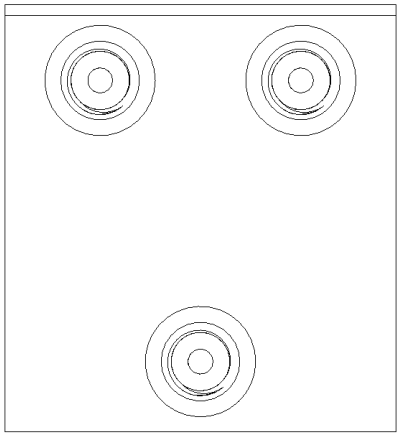
Misch-Chip 1 // Mixing Chip 1

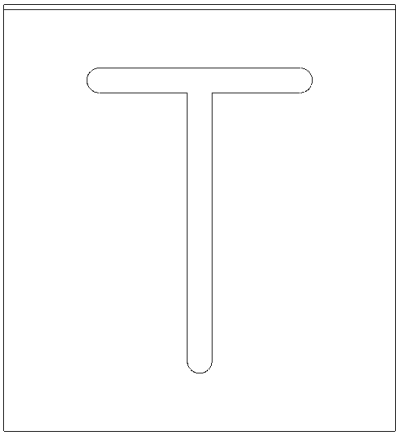




Bestellnummer // Order Number	20102639
Werkstoff // Material	Polypropylene (PP)
Hersteller // Manufacturer	Ultimaker
Pfadlänge // Path Length	49.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Chipinhalt // Reactor Volume	310.6 mm^3

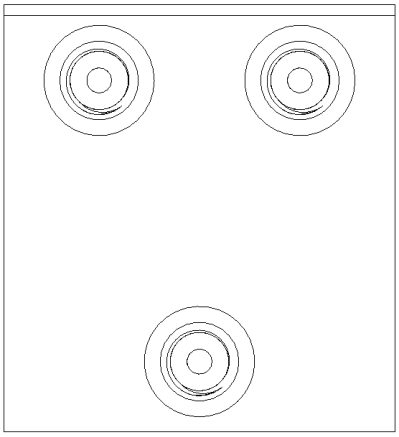
Misch-Chip 2 // Mixing Chip 2

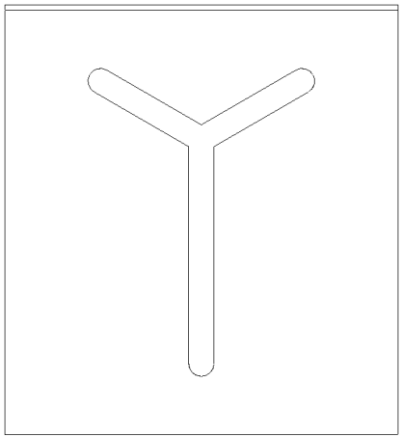




Bestellnummer // Order Number	20102640
Werkstoff // Material	Polyvinylidene Fluoride (PVDF)
Hersteller // Manufacturer	Arkema
Pfadlänge // Path Length	49.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Chipinhalt // Reactor Volume	310.6 mm^3

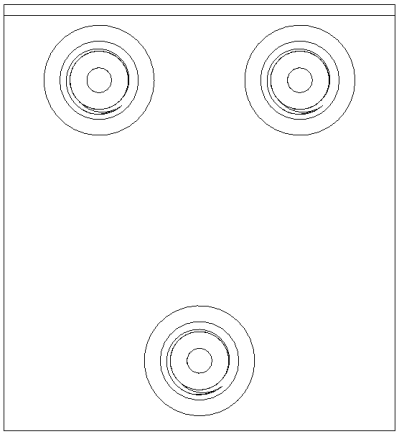
Misch-Chip 3 // Mixing Chip 3

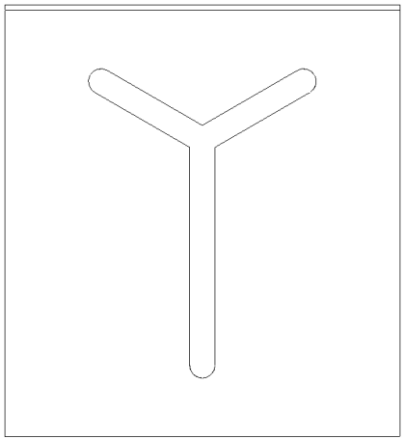




Bestellnummer // Order Number	20102707
Werkstoff // Material	Polypropylene (PP)
Hersteller // Manufacturer	Ultimaker
Pfadlänge // Path Length	47.2 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Chipinhalt // Reactor Volume	294.9 mm^3

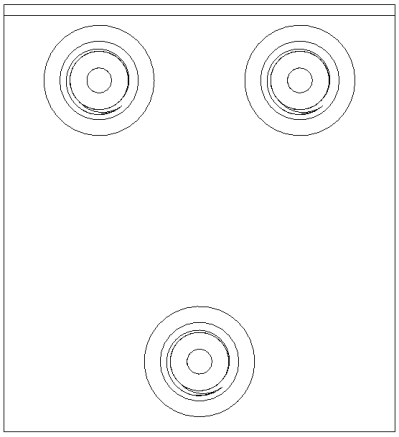
Misch-Chip 4 // Mixing Chip 4

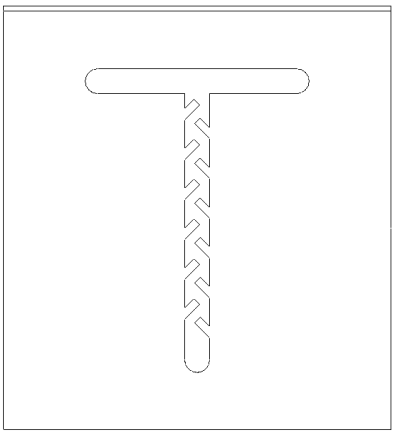




Bestellnummer // Order Number	20102709
Werkstoff // Material	Polyvinylidene Fluoride (PVDF)
Hersteller // Manufacturer	Arkema
Pfadlänge // Path Length	47.2 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm)
Chipinhalt // Reactor Volume	294.9 mm^3

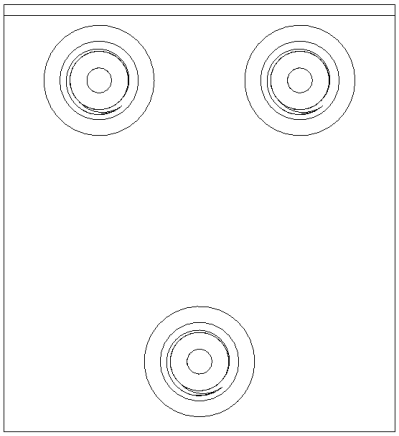
Misch-Chip 5 // Mixing Chip 5

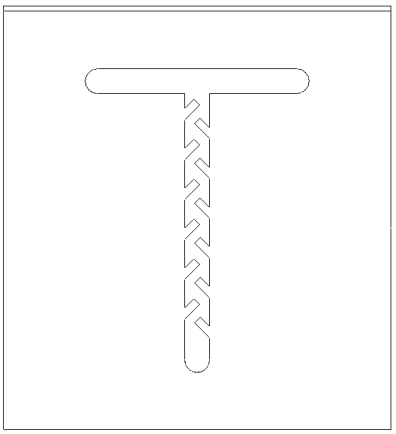




Bestellnummer // Order Number	20102708
Werkstoff // Material	Polypropylene (PP)
Hersteller // Manufacturer	Ultimaker
Pfadlänge // Path Length	49.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm) with barbs
Chipinhalt // Reactor Volume	269.3 mm^3

Misch-Chip 6 // Mixing Chip 6



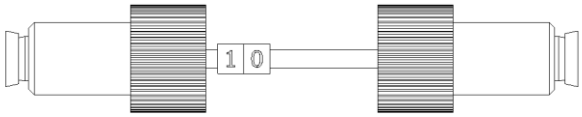


Bestellnummer // Order Number	20102710
Werkstoff // Material	Polyvinylidene Fluoride (PVDF)
Hersteller // Manufacturer	Arkema
Pfadlänge // Path Length	49.7 mm
Pfadprofil // Path Profile	Square (2.5 mm x 2.5 mm) with barbs
Chipinhalt // Reactor Volume	269.3 mm^3

Kapillare 1 // Capillary 1

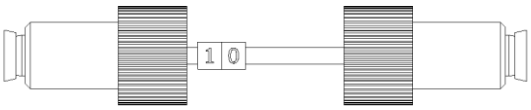
Bestellnummer // Order Number	20103068
Werkstoff // Material	SS 316
Hersteller // Manufacturer	IDEX Health & Science
Länge // Length	100 mm
Innendurchmesser// Inner Diameter	0.125 mm
Farbe // Color	Red

Kapillare 2 // Capillary 2



Bestellnummer // Order Number	20102988
Werkstoff // Material	SS 316
Hersteller // Manufacturer	IDEX Health & Science
Länge // Length	50 mm
Innendurchmesser// Inner Diameter	0.125 mm
Farbe // Color	Red

Kapillare 3 // Capillary 3



Bestellnummer // Order Number	20103069
Werkstoff // Material	SS 316
Hersteller // Manufacturer	IDEX Health & Science
Länge // Length	50 mm
Innendurchmesser// Inner Diameter	0.180 mm
Farbe // Color	Black

Kapillare 4 // Capillary 4

Bestellnummer // Order Number	20103070
Werkstoff // Material	SS 316
Werkstoff // Material	IDEX Health & Science
Länge // Length	100 mm
Innendurchmesser// Inner Diameter	0.250 mm
Farbe // Color	Blue

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Polypropylen (PP)

Explanation of Footnotes
1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)

Ratings: Chemical Effect
A = Excellent.
B = Good, Minor Effect, slight corrosion or discoloration
C = Fair, Moderate Effect, not recommended for continuous use. Softening, loss of strength, or swelling may occur.
D = Severe Effect, not recommended for ANY use.
N/A = Information not available.

Chemical	Compatibility
Acetaldehyde	A1-Excellent
Acetamide	A1-Excellent
Acetate Solvent	B1-Good
Acetic Acid	B-Good
Acetic Acid 20%	A-Excellent
Acetic Acid 80%	A-Excellent
Acetic Acid, Glacial	A1-Excellent
Acetic Anhydride	B1-Good
Acetone	A-Excellent
Acetyl Bromide	N/A
Acetyl Chloride (dry)	D-Severe Effect
Acetylene	A1-Excellent
Acrylonitrile	A1-Excellent
Adipic Acid	B2-Good
Alcohols: Amyl	B1-Good
Alcohols: Benzyl	A-Excellent
Alcohols: Butyl	A-Excellent
Alcohols: Diacetone	B2-Good
Alcohols: Ethyl	A-Excellent
Alcohols: Hexyl	N/A
Alcohols: Isobutyl	A1-Excellent
Alcohols: Isopropyl	A2-Excellent
Alcohols: Methyl	A2-Excellent
Alcohols: Octyl	N/A
Alcohols: Propyl	A-Excellent
Aluminum Chloride	A-Excellent
Aluminum Chloride 20%	A-Excellent
Aluminum Fluoride	A-Excellent
Aluminum Hydroxide	A-Excellent
Aluminum Nitrate	A2-Excellent
Aluminum Potassium Sulfate 10%	A-Excellent
Aluminum Potassium Sulfate 100%	A-Excellent
Aluminum Sulfate	A-Excellent
Alums	A-Excellent
Amines	B2-Good
Ammonia 10%	A2-Excellent
Ammonia Nitrate	A-Excellent
Ammonia, anhydrous	A-Excellent
Ammonia, liquid	A2-Excellent
Ammonium Acetate	A-Excellent
Ammonium Bifluoride	A-Excellent
Ammonium Carbonate	A-Excellent
Ammonium Caseinate	N/A
Ammonium Chloride	A-Excellent
Ammonium Hydroxide	A-Excellent
Ammonium Nitrate	A-Excellent
Ammonium Oxalate	A-Excellent
Ammonium Persulfate	A-Excellent
Ammonium Phosphate, Dibasic	A-Excellent
Ammonium Phosphate, Monobasic	A-Excellent
Ammonium Phosphate, Tribasic	A-Excellent
Ammonium Sulfate	A-Excellent
Ammonium Sulfite	A2-Excellent
Ammonium Thiosulfate	N/A
Amyl Acetate	B1-Good
Amyl Alcohol	B1-Good
Amyl Chloride	D-Severe Effect
Aniline	A1-Excellent
Aniline Hydrochloride	D-Severe Effect
Antifreeze	D-Severe Effect
Antimony Trichloride	A-Excellent
Aqua Regia (80% HCl, 20% HNO3)	B1-Good
Arochlor 1248	D-Severe Effect
Aromatic Hydrocarbons	D-Severe Effect
Arsenic Acid	A-Excellent
Arsenic Salts	N/A
Asphalt	B1-Good
Barium Carbonate	A-Excellent
Barium Chloride	A-Excellent
Barium Cyanide	D-Severe Effect
Barium Hydroxide	B-Good
Barium Nitrate	A-Excellent
Barium Sulfate	B1-Good
Barium Sulfide	B-Good
Beer	A1-Excellent

Chemical	Compatibility
Beet Sugar Liquids	A1-Excellent
Benzaldehyde	D-Severe Effect
Benzene	D-Severe Effect
Benzene Sulfonic Acid	D-Severe Effect
Benzoic Acid	B1-Good
Benzol	B-Good
Benzonitrile	N/A
Benzyl Chloride	C1-Fair
Bleaching Liquors	A1-Excellent
Borax (Sodium Borate)	B-Good
Boric Acid	A-Excellent
Brewery Slop	N/A
Bromine	D-Severe Effect
Butadiene	C-Fair
Butane	A1-Excellent
Butanol (Butyl Alcohol)	A1-Excellent
Butter	N/A
Buttermilk	A1-Excellent
Butyl Amine	B1-Good
Butyl Ether	D-Severe Effect
Butyl Phthalate	B2-Good
Butylacetate	B1-Good
Butylene	N/A
Butyric Acid	B1-Good
Calcium Bisulfate	N/A
Calcium Bisulfide	A-Excellent
Calcium Bisulfite	A-Excellent
Calcium Carbonate	A-Excellent
Calcium Chlorate	N/A
Calcium Chloride	A2-Excellent
Calcium Hydroxide	A2-Excellent
Calcium Hypochlorite	A1-Excellent
Calcium Nitrate	A2-Excellent
Calcium Oxide	A-Excellent
Calcium Sulfate	A-Excellent
Calgon	A-Excellent
Cane Juice	C1-Fair
Carbolic Acid (Phenol)	B-Good
Carbon Bisulfide	D-Severe Effect
Carbon Dioxide (dry)	A2-Excellent
Carbon Dioxide (wet)	A2-Excellent
Carbon Disulfide	D-Severe Effect
Carbon Monoxide	A-Excellent
Carbon Tetrachloride	D-Severe Effect
Carbon Tetrachloride (dry)	D-Severe Effect
Carbon Tetrachloride (wet)	D-Severe Effect
Carbonated Water	B-Good
Carbonic Acid	A-Excellent
Catsup	A-Excellent
Chloric Acid	N/A
Chlorinated Glue	N/A
Chlorine (dry)	D-Severe Effect
Chlorine Water	D-Severe Effect
Chlorine, Anhydrous Liquid	D-Severe Effect
Chloroacetic Acid	C1-Fair
Chlorobenzene (Mono)	C1-Fair
Chlorobromomethane	A-Excellent
Chloroform	C1-Fair
Chlorosulfonic Acid	D-Severe Effect
Chocolate Syrup	A2-Excellent
Chromic Acid 10%	D-Severe Effect
Chromic Acid 30%	D-Severe Effect
Chromic Acid 5%	D-Severe Effect
Chromic Acid 50%	D-Severe Effect
Chromium Salts	N/A
Cider	A-Excellent
Citric Acid	A-Excellent
Citric Oils	A-Excellent
Clorox (Bleach)	A-Excellent
Coffee	A-Excellent
Copper Chloride	A-Excellent
Copper Cyanide	A-Excellent
Copper Fluoborate	N/A
Copper Nitrate	A-Excellent
Copper Sulfate>5%	A-Excellent

IKA Flow Anhang B // Appendix B

Chemical	Compatibility
Copper Sulfate 5%	A-Excellent
Cream	A-Excellent
Cresols	D-Severe Effect
Cresylic Acid	A1-Excellent
Cupric Acid	A2-Excellent
Cyanic Acid	N/A
Cyclohexane	D-Severe Effect
Cyclohexanone	D-Severe Effect
Detergents	A-Excellent
Diacetone Alcohol	A1-Excellent
Dichlorobenzene	C1-Fair
Dichloroethane	D-Severe Effect
Diesel Fuel	A1-Excellent
Diethyl Ether	A1-Excellent
Diethylamine	A1-Excellent
Diethylene Glycol	A2-Excellent
Dimethyl Aniline	D-Severe Effect
Dimethyl Formamide	A-Excellent
Diphenyl	D-Severe Effect
Diphenyl Oxide	D-Severe Effect
Dyes	N/A
Epsom Salts (Magnesium Sulfate)	A-Excellent
Ethane	D-Severe Effect
Ethanol	A-Excellent
Ethanolamine	D-Severe Effect
Ether	D-Severe Effect
Ethyl Acetate	A1-Excellent
Ethyl Benzoate	B1-Good
Ethyl Chloride	D-Severe Effect
Ethyl Ether	D-Severe Effect
Ethyl Sulfate	N/A
Ethylene Bromide	D-Severe Effect
Ethylene Chloride	C1-Fair
Ethylene Chlorohydrin	D-Severe Effect
Ethylene Diamine	N/A
Ethylene Dichloride	D-Severe Effect
Ethylene Glycol	A-Excellent
Ethylene Oxide	D-Severe Effect
Fatty Acids	A-Excellent
Ferric Chloride	A-Excellent
Ferric Nitrate	A-Excellent
Ferric Sulfate	A-Excellent
Ferrous Chloride	A-Excellent
Ferrous Sulfate	A-Excellent
Fluoboric Acid	A-Excellent
Fluorine	D-Severe Effect
Fluosilicic Acid	A-Excellent
Formaldehyde 100%	C-Fair
Formaldehyde 40%	A-Excellent
Formic Acid	A1-Excellent
Freon 113	D-Severe Effect
Freon 12	A2-Excellent
Freon 22	B-Good
Freon TF	D-Severe Effect
Freonr 11	A-Excellent
Fruit Juice	B-Good
Fuel Oils	A-Excellent
Furan Resin	D-Severe Effect
Furfural	D-Severe Effect
Gallic Acid	A-Excellent
Gasoline (high-aromatic)	A-Excellent
Gasoline, leaded, ref.	B-Good
Gasoline, unleaded	C1-Fair
Gelatin	A-Excellent
Glucose	A-Excellent
Glue, P.V.A.	N/A
Glycerin	A-Excellent
Glycolic Acid	A-Excellent
Gold Monocyanide	N/A
Grape Juice	N/A
Grease	N/A
Heptane	C2-Fair
Hexane	B1-Good
Honey	A-Excellent
Hydraulic Oil (Petro)	D-Severe Effect
Hydraulic Oil (Synthetic)	D-Severe Effect
Hydrazine	C-Fair
Hydrobromic Acid 100%	C1-Fair
Hydrobromic Acid 20%	A2-Excellent
Hydrochloric Acid 100%	C-Fair
Hydrochloric Acid 20%	B2-Good
Hydrochloric Acid 37%	C-Fair
Hydrochloric Acid, Dry Gas	B-Good
Hydrocyanic Acid	A-Excellent
Hydrocyanic Acid (Gas 10%)	A-Excellent
Hydrofluoric Acid 100%	C1-Fair
Hydrofluoric Acid 20%	A2-Excellent
Hydrofluoric Acid 50%	A2-Excellent
Hydrofluoric Acid 75%	C1-Fair
Hydrofluosilicic Acid 100%	A-Excellent
Hydrofluosilicic Acid 20%	A-Excellent
Hydrogen Gas	A-Excellent
Hydrogen Peroxide 10%	A-Excellent
Hydrogen Peroxide 100%	B1-Good
Hydrogen Peroxide 30%	B1-Good
Hydrogen Peroxide 50%	B1-Good

Chemical	Compatibility
Hydrogen Sulfide (aqua)	A1-Excellent
Hydrogen Sulfide (dry)	A1-Excellent
Hydroquinone	A-Excellent
Hydroxyacetic Acid 70%	N/A
Ink	N/A
Iodine	C-Fair
Iodine (in alcohol)	N/A
Iodoform	N/A
Isooctane	A2-Excellent
Isopropyl Acetate	B1-Good
Isopropyl Ether	B-Good
Isotane	D-Severe Effect
Jet Fuel (JP3, JP4, JP5)	A1-Excellent
Kerosene	B-Good
Ketones	C-Fair
Lacquer Thinners	D-Severe Effect
Lacquers	D-Severe Effect
Lactic Acid	B-Good
Lard	B1-Good
Latex	A2-Excellent
Lead Acetate	A1-Excellent
Lead Nitrate	A2-Excellent
Lead Sulfamate	A2-Excellent
Ligroin	A2-Excellent
Lime	N/A
Linoleic Acid	B1-Good
Lithium Chloride	A2-Excellent
Lithium Hydroxide	N/A
Lubricants	A1-Excellent
Lye: Ca(OH)2 Calcium Hydroxide	A2-Excellent
Lye: KOH Potassium Hydroxide	A-Excellent
Lye: NaOH Sodium Hydroxide	A-Excellent
Magnesium Bisulfate	A2-Excellent
Magnesium Carbonate	A-Excellent
Magnesium Chloride	A2-Excellent
Magnesium Hydroxide	A-Excellent
Magnesium Nitrate	A-Excellent
Magnesium Oxide	N/A
Magnesium Sulfate (Epsom Salts)	A-Excellent
Maleic Acid	A-Excellent
Maleic Anhydride	D-Severe Effect
Malic Acid	A1-Excellent
Manganese Sulfate	N/A
Mash	N/A
Mayonnaise	N/A
Melamine	A-Excellent
Mercuric Chloride (dilute)	B-Good
Mercuric Cyanide	B-Good
Mercurous Nitrate	A-Excellent
Mercury	B-Good
Methane	A-Excellent
Methanol (Methyl Alcohol)	A2-Excellent
Methyl Acetate	D-Severe Effect
Methyl Acetone	N/A
Methyl Acrylate	D-Severe Effect
Methyl Alcohol 10%	A2-Excellent
Methyl Bromide	C-Fair
Methyl Butyl Ketone	D-Severe Effect
Methyl Cellosolve	B-Good
Methyl Chloride	D-Severe Effect
Methyl Dichloride	D-Severe Effect
Methyl Ethyl Ketone	B-Good
Methyl Ethyl Ketone Peroxide	N/A
Methyl Isobutyl Ketone	A-Excellent
Methyl Isopropyl Ketone	N/A
Methyl Methacrylate	D-Severe Effect
Methylamine	A2-Excellent
Methylene Chloride	B1-Good
Milk	B-Good
Mineral Spirits	B-Good
Molasses	B-Good
Monochloroacetic acid	N/A
Monoethanolamine	B-Good
Morpholine	B2-Good
Motor oil	A1-Excellent
Mustard	A-Excellent
Naphtha	B-Good
Naphthalene	B-Good
Natural Gas	A-Excellent
Nickel Chloride	A-Excellent
Nickel Nitrate	A2-Excellent
Nickel Sulfate	A-Excellent
Nitrating Acid (<15% HNO3)	C-Fair
Nitrating Acid (>15% H2SO4)	C-Fair
Nitrating Acid (S1% Acid)	C-Fair
Nitrating Acid (S15% H2SO4)	C-Fair
Nitric Acid (20%)	A2-Excellent
Nitric Acid (50%)	B-Good
Nitric Acid (5-10%)	A-Excellent
Nitric Acid (Concentrated)	D-Severe Effect
Nitrobenzene	B1-Good
Nitrogen Fertilizer	N/A
Nitromethane	B2-Good
Nitrous Acid	A-Excellent
Nitrous Oxide	D-Severe Effect
Oils: Aniline	A-Excellent

IKA Flow Anhang B // Appendix B

Chemical	Compatibility
Oils: Anise	N/A
Oils: Bay	N/A
Oils: Bone	A-Excellent
Oils: Castor	A-Excellent
Oils: Cinnamon	D-Severe Effect
Oils: Citric	A-Excellent
Oils: Clove	N/A
Oils: Coconut	A1-Excellent
Oils: Cod Liver	A1-Excellent
Oils: Corn	A2-Excellent
Oils: Cottonseed	A-Excellent
Oils: Creosote	C-Fair
Oils: Diesel Fuel Oil (20, 30, 40, 50)	A1-Excellent
Oils: Fuel Oil (1, 2, 3, 5A, 5B, 6)	B-Good
Oils: Ginger	N/A
Oils: Hydraulic Oil (Petro)	D-Severe Effect
Oils: Hydraulic Oil (Synthetic)	D-Severe Effect
Oils: Lemon	N/A
Oils: Linseed	A-Excellent
Oils: Mineral	A-Excellent
Oils: Olive	A-Excellent
Oils: Orange	A-Excellent
Oils: Palm	N/A
Oils: Peanut	D-Severe Effect
Oils: Peppermint	N/A
Oils: Pine	B-Good
Oils: Rapeseed	D-Severe Effect
Oils: Rosin	A2-Excellent
Oils: Sesame Seed	A-Excellent
Oils: Silicone	A-Excellent
Oils: Soybean	A1-Excellent
Oils: Sperm (whale)	N/A
Oils: Tanning	N/A
Oils: Transformer	B-Good
Oils: Turbine	B1-Good
Oleic Acid	B1-Good
Oleum 100%	D-Severe Effect
Oleum 25%	D-Severe Effect
Oxalic Acid (cold)	A2-Excellent
Ozone	B-Good
Palmitic Acid	B1-Good
Paraffin	A1-Excellent
Pentane	D-Severe Effect
Perchloric Acid	C-Fair
Perchloroethylene	D-Severe Effect
Petrolatum	D-Severe Effect
Petroleum	B1-Good
Phenol (10%)	B1-Good
Phenol (Carbolic Acid)	B-Good
Phosphoric Acid (>40%)	A2-Excellent
Phosphoric Acid (crude)	B2-Good
Phosphoric Acid (molten)	D-Severe Effect
Phosphoric Acid (S40%)	A2-Excellent
Phosphoric Acid Anhydride	A-Excellent
Phosphorus	A-Excellent
Phosphorus Trichloride	N/A
Photographic Developer	A-Excellent
Photographic Solutions	A2-Excellent
Phthalic Acid	A-Excellent
Phthalic Anhydride	D-Severe Effect
Picric Acid	B1-Good
Plating Solutions, Antimony Plating 130°F	A-Excellent
Plating Solutions, Arsenic Plating 110°F	A-Excellent
Plating Solutions (Brass): High-Speed Brass Bath 110°F	A-Excellent
Plating Solutions (Brass): Regular Brass Bath 100°F	A-Excellent
Plating Solutions (Bronze): Cu-Cd Bronze Bath R.T.	A-Excellent
Plating Solutions (Bronze): Cu-Sn Bronze Bath 160°F	A-Excellent
Plating Solutions (Bronze): Cu-Zn Bronze Bath 100°F	A-Excellent
Plating Solutions (Cadmium): Cyanide Bath 90°F	A-Excellent
Plating Solutions (Cadmium): Fluoborate Bath 100°F	A-Excellent
Plating Solutions, (Chromium): Barrel Chrome Bath 95°F	A-Excellent
Plating Solutions, (Chromium): Black Chrome Bath 115°F	A-Excellent
Plating Solutions, (Chromium): Chromic-Sulfuric Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluoride Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluosilicate Bath 95°F	D-Severe Effect
Plating Solutions (Copper) (Acid): Copper Fluoborate Bath 120°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Sulfate Bath R.T.	A-Excellent
Plating Solutions (Copper) (Cyanide): Copper Strike Bath 120°F	A-Excellent
Plating Solutions (Copper) (Cyanide): High-Speed Bath 180°F	A-Excellent
Plating Solutions (Copper) (Cyanide): Rochelle Salt Bath 150°F	A-Excellent
Plating Solutions (Copper) (Misc): Copper (Electroless)	A-Excellent
Plating Solutions (Copper) (Misc): Copper Pyrophosphate	A-Excellent
Plating Solutions (Gold): Acid 75°F	A-Excellent
Plating Solutions (Gold): Cyanide 150°F	A-Excellent
Plating Solutions (Gold): Neutral 75°F	A-Excellent
Plating Solutions, Indium Sulfamate Plating R.T.	A-Excellent
Plating Solutions (Iron): Ferrous Am Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Ferrous Chloride Bath 190°F	C-Fair
Plating Solutions (Iron): Ferrous Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Fluoborate Bath 145°F	A-Excellent

Chemical	Compatibility
Plating Solutions (Iron): Sulfamate 140°F	A-Excellent
Plating Solutions (Iron): Sulfate-Chloride Bath 160°F	A-Excellent
Plating Solutions, Lead Fluoborate Plating	A-Excellent
Plating Solutions, (Nickel): Electroless 200°F	D-Severe Effect
Plating Solutions, (Nickel): Fluoborate 100-170°F	A-Excellent
Plating Solutions, (Nickel): High-Chloride 130-160°F	A-Excellent
Plating Solutions, (Nickel): Sulfamate 100-140°F	A-Excellent
Plating Solutions, (Nickel): Watts Type 115-160°F	A-Excellent
Plating Solutions (Rhodium) 120°F	A-Excellent
Plating Solutions, (Silver) 80-120°F	A-Excellent
Plating Solutions, Tin-Fluoborate Plating 100°F	A-Excellent
Plating Solutions, Tin-Lead Plating 100°F	A-Excellent
Plating Solutions (Zinc): Acid Chloride 140°F	A-Excellent
Plating Solutions (Zinc): Acid Fluoborate Bath R.T.	A-Excellent
Plating Solutions (Zinc): Acid Sulfate Bath 150°F	A-Excellent
Plating Solutions (Zinc): Alkaline Cyanide Bath R.T.	A-Excellent
Potash (Potassium Carbonate)	A-Excellent
Potassium Bicarbonate	A-Excellent
Potassium Bromide	A-Excellent
Potassium Chlorate	A-Excellent
Potassium Chloride	A-Excellent
Potassium Chromate	A-Excellent
Potassium Cyanide Solutions	A-Excellent
Potassium Dichromate	A-Excellent
Potassium Ferricyanide	A2-Excellent
Potassium Ferrocyanide	A-Excellent
Potassium Hydroxide (Caustic Potash)	A-Excellent
Potassium Hypochlorite	N/A
Potassium Iodide	A2-Excellent
Potassium Nitrate	A-Excellent
Potassium Oxalate	N/A
Potassium Permanganate	A1-Excellent
Potassium Sulfate	A-Excellent
Potassium Sulfide	A-Excellent
Propane (liquefied)	A-Excellent
Propylene	N/A
Propylene Glycol	A2-Excellent
Pyridine	A2-Excellent
Pyrogallic Acid	A-Excellent
Resorcinal	A2-Excellent
Rosins	A2-Excellent
Rum	A-Excellent
Rust Inhibitors	A-Excellent
Salad Dressings	A-Excellent
Salicylic Acid	A1-Excellent
Salt Brine (NaCl saturated)	A-Excellent
Sea Water	A-Excellent
Shellac (Bleached)	A-Excellent
Shellac (Orange)	A-Excellent
Silicone	A-Excellent
Silver Bromide	N/A
Silver Nitrate	A1-Excellent
Soap Solutions	A-Excellent
Soda Ash (see Sodium Carbonate)	A-Excellent
Sodium Acetate	A-Excellent
Sodium Aluminate	N/A
Sodium Benzoate	A2-Excellent
Sodium Bicarbonate	A-Excellent
Sodium Bisulfate	A-Excellent
Sodium Bisulfite	A-Excellent
Sodium Borate (Borax)	A2-Excellent
Sodium Bromide	N/A
Sodium Carbonate	A-Excellent
Sodium Chlorate	A-Excellent
Sodium Chloride	A-Excellent
Sodium Chromate	N/A
Sodium Cyanide	A-Excellent
Sodium Ferrocyanide	A-Excellent
Sodium Fluoride	A-Excellent
Sodium Hydrosulfite	N/A
Sodium Hydroxide (20%)	A-Excellent
Sodium Hydroxide (50%)	A-Excellent
Sodium Hydroxide (80%)	A-Excellent
Sodium Hypochlorite (<20%)	A-Excellent
Sodium Hypochlorite (100%)	B-Good
Sodium Hyposulfate	N/A
Sodium Metaphosphate	A1-Excellent
Sodium Metasilicate	A-Excellent
Sodium Nitrate	A-Excellent
Sodium Perborate	A-Excellent
Sodium Peroxide	B-Good
Sodium Polyphosphate	A-Excellent
Sodium Silicate	A-Excellent
Sodium Sulfate	A-Excellent
Sodium Sulfide	A-Excellent
Sodium Sulfite	A2-Excellent
Sodium Tetraborate	N/A
Sodium Thiosulfate (hypo)	A2-Excellent
Sorghum	N/A
Soy Sauce	N/A
Stannic Chloride	A-Excellent
Stannic Fluoborate	N/A
Stannous Chloride	A-Excellent
Starch	A2-Excellent
Stearic Acid	A2-Excellent
Stoddard Solvent	C-Fair

IKA Flow Anhang B // Appendix B

Chemical	Compatibility
Styrene	N/A
Sugar (Liquids)	A-Excellent
Sulfate (Liquors)	A-Excellent
Sulfur Chloride	C1-Fair
Sulfur Dioxide	A1-Excellent
Sulfur Dioxide (dry)	A1-Excellent
Sulfur Hexafluoride	N/A
Sulfur Trioxide	C-Fair
Sulfur Trioxide (dry)	D-Severe Effect
Sulfuric Acid (<10%)	A2-Excellent
Sulfuric Acid (10-75%)	A1-Excellent
Sulfuric Acid (75-100%)	C1-Fair
Sulfuric Acid (cold concentrated)	A2-Excellent
Sulfuric Acid (hot concentrated)	D-Severe Effect
Sulfurous Acid	A-Excellent
Sulfuryl Chloride	N/A
Tallow	A2-Excellent
Tannic Acid	A-Excellent
Tanning Liquors	A1-Excellent
Tartaric Acid	A-Excellent
Tetrachloroethane	C-Fair
Tetrachloroethylene	D-Severe Effect
Tetrahydrofuran	C2-Fair
Tin Salts	A-Excellent
Toluene (Toluol)	C1-Fair
Tomato Juice	A-Excellent
Trichloroacetic Acid	A-Excellent
Trichloroethane	C-Fair
Trichloroethylene	C1-Fair

Chemical	Compatibility
Trichloropropane	N/A
Tricresylphosphate	A1-Excellent
Triethylamine	D-Severe Effect
Trisodium Phosphate	A-Excellent
Turpentine	D-Severe Effect
Urea	A-Excellent
Uric Acid	N/A
Urine	A-Excellent
Varnish	A-Excellent
Vegetable Juice	N/A
Vinegar	A-Excellent
Vinyl Acetate	B1-Good
Vinyl Chloride	N/A
Water, Acid, Mine	A-Excellent
Water, Deionized	A2-Excellent
Water, Distilled	A-Excellent
Water, Fresh	A-Excellent
Water, Salt	A-Excellent
Weed Killers	N/A
Whey	N/A
Whiskey & Wines	A-Excellent
White Liquor (Pulp Mill)	A1-Excellent
White Water (Paper Mill)	A-Excellent
Xylene	B-Good
Zinc Chloride	A-Excellent
Zinc Hydrosulfite	N/A
Zinc Sulfate	A-Excellent

KYNAR (PVDF)

Explanation of Footnotes
1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)

Ratings: Chemical Effect
R = Resistant
LR = Limited Resistance
NR = Not Recommended
ND = No Data

Chemical	Concentration	Max. Temperature
Acetaldehyde		
Acetaldehyde		NR
Acetamide		NR
Acetic Acid	10% in water	95
Acetic Acid	50% in water	95
Acetic Acid	80% in water	50
Acetic Anhydride		NR
Acetone		NR
Acetone	10% in water	40
Acetonitrile		NR
Acetophenone		NR
Acetyl Bromide		50
Acetyl Chloride		50
Acetylacetone		50
Acetylene		65
Adipic Acid		65
Air		135
Alcoholic Spirits	40% Ethyl Alcohol	95
Allyl Alcohol		50
Allyl Chloride		100
Aluminum Acetate		110
Aluminum Bromide		110
Aluminum Chloride	Up to 40% in water	110
Aluminum Fluoride	Aqueous solution or solid	110
Aluminum Nitrate	Aqueous solution or solid	110
Aluminum Oxychloride		110
Aluminum Sulfate	Aqueous solution or solid	110
Ammonia, gas		NR
Ammonia, liquid		NR
Ammonium Acetate	Aqueous solution or solid	65
Ammonium Alum	Aqueous solution or solid	110
Ammonium Bifluoride	Aqueous solution or solid	65
Ammonium Bromide	Aqueous solution or solid	110
Ammonium Carbonate	Aqueous solution or solid	110
Ammonium Chloride	Aqueous solution or solid	110
Ammonium Dichromate	Aqueous solution or solid	110
Ammonium Fluoride	Aqueous solution or solid	75
Ammonium Fluoride	Up to “concentrated”	95
Ammonium Metaphosphate	Aqueous solution or solid	110
Ammonium Nitrate	Aqueous solution or solid	110
Ammonium Persulfate	Aqueous solution or solid	25
Ammonium Phosphate	Aqueous solution or solid	25
Ammonium Sulfate	Aqueous solution or solid	110
Ammonium Sulfide	Aqueous solution or solid	50
Ammonium Thiocyanate	Aqueous solution or solid	110
Amyl Acetate		40
Amyl Alcohol		110
sec-Amyl Alcohol		110
Amyl Chloride		110
Aniline		40
Aniline Hydrochloride	Aqueous solution or solid	25
Aqua Regia		25
Arsenic Acid	Aqueous solution	110
Asphalt		110
Barium Chloride	Aqueous solution or solid	110
Barium Hydroxide		110
Barium Nitrate	Aqueous solution or solid	110
Barium Sulfate		110
Beer		100
Beet Sugar Liquors		110
Benzaldehyde		NR
Benzene		75
Benzenesulfonic Acid	Aqueous solution or solid	50
Benzoic Acid		105
Benzoyl Chloride		75
Benzoyl Chloride		75
Benzoyl Peroxide		75
Benzyl Alcohol		110
Benzyl Chloride		110
Benzyl Ether		110
Benzylamine		NR
Benzylamine	Aqueous solution or liquid	NR
Black Liquor		NR
Bio Diesel		90
Bleaching Agents		110
Borax		110

Chemical	Concentration	Max. Temperature
Boric Acid		110
Boron Trifluoride		25
Brine		110
Brine, acid		110
Bromic Acid	Aqueous solution	35
Bromine dry gas		65
Bromine, liquid		65
Bromine, water		95
Bromobenzene		65
Bromoform		65
m-Bromotoluene		65
Butadiene		110
Butane		110
Butanediol	Aqueous solution or liquid	110
Butyl Acetate		NR
Butyl Acrylate		40
Butyl Alcohol	Aqueous solution or liquid	105
sec-Butyl Alcohol	Aqueous solution or liquid	95
t-Butyl Alcohol	Aqueous solution or liquid	95
Butyl Bromide	Aqueous solution or liquid	110
Butyl Bromide		110
Butyl Chloride		110
Butyl Ether		NR
Butyl Mercaptan		110
Butyl Stearate		40
Butylamine	Aqueous solution or liquid	NR
sec-Butylamine	Aqueous solution or liquid	NR
t-Butylamine	Aqueous solution or liquid	NR
1-Butylene	Aqueous solution or liquid	NR
Butylphenol		110
Butyraldehyde		50
Butyric Acid		110
Calcium Acetate	Aqueous solution or solid	110
Calcium Bisulfate	Aqueous solution or solid	110
Calcium Bisulfite	Aqueous solution or solid	95
Calcium Bromide	Aqueous solution or solid	110
Calcium Carbonate		110
Calcium Chlorate	Aqueous solution or solid	110
Calcium Chloride	Aqueous solution or solid	110
Calcium Hydroxide		110
Calcium Hypochlorite	Aqueous solution or solid	95
Calcium Nitrate	Aqueous solution or solid	110
Calcium Oxide		110
Calcium Phosphate		110
Calcium Sulfate		110
Cane Sugar Liquors		110
Caprylic Acid		80
Carbon Dioxide		110
Carbon Disulfide		25
Carbon Monoxide		110
Carbon Tetrachloride		110
Carbonic Acid		110
Casein		110
Castor Oil		110
Chloral Hydrate		25
Chlorinated Phenol		65
Chlorine	5% in CCl4	75
Chlorine, gas		75
Chlorine, liquid		80
Chlorine Dioxide		65
Chlorine Water		110
Chloroacetic Acid	Aqueous solution or pure	NR
Chloroacetyl Chloride		50
Chlorobenzene		70
Chlorobenzyl Chloride		50
Chloroform		50
6-Chlorohexanol		75
Chlorohydrin		50
Chloropicrin		65
Chlorosulfonic Acid		25
Chlorotrimethylsilane		50
Chrome Alum	Aqueous solution or solid	95
Chromic Acid	Up to 40% in water	80
Chromic Acid	50% in water	65
Chromyl Chloride		50
Cider		100

IKA Flow Anhang B // Appendix B

Chemical	Concentration	Max. Temperature
Citric Acid	Aqueous solution or solid	110
Coal Gas		110
Coconut Oil		110
Copper Acetate	Aqueous solution or solid	110
Copper Carbonate, basic		110
Copper Chloride	Aqueous solution or solid	110
Copper Cyanide		110
Copper Fluoride		110
Copper Nitrate	Aqueous solution or solid	110
Copper Sulfate	Aqueous solution or solid	110
Corn Oil		110
Corn Syrup		110
Cottonseed Oil		110
Cresol		65
Cresylic Acid		65
Crotonaldehyde		40
Crude Oil		110
Cryolite		110
Cuprous Chloride		110
Cyclohexane		110
Cyclohexanol		65
Cyclohexanone		25
Cyclohexyl Acetate		95
Decane		110
Dextrin	Aqueous solution or solid	110
Diacetone Alcohol		NR
p-Dibromobenzene		95
1,2,-Dibromopropane		95
Dibutyl Phthalate		NR
Dibutyl Sebacate		NR
Dibutylamine	Aqueous solution or liquid	NR
Dichloroacetic Acid	Aqueous solution or liquid	50
o-Dichlorobenzene		65
Dichlorodimethylsilane		50
Dichloroethylene		105
2,2-Dichloropropionic Acid		50
Diesel Fuels		110
Diethanolamine	Aqueous solution or liquid	NR
Diethylamine	Aqueous solution or liquid	NR
Diethyl Malonate		NR
Diethylenetriamine	Aqueous solution or liquid	40
Diglycolic Acid		25
Diisobutyl Ketone		25
Diisobutylene		110
Diisopropyl Ketone		NR
Dimethyl Acetamide		NR
Dimethyl Formamide		NR
Dimethyl Phthalate		NR
Dimethyl Sulfate		25
Dimethyl Sulfoxide		NR
Dimethylamine	Aqueous solution or gas	NR
Dimethylaniline		25
2,6,-Dimethyl-4-heptanol		95
2,5-Dimethyl-1,5-hexadiene		110
Dioctyl Phthalate		25
1,4,-Dioxane		NR
Dioxolane		NR
Dipropylene Glycol Methyl Ether		NR
Disodium Phosphate	Aqueous solution or solid	95
Divinyl Benzene		50
Epichlorohydrin		NR
Epsom Salts	Aqueous solution or solid	95
Ethanethiol		25
Ethanolamine	Aqueous solution or liquid	NR
2-Ethoxyethyl Acetate	Aqueous solution or liquid	95
Ethyl Acetate		NR
Ethyl Acetoacetate		25
Ethyl Acrylate		25
Ethyl Alcohol	Aqueous solution or liquid	100
Ethyl Chloride		110
Ethyl Chloroacetate		25
Ethyl Chloroformate		50
Ethyl Cyanoacetate		25
Ethyl Ether		40
Ethyl Formate		25
Ethylbenzene		50
Ethylene Chlorohydrin	Aqueous solution or liquid	25
Ethylene Dichloride		110
Ethylene Glycol	Aqueous solution or liquid	110
Ethylene Oxide		95
Ethylenediamine	Aqueous solution or liquid	50
2-Ethyl-1-hexanol		110
Fatty Acids		110
Ferric Chloride	Aqueous solution or solid	110
Ferric Hydroxide		110
Ferric Nitrate	Aqueous solution or solid	110
Ferric Sulfate		110
Ferric Sulfide		110
Ferrous Chloride	Aqueous solution or solid	110
Ferrous Hydroxide		110
Ferrous Nitrate	Aqueous solution or solid	110
Ferrous Sulfate		110
Fluorine		25
Fluoroboric Acid	Aqueous solution	110

Chemical	Concentration	Max. Temperature
Fluorosilic Acid		110
Formaldehyde	37% in water	50
Formic Acid	Aqueous solution or liquid	110
Fructose	Aqueous solution or solid	110
Fruit Juices, Pulp		110
Fuel Blend Diesel/Biodiesel		70
Fuel C		60
Fuel CM15		60
Fuel E85		60
Fuel Oil		110
Fuel Rapeseed Oil Biodiesel 100%		60
Fumaric Acid		65
Furan		NR
Furfural		25
Gallic Acid		25
Gas, manufactured		110
Gas, natural		110
Gasoline, leaded		110
Gasoline, sour		110
Gasoline, unleaded		110
Gelatin		110
Gin		100
Glucose	Aqueous solution or solid	100
Glue		110
Glutamic Acid		95
Glycerin	Aqueous solution or liquid	110
Glycine	Aqueous solution or solid	25
Glycolic Acid		25
Heptane		110
Hexachloro-1,3-butadiene		50
Hexamethylenediamine		NR
Hexamethylphosphotriamide		NR
Hexane		110
Hexyl Alcohol		80
Hydrazine	Aqueous solution or liquid	95
Hydrazine Dihydrochloride	Aqueous solution or solid	25
Hydrazine Hydrate	Aqueous solution or liquid	50
Hydriodic Acid	Aqueous solution	110
Hydrobromic Acid	Up to 50% in water	110
Hydrochloric Acid	Up to “concentrated”	110
Hydrocyanic Acid	Aqueous solution	110
Hydrofluoric Acid	Up to 40% in water	110
Hydrofluoric Acid	41-100% in water	95
Hydrogen		110
Hydrogen Chloride		110
Hydrogen Cyanide		110
Hydrogen Fluoride		95
Hydrogen Peroxide	Up to 30% in water	95
Hydrogen Peroxide	90% in water	20
Hydrogen Sulfide		110
Hydrogen Sulfide	Aqueous solution	110
Hydroquinone		110
Hypochlorous Acid	Aqueous solution	20
Iodine	10% in Non-Aqueous solvent	65
Iodine, gas		65
Iodoform		95
Isoamyl Ether		50
Isobutyl Alcohol		110
Isooctane		110
Isophorone		50
Isopropyl Alcohol	Aqueous solution or liquid	60
Isopropyl Chloride		40
Isopropyl Ether		50
Isopropylbenzene		40
Jet Fuel (JP4, JP5)		95
Kerosene		110
Lactic Acid	Aqueous solution or pure	65
Lanolin		110
Lard Oil		110
Lauric Acid		110
Lauroyl Chloride		110
Lauryl Sulfate		110
Lead Acetate	Aqueous solution or solid	110
Lead Chloride		110
Lead Nitrate	Aqueous solution or solid	110
Lead Sulfate		110
Lemon Oil		110
Linoleic Acid		110
Linseed Oil		110
Lithium Bromide	Aqueous solution or solid	105
Lithium Chloride	Aqueous solution or solid	110
Lubricating Oil		110
Magnesium Carbonate		110
Magnesium Chloride	Aqueous solution or solid	110
Magnesium Citrate		110
Magnesium Hydroxide		110
Magnesium Nitrate	Aqueous solution or solid	110
Magnesium Sulfate	Aqueous solution or solid	110
Maleic Acid	Aqueous solution or solid	110
Maleic Anhydride		NR
Malic Acid	Aqueous solution or solid	110
Manganese Sulfate	Aqueous solution or solid	110
Mercuric Chloride		110
Mercuric Cyanide		110

IKA Flow Anhang B // Appendix B

Chemical	Concentration	Max. Temperature
Mercuric Nitrate	Aqueous solution or solid	110
Mercury		110
Methacrylic Acid		50
Methane		110
Methanesulfonic Acid	Aqueous solution or liquid	95
Methyl Acetate		40
Methyl Acrylate		25
Methyl Alcohol	Aqueous solution or liquid	110
Methyl Bromide		110
Methyl Chloride		110
Methyl Chloroacetate		NR
Methyl Chloromethyl Ether		NR
Methyl Ethyl Ketone		NR
Methyl Isobutyl Ketone		NR
Methyl Methacrylate		40
Methyl Salicylate		65
Methylamine		NR
Methylchloroform		50
Methylene Bromide		80
Methylene Chloride		25
Methylene Iodine		95
Methylsulfuric Acid	Aqueous solution or liquid	65
Methyltrichlorosilane		65
Milk		110
Mineral Oil		110
Molasses		100
Morpholine	Aqueous solution or liquid	25
Motor Oil		110
Naphtha		110
Naphthalene		95
Nickel Acetate	Aqueous solution or solid	110
Nickel Chloride	Aqueous solution or solid	110
Nickel Nitrate	Aqueous solution or solid	110
Nickel Sulfate	Aqueous solution or solid	110
Nicotine		20
Nicotinic Acid		110
Nitric Acid	Up to 10% in water	80
Nitric Acid	11-70% in water	65
Nitric Acid, fuming		NR
Nitrobenzene		25
Nitroethane		20
Nitrogen		110
Nitrogen Dioxide		75
Nitroglycerin		50
Nitromethane		50
Nitrotoluene		80
Nitrous Oxide		NR
Octane		110
Octene		110
Oleic Acid		110
Oleum		NR
Olive Oil		110
Oxalic Acid		50
Oxygen		110
Ozone		110
Palm Oil		95
Palmitic Acid		110
Paraffin		110
Paraffin Oil		110
Peanut Oil		110
Perchloric Acid	10% in water	95
Perchloric Acid	70% in water	50
Perchloroethylene		110
Perchloromethyl Mercaptan		50
Petrolatum		110
Petroleum		110
Phenol	5% in water	80
Phenol		50
1-Phenol-2-sulfonic Acid		50
Phenyl Ether		50
Phenylhydrazine		50
Phenylhydrazine Hydrochloride	Aqueous solution or solid	50
o-Phenylphenol		80
Phosgene		80
Phosphoric Acid	Less than 85% in water	110
Phosphoric Acid	85% in water	110
Phosphorus, red		25
Phosphorus, Oxychloride		NR
Phosphorus, Pentachloride		95
Phosphorus, Pentoxide		95
Phosphorus, Trichloride		95
Phthalic Acid		95
Picric Acid		25
Plating Solution: Brass		105
Plating Solution: Cadmium		105
Plating Solution: Chrome		105
Plating Solution: Copper		105
Plating Solution: Iron		105
Plating Solution: Lead		105
Plating Solution: Nickel		105
Plating Solution: Rhodium		105
Plating Solution: Silver		105
Plating Solution: Tin		105
Plating Solution: Zinc		105

Chemical	Concentration	Max. Temperature
Polyethylene Glycol		95
Polyvinyl Acetate		110
Polyvinyl Alcohol		110
Potassium		NR
Potassium Acetate	Aqueous solution or solid	110
Potassium Alum	Aqueous solution or liquid	110
Potassium Bicarbonate	Aqueous solution or solid	95
Potassium Bisulfate	Aqueous solution or solid	110
Potassium Borate	Aqueous solution or solid	110
Potassium Bromate	Aqueous solution or solid	110
Potassium Bromide	Aqueous solution or solid	110
Potassium Carbonate	Aqueous solution or solid	110
Potassium Chlorate		95
Potassium Chloride	Aqueous solution or solid	110
Potassium Chromate	Aqueous solution or solid	110
Potassium Cyanide	Aqueous solution or solid	110
Potassium Dichromate		110
Potassium Ferricyanide	Aqueous solution or solid	110
Potassium Ferrocyanide	Aqueous solution or solid	110
Potassium Fluoride	Aqueous solution or solid	110
Potassium Hydroxide	5 to 10% in water	NR
Potassium Hydroxide	Greater than 50% in water	NR
Potassium Hypochlorite	Aqueous solution	95
Potassium Iodide	Aqueous solution or solid	110
Potassium Nitrate	Aqueous solution or solid	110
Potassium Perborate		110
Potassium Perchlorate		95
Potassium Permanganate	Aqueous solution or solid	110
Potassium Persulfate		50
Potassium Sulfate	Aqueous solution or solid	110
Potassium Sulfide		110
Propane		110
Propyl Acetate		25
Propyl Alcohol	Aqueous solution or liquid	65
Propylamine		NR
Propylene Dibromide		95
Propylene Dichloride		95
Propylene Glycol	Aqueous solution or liquid	65
Propylene Oxide		NR
Pyridine		NR
Pyrogallol	Aqueous solution or solid	50
Refrigerant 11		100
Refrigerant 12		100
Refrigerant 13		100
Refrigerant 14		100
Refrigerant 21		100
Refrigerant 22		100
Refrigerant 113		212
Refrigerant 114		100
Salicylaldehyde		50
Salicylic Acid		95
Selenic Acid	Aqueous solution or pure	65
Silicon Tetrachloride		50
Silcone Oil		110
Silver Cyanide		110
Silver Nitrate	Aqueous solution or solid	110
Silver Sulfate		110
Sodium		NR
Sodium Acetate	Aqueous solution or solid	110
Sodium Amalgam		NR
Sodium Benzoate	Aqueous solution or solid	110
Sodium Bicarbonate	Aqueous solution or solid	110
Sodium Bisulfate	Aqueous solution or solid	110
Sodium Bisulfite	Aqueous solution or solid	110
Sodium Bromate	Aqueous solution or solid	95
Sodium Bromide	Aqueous solution or solid	110
Sodium Carbonate	Aqueous solution or solid	110
Sodium Chlorate	Aqueous solution or solid	110
Sodium Chlorite	Aqueous solution or solid	110
Sodium Chromate	Aqueous solution or solid	95
Sodium Cyanide	Aqueous solution or solid	110
Sodium Dichromate	Aqueous solution or solid	95
Sodium Dithionite	Aqueous solution or solid	40
Sodium Ferricyanide	Aqueous solution or solid	110
Sodium Ferrocyanide	Aqueous solution or solid	110
Sodium Fluoride	Aqueous solution or solid	110
Sodium Hydrogen Phosphate	Aqueous solution or solid	110
Sodium Hydroxide	Up to 10% in water	125
Sodium Hydroxide	Greater than 50% in water	25
Sodium Hypochlorite	Up to 5% in water	110
Sodium Hypochlorite	6-15% in water	95
Sodium Iodide	Aqueous solution or solid	110
Sodium Nitrate	Aqueous solution or solid	110
Sodium Nitrite	Aqueous solution or solid	110
Sodium Palmitate		110
Sodium Perchlorate	Aqueous solution or solid	110
Sodium Peroxide		95
Sodium Phosphate	Aqueous solution or solid	110
Sodium Thiocyanate	Aqueous solution or solid	110
Sodium Thiosulfate	Aqueous solution or solid	110
Sour Crude Oil		110
Soybean Oil		110
Stannic Chloride	Aqueous solution or solid	110
Stannous Chloride	Aqueous solution or solid	110

IKA Flow Anhang B // Appendix B

Chemical	Concentration	Max. Temperature
Starch		95
Stearic Acid		110
Stilbene		80
Styrene		85
Succinic Acid		65
Sugar Syrup		110
Sulfur		110
Sulfur Chloride		25
Sulfur Dichloride		25
Sulfur Dioxide		80
Sulfur Trioxide		NR
Sulfuric Acid	Up to 60% in water	110
Sulfuric Acid	60-93% in water	95
Sulfuric Acid	93-98% in water	65
Sulfuric Acid, fuming		50
Sulfuryl Chloride		NR
Sulfuryl Fluoride		25
Tall Oil		110
Tallow		110
Tannic Acid		110
Tar		110
Tartaric Acid	Aqueous solution or solid	110
1,1,2,2,-Tetrabromoethane		110
1,1,2,2,-Tetrachloroethane		110
2,3,4,6-Tetrachlorophenol		65
Tetraethyllead		110
Tetrahydrofuran	Aqueous solution or liquid	NR
Tetramethylammonium Hydroxide	Up to 10% in water	80
Tetramethylurea		NR
Thioglycol		25
Thioglycolic Acid		80
Thionyl Chloride		NR
Thiophosphoryl Chloride		NR
Titanium Tetrachloride		65
Toluene		65
Toluenesulfonyl Chloride		50
Tomato Juice		110
Tributyl Phosphate		25
Trichloroacetic Acid	Up to 10% in water	95
Trichloroacetic Acid	50% in water to pure	50
1,2,4-Trichlorobenzene		95
1,1,2-Trichloroethane		65
Trichloroethylene		110
2,4,5-Trichlorophenol		65
Tricresyl Phosphate		NR
Triethanolamine	Aqueous solution or liquid	50
Triethyl Phosphate		NR
Triethylamine		40

Chemical	Concentration	Max. Temperature
Trifluoroacetic Acid	50% in water	95
Trifluoroacetic Acid		50
Trimethylamine	Aqueous solution or gas	50
Turpentine		110
Urea	Aqueous solution or solid	95
Varnish		110
Varsol		110
Vegetable Oil		110
Vinegar		110
Vinyl Acetate		110
Vinyl Chloride		95
Vinylidene Chloride		95
Water		110
Water, salt		110
Water, sewage		110
Whiskey		110
Wine		110
Xylene		95
Zinc Acetate	Aqueous solution	110
Zinc Bromide	Aqueous solution or solid	110
Zinc Chloride	Aqueous solution or solid	110
Zinc Nitrate	Aqueous solution or solid	110

Teflon® (PTFE)

Explanation of Footnotes

1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)

Ratings: Chemical Effect

A = Excellent.
B = Good, Minor Effect, slight corrosion or discoloration
C = Fair, Moderate Effect, not recommended for continuous use. Softening, loss of strength, or swelling may occur.
D = Severe Effect, not recommended for ANY use.
N/A = Information not available.

Chemical	Compatibility
Acetaldehyde	A1-Excellent
Acetaldehyde	A-Excellent
Acetamide	A-Excellent
Acetate Solvent	A-Excellent
Acetic Acid	A-Excellent
Acetic Acid 20%	A-Excellent
Acetic Acid 80%	A-Excellent
Acetic Acid, Glacial	A-Excellent
Acetic Anhydride	A-Excellent
Acetone	A-Excellent
Acetyl Bromide	A-Excellent
Acetyl Chloride (dry)	A-Excellent
Acetylene	A-Excellent
Acrylonitrile	A-Excellent
Adipic Acid	A-Excellent
Alcohols: Amyl	A-Excellent
Alcohols: Benzyl	A-Excellent
Alcohols: Butyl	A-Excellent
Alcohols: Diacetone	A-Excellent
Alcohols: Ethyl	A-Excellent
Alcohols: Hexyl	A-Excellent
Alcohols: Isobutyl	A2-Excellent
Alcohols: Isopropyl	A2-Excellent
Alcohols: Methyl	A-Excellent
Alcohols: Octyl	N/A
Alcohols: Propyl	A-Excellent
Aluminum Chloride	A-Excellent
Aluminum Chloride 20%	A-Excellent
Aluminum Fluoride	A-Excellent
Aluminum Hydroxide	A-Excellent
Aluminum Nitrate	A-Excellent
Aluminum Potassium Sulfate 10%	A-Excellent
Aluminum Potassium Sulfate 100%	A-Excellent
Aluminum Sulfate	A-Excellent
Alums	A-Excellent
Amines	A2-Excellent
Ammonia 10%	A-Excellent
Ammonia Nitrate	A-Excellent
Ammonia, anhydrous	A-Excellent
Ammonia, liquid	A-Excellent
Ammonium Acetate	A-Excellent
Ammonium Bifluoride	A-Excellent
Ammonium Carbonate	A-Excellent
Ammonium Caseinate	N/A
Ammonium Chloride	A-Excellent
Ammonium Hydroxide	A-Excellent
Ammonium Nitrate	A-Excellent
Ammonium Oxalate	N/A
Ammonium Persulfate	A1-Excellent
Ammonium Phosphate, Dibasic	A2-Excellent
Ammonium Phosphate, Monobasic	A-Excellent
Ammonium Phosphate, Tribasic	A-Excellent
Ammonium Sulfate	A-Excellent
Ammonium Sulfite	A2-Excellent
Ammonium Thiosulfate	N/A
Amyl Acetate	A-Excellent
Amyl Alcohol	A-Excellent
Amyl Chloride	A-Excellent
Aniline	A-Excellent
Aniline Hydrochloride	A-Excellent
Antifreeze	N/A
Antimony Trichloride	A-Excellent
Aqua Regia (80% HCl, 20% HNO3)	A-Excellent
Arochlor 1248	A-Excellent
Aromatic Hydrocarbons	N/A
Arsenic Acid	A-Excellent
Arsenic Salts	N/A
Asphalt	A1-Excellent
Barium Carbonate	A-Excellent
Barium Chloride	A-Excellent
Barium Cyanide	A1-Excellent
Barium Hydroxide	A-Excellent
Barium Nitrate	A1-Excellent
Barium Sulfate	A-Excellent

Chemical	Compatibility
Barium Sulfide	A-Excellent
Beer	A-Excellent
Beet Sugar Liquids	A1-Excellent
Benzaldehyde	A1-Excellent
Benzene	A-Excellent
Benzene Sulfonic Acid	A-Excellent
Benzoic Acid	A2-Excellent
Benzol	A-Excellent
Benzonitrile	A2-Excellent
Benzyl Chloride	N/A
Bleaching Liquors	A-Excellent
Borax (Sodium Borate)	A-Excellent
Boric Acid	A-Excellent
Brewery Slop	N/A
Bromine	A-Excellent
Butadiene	A2-Excellent
Butane	A-Excellent
Butanol (Butyl Alcohol)	A2-Excellent
Butter	A-Excellent
Buttermilk	A-Excellent
Butyl Amine	A2-Excellent
Butyl Ether	A1-Excellent
Butyl Phthalate	A2-Excellent
Butylacetate	A-Excellent
Butylene	A-Excellent
Butyric Acid	A2-Excellent
Calcium Bisulfate	N/A
Calcium Bisulfide	A-Excellent
Calcium Bisulfite	A-Excellent
Calcium Carbonate	A-Excellent
Calcium Chlorate	A-Excellent
Calcium Chloride	A-Excellent
Calcium Hydroxide	A-Excellent
Calcium Hypochlorite	A-Excellent
Calcium Nitrate	A2-Excellent
Calcium Oxide	A-Excellent
Calcium Sulfate	A-Excellent
Calgon	N/A
Cane Juice	A-Excellent
Carbolic Acid (Phenol)	A-Excellent
Carbon Bisulfide	N/A
Carbon Dioxide (dry)	A-Excellent
Carbon Dioxide (wet)	A-Excellent
Carbon Disulfide	A-Excellent
Carbon Monoxide	A-Excellent
Carbon Tetrachloride	A-Excellent
Carbon Tetrachloride (dry)	A-Excellent
Carbon Tetrachloride (wet)	A-Excellent
Carbonated Water	N/A
Carbonic Acid	A-Excellent
Catsup	N/A
Chloric Acid	A-Excellent
Chlorinated Glue	N/A
Chlorine (dry)	A-Excellent
Chlorine Water	A-Excellent
Chlorine, Anhydrous Liquid	A-Excellent
Chloroacetic Acid	A-Excellent
Chlorobenzene (Mono)	B-Good
Chlorobromomethane	A-Excellent
Chloroform	A1-Excellent
Chlorosulfonic Acid	A-Excellent
Chocolate Syrup	A-Excellent
Chromic Acid 10%	A-Excellent
Chromic Acid 30%	A-Excellent
Chromic Acid 5%	A-Excellent
Chromic Acid 50%	A-Excellent
Chromium Salts	N/A
Cider	N/A
Citric Acid	A-Excellent
Citric Oils	N/A
Cloroxr (Bleach)	A-Excellent
Coffee	N/A
Copper Chloride	A-Excellent
Copper Cyanide	A-Excellent

IKA Flow Anhang B // Appendix B

Chemical	Compatibility
Copper Fluoborate	N/A
Copper Nitrate	A-Excellent
Copper Sulfate>5%	A-Excellent
Copper Sulfate 5%	A-Excellent
Cream	A-Excellent
Cresols	N/A
Cresylic Acid	A-Excellent
Cupric Acid	A-Excellent
Cyanic Acid	A-Excellent
Cyclohexane	A-Excellent
Cyclohexanone	A-Excellent
Detergents	A-Excellent
Diacetone Alcohol	A-Excellent
Dichlorobenzene	A-Excellent
Dichloroethane	A1-Excellent
Diesel Fuel	A-Excellent
Diethyl Ether	A-Excellent
Diethylamine	D-Severe Effect
Diethylene Glycol	A2-Excellent
Dimethyl Aniline	A-Excellent
Dimethyl Formamide	A-Excellent
Diphenyl	A-Excellent
Diphenyl Oxide	A1-Excellent
Dyes	N/A
Epsom Salts (Magnesium Sulfate)	A-Excellent
Ethane	A-Excellent
Ethanol	A-Excellent
Ethanolamine	A1-Excellent
Ether	A-Excellent
Ethyl Acetate	A-Excellent
Ethyl Benzoate	A-Excellent
Ethyl Chloride	A-Excellent
Ethyl Ether	A-Excellent
Ethyl Sulfate	A-Excellent
Ethylene Bromide	A-Excellent
Ethylene Chloride	A-Excellent
Ethylene Chlorohydrin	A-Excellent
Ethylene Diamine	A-Excellent
Ethylene Dichloride	A-Excellent
Ethylene Glycol	A-Excellent
Ethylene Oxide	A-Excellent
Fatty Acids	A-Excellent
Ferric Chloride	A-Excellent
Ferric Nitrate	A-Excellent
Ferric Sulfate	A-Excellent
Ferrous Chloride	A-Excellent
Ferrous Sulfate	A-Excellent
Fluoboric Acid	A-Excellent
Fluorine	D-Severe Effect
Fluosilicic Acid	A-Excellent
Formaldehyde 100%	A-Excellent
Formaldehyde 40%	A-Excellent
Formic Acid	A-Excellent
Freon 113	A-Excellent
Freon 12	A-Excellent
Freon 22	A-Excellent
Freon TF	A-Excellent
Freonr 11	A-Excellent
Fruit Juice	A-Excellent
Fuel Oils	B-Good
Furan Resin	A-Excellent
Furfural	A-Excellent
Gallic Acid	B-Good
Gasoline (high-aromatic)	B-Good
Gasoline, leaded, ref.	A-Excellent
Gasoline, unleaded	A-Excellent
Gelatin	A-Excellent
Glucose	A-Excellent
Glue, P.V.A.	A-Excellent
Glycerin	A-Excellent
Glycolic Acid	A-Excellent
Gold Monocyanide	D-Severe Effect
Grape Juice	A-Excellent
Grease	A-Excellent
Heptane	A-Excellent
Hexane	A-Excellent
Honey	A-Excellent
Hydraulic Oil (Petro)	A-Excellent
Hydraulic Oil (Synthetic)	A-Excellent
Hydrazine	A-Excellent
Hydrobromic Acid 100%	A-Excellent
Hydrobromic Acid 20%	N/A
Hydrochloric Acid 100%	A-Excellent
Hydrochloric Acid 20%	A-Excellent
Hydrochloric Acid 37%	A-Excellent
Hydrochloric Acid, Dry Gas	A-Excellent
Hydrocyanic Acid	A-Excellent
Hydrocyanic Acid (Gas 10%)	A-Excellent
Hydrofluoric Acid 100%	A-Excellent
Hydrofluoric Acid 20%	A-Excellent
Hydrofluoric Acid 50%	A-Excellent
Hydrofluoric Acid 75%	A-Excellent

Chemical	Compatibility
Hydrofluosilicic Acid 100%	A-Excellent
Hydrofluosilicic Acid 20%	A-Excellent
Hydrogen Gas	A-Excellent
Hydrogen Peroxide 10%	A-Excellent
Hydrogen Peroxide 100%	A-Excellent
Hydrogen Peroxide 30%	A-Excellent
Hydrogen Peroxide 50%	A-Excellent
Hydrogen Sulfide (aqua)	A-Excellent
Hydrogen Sulfide (dry)	A-Excellent
Hydroquinone	A-Excellent
Hydroxyacetic Acid 70%	A-Excellent
Ink	A-Excellent
Iodine	A-Excellent
Iodine (in alcohol)	N/A
Iodoform	C-Fair
Isooctane	A-Excellent
Isopropyl Acetate	A-Excellent
Isopropyl Ether	A1-Excellent
Isotane	N/A
Jet Fuel (JP3, JP4, JP5)	A-Excellent
Kerosene	A-Excellent
Ketones	A-Excellent
Lacquer Thinners	A-Excellent
Lacquers	A-Excellent
Lactic Acid	A-Excellent
Lard	A-Excellent
Latex	A-Excellent
Lead Acetate	A-Excellent
Lead Nitrate	A1-Excellent
Lead Sulfamate	B-Good
Ligroin	A-Excellent
Lime	A1-Excellent
Linoleic Acid	A-Excellent
Lithium Chloride	A-Excellent
Lithium Hydroxide	A-Excellent
Lubricants	A-Excellent
Lye: Ca(OH)2 Calcium Hydroxide	A-Excellent
Lye: KOH Potassium Hydroxide	A-Excellent
Lye: NaOH Sodium Hydroxide	A-Excellent
Magnesium Bisulfate	A-Excellent
Magnesium Carbonate	A1-Excellent
Magnesium Chloride	A-Excellent
Magnesium Hydroxide	A-Excellent
Magnesium Nitrate	A-Excellent
Magnesium Oxide	A-Excellent
Magnesium Sulfate (Epsom Salts)	A-Excellent
Maleic Acid	A-Excellent
Maleic Anhydride	A-Excellent
Malic Acid	A-Excellent
Manganese Sulfate	A-Excellent
Mash	N/A
Mayonnaise	A-Excellent
Melamine	A-Excellent
Mercuric Chloride (dilute)	A-Excellent
Mercuric Cyanide	B-Good
Mercurous Nitrate	A-Excellent
Mercury	A-Excellent
Methane	A-Excellent
Methanol (Methyl Alcohol)	A-Excellent
Methyl Acetate	A-Excellent
Methyl Acetone	A-Excellent
Methyl Acrylate	N/A
Methyl Alcohol 10%	A-Excellent
Methyl Bromide	A-Excellent
Methyl Butyl Ketone	N/A
Methyl Cellosolve	A-Excellent
Methyl Chloride	A-Excellent
Methyl Dichloride	N/A
Methyl Ethyl Ketone	A-Excellent
Methyl Ethyl Ketone Peroxide	N/A
Methyl Isobutyl Ketone	A-Excellent
Methyl Isopropyl Ketone	A-Excellent
Methyl Methacrylate	N/A
Methylamine	A-Excellent
Methylene Chloride	A-Excellent
Milk	A-Excellent
Mineral Spirits	A-Excellent
Molasses	A-Excellent
Monochloroacetic acid	A2-Excellent
Monoethanolamine	A-Excellent
Morpholine	A2-Excellent
Motor oil	A-Excellent
Mustard	A-Excellent
Naphtha	B-Good
Naphthalene	A-Excellent
Natural Gas	A-Excellent
Nickel Chloride	A-Excellent
Nickel Nitrate	A2-Excellent
Nickel Sulfate	A-Excellent
Nitrating Acid (<15% HNO3)	A-Excellent
Nitrating Acid (>15% H2SO4)	A-Excellent
Nitrating Acid (S1% Acid)	A-Excellent
Nitrating Acid (S15% H2SO4)	A-Excellent
Nitric Acid (20%)	A-Excellent
Nitric Acid (50%)	A-Excellent

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Chemical	Compatibility
Nitric Acid (5-10%)	A-Excellent
Nitric Acid (Concentrated)	A-Excellent
Nitrobenzene	A-Excellent
Nitrogen Fertilizer	A-Excellent
Nitromethane	A-Excellent
Nitrous Acid	A-Excellent
Nitrous Oxide	A-Excellent
Oils: Aniline	A-Excellent
Oils: Anise	N/A
Oils: Bay	N/A
Oils: Bone	A-Excellent
Oils: Castor	A-Excellent
Oils: Cinnamon	A-Excellent
Oils: Citric	A-Excellent
Oils: Clove	A-Excellent
Oils: Coconut	A-Excellent
Oils: Cod Liver	A-Excellent
Oils: Corn	A-Excellent
Oils: Cottonseed	A-Excellent
Oils: Creosote	A-Excellent
Oils: Diesel Fuel Oil (20, 30, 40, 50)	A-Excellent
Oils: Fuel Oil (1, 2, 3, 5A, 5B, 6)	A-Excellent
Oils: Ginger	A-Excellent
Oils: Hydraulic Oil (Petro)	A-Excellent
Oils: Hydraulic Oil (Synthetic)	A-Excellent
Oils: Lemon	A-Excellent
Oils: Linseed	A-Excellent
Oils: Mineral	A-Excellent
Oils: Olive	A1-Excellent
Oils: Orange	N/A
Oils: Palm	A-Excellent
Oils: Peanut	A-Excellent
Oils: Peppermint	A-Excellent
Oils: Pine	A-Excellent
Oils: Rapeseed	A-Excellent
Oils: Rosin	A-Excellent
Oils: Sesame Seed	A-Excellent
Oils: Silicone	A-Excellent
Oils: Soybean	A-Excellent
Oils: Sperm (whale)	A-Excellent
Oils: Tanning	N/A
Oils: Transformer	A-Excellent
Oils: Turbine	A-Excellent
Oleic Acid	A-Excellent
Oleum 100%	A-Excellent
Oleum 25%	A-Excellent
Oxalic Acid (cold)	A1-Excellent
Ozone	A-Excellent
Palmitic Acid	A2-Excellent
Paraffin	A-Excellent
Pentane	A-Excellent
Perchloric Acid	A-Excellent
Perchloroethylene	A-Excellent
Petrolatum	C-Fair
Petroleum	A2-Excellent
Phenol (10%)	A-Excellent
Phenol (Carbolic Acid)	A-Excellent
Phosphoric Acid (>40%)	A-Excellent
Phosphoric Acid (crude)	A-Excellent
Phosphoric Acid (molten)	N/A
Phosphoric Acid (S40%)	A-Excellent
Phosphoric Acid Anhydride	N/A
Phosphorus	A2-Excellent
Phosphorus Trichloride	A2-Excellent
Photographic Developer	A-Excellent
Photographic Solutions	A2-Excellent
Phthalic Acid	A2-Excellent
Phthalic Anhydride	A-Excellent
Picric Acid	A-Excellent
Plating Solutions, Antimony Plating 130°F	A-Excellent
Plating Solutions, Arsenic Plating 110°F	A-Excellent
Plating Solutions (Brass): High-Speed Brass Bath 110°F	A-Excellent
Plating Solutions (Brass): Regular Brass Bath 100°F	A-Excellent
Plating Solutions (Bronze): Cu-Cd Bronze Bath R.T.	A-Excellent
Plating Solutions (Bronze): Cu-Sn Bronze Bath 160°F	A-Excellent
Plating Solutions (Bronze): Cu-Zn Bronze Bath 100°F	A-Excellent
Plating Solutions (Cadmium): Cyanide Bath 90°F	A-Excellent
Plating Solutions (Cadmium): Fluoborate Bath 100°F	A-Excellent
Plating Solutions, (Chromium): Barrel Chrome Bath 95°F	A-Excellent
Plating Solutions, (Chromium): Black Chrome Bath 115°F	A-Excellent
Plating Solutions, (Chromium): Chromic-Sulfuric Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluoride Bath 130°F	A-Excellent
Plating Solutions, (Chromium): Fluosilicate Bath 95°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Fluoborate Bath 120°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Sulfate Bath R.T.	A-Excellent
Plating Solutions (Copper) (Cyanide): Copper Strike Bath 120°F	A-Excellent
Plating Solutions (Copper) (Cyanide): High-Speed Bath 180°F	A-Excellent
Plating Solutions (Copper) (Cyanide): Rochelle Salt Bath 150°F	A-Excellent
Plating Solutions (Copper) (Misc): Copper (Electroless)	A-Excellent
Plating Solutions (Copper) (Misc): Copper Pyrophosphate	A-Excellent
Plating Solutions (Gold): Acid 75°F	A-Excellent

Chemical	Compatibility
Plating Solutions (Gold): Cyanide 150°F	A-Excellent
Plating Solutions (Gold): Neutral 75°F	A-Excellent
Plating Solutions, Indium Sulfamate Plating R.T.	A-Excellent
Plating Solutions (Iron): Ferrous Am Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Ferrous Chloride Bath 190°F	A-Excellent
Plating Solutions (Iron): Ferrous Sulfate Bath 150°F	A-Excellent
Plating Solutions (Iron): Fluoborate Bath 145°F	A-Excellent
Plating Solutions (Iron): Sulfamate 140°F	A-Excellent
Plating Solutions (Iron): Sulfate-Chloride Bath 160°F	A-Excellent
Plating Solutions, Lead Fluoborate Plating	A-Excellent
Plating Solutions, (Nickel): Electroless 200°F	A-Excellent
Plating Solutions, (Nickel): Fluoborate 100-170°F	A-Excellent
Plating Solutions, (Nickel): High-Chloride 130-160°F	A-Excellent
Plating Solutions, (Nickel): Sulfamate 100-140°F	A-Excellent
Plating Solutions, (Nickel): Watts Type 115-160°F	A-Excellent
Plating Solutions (Rhodium) 120°F	A-Excellent
Plating Solutions, (Silver) 80-120°F	A-Excellent
Plating Solutions, Tin-Fluoborate Plating 100°F	A-Excellent
Plating Solutions, Tin-Lead Plating 100°F	A-Excellent
Plating Solutions (Zinc): Acid Chloride 140°F	A-Excellent
Plating Solutions (Zinc): Acid Fluoborate Bath R.T.	A-Excellent
Plating Solutions (Zinc): Acid Sulfate Bath 150°F	A-Excellent
Plating Solutions (Zinc): Alkaline Cyanide Bath R.T.	A-Excellent
Potash (Potassium Carbonate)	N/A
Potassium Bicarbonate	A-Excellent
Potassium Bromide	A-Excellent
Potassium Chlorate	A-Excellent
Potassium Chloride	A-Excellent
Potassium Chromate	A1-Excellent
Potassium Cyanide Solutions	A-Excellent
Potassium Dichromate	A-Excellent
Potassium Ferricyanide	A2-Excellent
Potassium Ferrocyanide	A-Excellent
Potassium Hydroxide (Caustic Potash)	A-Excellent
Potassium Hypochlorite	A2-Excellent
Potassium Iodide	A2-Excellent
Potassium Nitrate	A-Excellent
Potassium Oxalate	A2-Excellent
Potassium Permanganate	A-Excellent
Potassium Sulfate	A-Excellent
Potassium Sulfide	A-Excellent
Propane (liquefied)	A-Excellent
Propylene	A2-Excellent
Propylene Glycol	A-Excellent
Pyridine	A-Excellent
Pyrogallic Acid	A-Excellent
Resorcinal	A2-Excellent
Rosins	A-Excellent
Rum	N/A
Rust Inhibitors	N/A
Salad Dressings	N/A
Salicylic Acid	A2-Excellent
Salt Brine (NaCl saturated)	A2-Excellent
Sea Water	A-Excellent
Shellac (Bleached)	A-Excellent
Shellac (Orange)	A-Excellent
Silicone	A-Excellent
Silver Bromide	A-Excellent
Silver Nitrate	A-Excellent
Soap Solutions	A-Excellent
Soda Ash (see Sodium Carbonate)	A-Excellent
Sodium Acetate	A-Excellent
Sodium Aluminate	A-Excellent
Sodium Benzoate	A2-Excellent
Sodium Bicarbonate	A-Excellent
Sodium Bisulfate	A-Excellent
Sodium Bisulfite	A-Excellent
Sodium Borate (Borax)	A-Excellent
Sodium Bromide	A2-Excellent
Sodium Carbonate	A-Excellent
Sodium Chlorate	A-Excellent
Sodium Chloride	A-Excellent
Sodium Chromate	A-Excellent
Sodium Cyanide	A-Excellent
Sodium Ferrocyanide	A-Excellent
Sodium Fluoride	A1-Excellent
Sodium Hydrosulfite	A-Excellent
Sodium Hydroxide (20%)	A-Excellent
Sodium Hydroxide (50%)	A-Excellent
Sodium Hydroxide (80%)	A1-Excellent
Sodium Hypochlorite (<20%)	A-Excellent
Sodium Hypochlorite (100%)	A-Excellent
Sodium Hyposulfate	A-Excellent
Sodium Metaphosphate	A-Excellent
Sodium Metasilicate	A-Excellent
Sodium Nitrate	A-Excellent
Sodium Perborate	A-Excellent
Sodium Peroxide	A-Excellent
Sodium Polyphosphate	A-Excellent
Sodium Silicate	A-Excellent
Sodium Sulfate	A-Excellent
Sodium Sulfide	A-Excellent
Sodium Sulfite	A-Excellent
Sodium Tetraborate	A-Excellent
Sodium Thiosulfate (hypo)	A-Excellent

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Chemical	Compatibility
Sorghum	N/A
Soy Sauce	N/A
Stannic Chloride	A-Excellent
Stannic Fluoborate	N/A
Stannous Chloride	A-Excellent
Starch	A-Excellent
Stearic Acid	A-Excellent
Stoddard Solvent	A-Excellent
Styrene	A-Excellent
Sugar (Liquids)	A-Excellent
Sulfate (Liquors)	A-Excellent
Sulfur Chloride	A-Excellent
Sulfur Dioxide	A-Excellent
Sulfur Dioxide (dry)	A-Excellent
Sulfur Hexafluoride	N/A
Sulfur Trioxide	A-Excellent
Sulfur Trioxide (dry)	A-Excellent
Sulfuric Acid (<10%)	A-Excellent
Sulfuric Acid (10-75%)	A-Excellent
Sulfuric Acid (75-100%)	A-Excellent
Sulfuric Acid (cold concentrated)	A-Excellent
Sulfuric Acid (hot concentrated)	A-Excellent
Sulfurous Acid	A-Excellent
Sulfuryl Chloride	A-Excellent
Tallow	A-Excellent
Tannic Acid	A-Excellent
Tanning Liquors	A-Excellent
Tartaric Acid	A-Excellent
Tetrachloroethane	A-Excellent
Tetrachloroethylene	A-Excellent
Tetrahydrofuran	A-Excellent
Tin Salts	A-Excellent
Toluene (Toluol)	A-Excellent
Tomato Juice	A-Excellent
Trichloroacetic Acid	A-Excellent
Trichloroethane	A-Excellent
Trichloroethylene	A-Excellent
Trichloropropane	A1-Excellent
Tricresylphosphate	A-Excellent
Triethylamine	A-Excellent
Trisodium Phosphate	A-Excellent
Turpentine	A-Excellent
Urea	A-Excellent

Chemical	Compatibility
Uric Acid	A-Excellent
Urine	A1-Excellent
Varnish	A-Excellent
Vegetable Juice	A-Excellent
Vinegar	A-Excellent
Vinyl Acetate	A2-Excellent
Vinyl Chloride	A2-Excellent
Water, Acid, Mine	A-Excellent
Water, Deionized	A2-Excellent
Water, Distilled	A-Excellent
Water, Fresh	A-Excellent
Water, Salt	A-Excellent
Weed Killers	N/A
Whey	A-Excellent
Whiskey & Wines	A-Excellent
White Liquor (Pulp Mill)	A-Excellent
White Water (Paper Mill)	N/A
Xylene	A-Excellent
Zinc Chloride	A-Excellent
Zinc Hydrosulfite	A-Excellent
Zinc Sulfate	A-Excellent

Teflon®* PTFE Chemical Compatibility Chart: Check the chemical compatibility of Teflon® and PTFE with various chemicals, solvents, alcohols and other products.

Polytetrafluoroethylene (PTFE) is very non-reactive and is often used in containers holding reactive and corrosive chemicals. According to DuPont, its melting point is 600 K (327 °C; 620 °F). It maintains high strength, toughness and self-lubrication at low temperatures down to 5 K (-268.15 °C; -450.67 °F), and good flexibility at temperatures above 194 K (-79 °C; -110 °F). Certain alkali metals and fluorinating agents such as xenon difluoride and cobalt (III) fluoride can damage PTFE, but otherwise it is highly resistant.

Please note that these charts are for general reference only. We have aggregated this data from dozens of original sources and any single piece of data cannot be guaranteed. Additionally, many factors affect the chemical resistance of a given plastic product including the concentration/purity of the chemical, working temperature, wall thickness and condition of the container, etc. It is **your responsibility** to test a container and chemical together ensure compatibility under your unique circumstances.

Stainless steel (316)

Explanation of Footnotes

1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)

Ratings: Chemical Effect

A = Excellent.
B = Good, Minor Effect, slight corrosion or discoloration
C = Fair, Moderate Effect, not recommended for continuous use. Softening, loss of strength, or swelling may occur.
D = Severe Effect, not recommended for ANY use.
N/A = Information not available.

Chemical	Compatibility
Acetaldehyde	A-Excellent
Acetamide	B-Good
Acetate Solvent	A-Excellent
Acetic Acid	D-Severe Effect
Acetic Acid 20%	B-Good
Acetic Acid 80%	D-Severe Effect
Acetic Acid, Glacial	C-Fair
Acetic Anhydride	B-Good
Acetone	A-Excellent
Acetyl Bromide	N/A
Acetyl Chloride (dry)	A-Excellent
Acetylene	A-Excellent
Acrylonitrile	A1-Excellent
Adipic Acid	A1-Excellent
Alcohols: Amyl	A-Excellent
Alcohols: Benzyl	B-Good
Alcohols: Butyl	A-Excellent
Alcohols: Diacetone	A-Excellent
Alcohols: Ethyl	A-Excellent
Alcohols: Hexyl	A-Excellent
Alcohols: Isobutyl	A-Excellent
Alcohols: Isopropyl	B-Good
Alcohols: Methyl	A-Excellent
Alcohols: Octyl	A-Excellent
Alcohols: Propyl	A-Excellent
Aluminum Chloride	B-Good
Aluminum Chloride 20%	D-Severe Effect
Aluminum Fluoride	D-Severe Effect
Aluminum Hydroxide	A1-Excellent
Aluminum Nitrate	A-Excellent
Aluminum Potassium Sulfate 10%	A-Excellent
Aluminum Potassium Sulfate 100%	D-Severe Effect
Aluminum Sulfate	B-Good
Alums	N/A
Amines	A-Excellent
Ammonia 10%	A-Excellent
Ammonia Nitrate	A-Excellent
Ammonia, anhydrous	A-Excellent
Ammonia, liquid	B2-Good
Ammonium Acetate	B-Good
Ammonium Bifluoride	D-Severe Effect
Ammonium Carbonate	B-Good
Ammonium Caseinate	N/A
Ammonium Chloride	C-Fair
Ammonium Hydroxide	A1-Excellent
Ammonium Nitrate	A1-Excellent
Ammonium Oxalate	A-Excellent
Ammonium Persulfate	A-Excellent
Ammonium Phosphate, Dibasic	B-Good
Ammonium Phosphate, Monobasic	B-Good
Ammonium Phosphate, Tribasic	B-Good
Ammonium Sulfate	B-Good
Ammonium Sulfite	B-Good
Ammonium Thiosulfate	N/A
Amyl Acetate	A1-Excellent
Amyl Alcohol	A-Excellent
Amyl Chloride	A2-Excellent
Aniline	A-Excellent
Aniline Hydrochloride	D-Severe Effect
Antifreeze	N/A
Antimony Trichloride	D-Severe Effect
Aqua Regia (80% HCl, 20% HNO3)	D-Severe Effect
Arochlor 1248	B-Good
Aromatic Hydrocarbons	N/A
Arsenic Acid	A2-Excellent
Arsenic Salts	N/A
Asphalt	B-Good
Barium Carbonate	B1-Good
Barium Chloride	A1-Excellent
Barium Cyanide	A1-Excellent
Barium Hydroxide	B1-Good
Barium Nitrate	B1-Good
Barium Sulfate	B1-Good
Barium Sulfide	B1-Good
Beer	A-Excellent

Chemical	Compatibility
Beet Sugar Liquids	A-Excellent
Benzaldehyde	B-Good
Benzene	B-Good
Benzene Sulfonic Acid	B-Good
Benzoic Acid	B-Good
Benzol	A1-Excellent
Benzonitrile	D-Severe Effect
Benzyl Chloride	C1-Fair
Bleaching Liquors	N/A
Borax (Sodium Borate)	A-Excellent
Boric Acid	B2-Good
Brewery Slop	N/A
Bromine	D-Severe Effect
Butadiene	A-Excellent
Butane	A2-Excellent
Butanol (Butyl Alcohol)	A-Excellent
Butter	C-Fair
Buttermilk	A-Excellent
Butyl Amine	N/A
Butyl Ether	N/A
Butyl Phthalate	B1-Good
Butylacetate	B-Good
Butylene	A-Excellent
Butyric Acid	B2-Good
Calcium Bisulfate	N/A
Calcium Bisulfide	B-Good
Calcium Bisulfite	B-Good
Calcium Carbonate	A1-Excellent
Calcium Chlorate	N/A
Calcium Chloride	C2-Fair
Calcium Hydroxide	B1-Good
Calcium Hypochlorite	C1-Fair
Calcium Nitrate	C1-Fair
Calcium Oxide	A-Excellent
Calcium Sulfate	B-Good
Calgon	A-Excellent
Cane Juice	A-Excellent
Carbolic Acid (Phenol)	B-Good
Carbon Bisulfide	A-Excellent
Carbon Dioxide (dry)	A-Excellent
Carbon Dioxide (wet)	A-Excellent
Carbon Disulfide	A1-Excellent
Carbon Monoxide	A-Excellent
Carbon Tetrachloride	B-Good
Carbon Tetrachloride (dry)	B-Good
Carbon Tetrachloride (wet)	A2-Excellent
Carbonated Water	A-Excellent
Carbonic Acid	A1-Excellent
Catsup	A-Excellent
Chloric Acid	D-Severe Effect
Chlorinated Glue	N/A
Chlorine (dry)	A1-Excellent
Chlorine Water	C-Fair
Chlorine, Anhydrous Liquid	C1-Fair
Chloroacetic Acid	B1-Good
Chlorobenzene (Mono)	A-Excellent
Chlorobromomethane	N/A
Chloroform	A-Excellent
Chlorosulfonic Acid	D-Severe Effect
Chocolate Syrup	A-Excellent
Chromic Acid 10%	B-Good
Chromic Acid 30%	B2-Good
Chromic Acid 5%	B-Good
Chromic Acid 50%	C-Fair
Chromium Salts	N/A
Cider	A-Excellent
Citric Acid	B1-Good
Citric Oils	A-Excellent
Cloroxr (Bleach)	A-Excellent
Coffee	A-Excellent
Copper Chloride	D-Severe Effect
Copper Cyanide	B-Good
Copper Fluoborate	D-Severe Effect
Copper Nitrate	A-Excellent
Copper Sulfate>5%	B-Good

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Chemical	Compatibility
Copper Sulfate 5%	B-Good
Cream	A-Excellent
Cresols	A2-Excellent
Cresylic Acid	A1-Excellent
Cupric Acid	D-Severe Effect
Cyanic Acid	A-Excellent
Cyclohexane	A1-Excellent
Cyclohexanone	A1-Excellent
Detergents	A1-Excellent
Diacetone Alcohol	B1-Good
Dichlorobenzene	N/A
Dichloroethane	B-Good
Diesel Fuel	A1-Excellent
Diethyl Ether	B1-Good
Diethylamine	A-Excellent
Diethylene Glycol	A1-Excellent
Dimethyl Aniline	B2-Good
Dimethyl Formamide	A-Excellent
Diphenyl	B-Good
Diphenyl Oxide	B1-Good
Dyes	A-Excellent
Epsom Salts (Magnesium Sulfate)	A-Excellent
Ethane	A-Excellent
Ethanol	A-Excellent
Ethanolamine	A-Excellent
Ether	A-Excellent
Ethyl Acetate	B-Good
Ethyl Benzoate	N/A
Ethyl Chloride	A-Excellent
Ethyl Ether	B-Good
Ethyl Sulfate	D-Severe Effect
Ethylene Bromide	A-Excellent
Ethylene Chloride	B-Good
Ethylene Chlorohydrin	B-Good
Ethylene Diamine	B1-Good
Ethylene Dichloride	B-Good
Ethylene Glycol	B-Good
Ethylene Oxide	B-Good
Fatty Acids	B-Good
Ferric Chloride	D-Severe Effect
Ferric Nitrate	B-Good
Ferric Sulfate	B1-Good
Ferrous Chloride	D-Severe Effect
Ferrous Sulfate	B-Good
Fluoboric Acid	B-Good
Fluorine	C-Fair
Fluosilicic Acid	C-Fair
Formaldehyde 100%	C-Fair
Formaldehyde 40%	A1-Excellent
Formic Acid	B1-Good
Freon 113	N/A
Freon 12	B1-Good
Freon 22	A-Excellent
Freon TF	A-Excellent
Freonr 11	A-Excellent
Fruit Juice	A-Excellent
Fuel Oils	A-Excellent
Furan Resin	A1-Excellent
Furfural	A-Excellent
Gallic Acid	A-Excellent
Gasoline (high-aromatic)	A-Excellent
Gasoline, leaded, ref.	A1-Excellent
Gasoline, unleaded	A1-Excellent
Gelatin	A2-Excellent
Glucose	A1-Excellent
Glue, P.V.A.	A1-Excellent
Glycerin	A2-Excellent
Glycolic Acid	A-Excellent
Gold Monocyanide	A-Excellent
Grape Juice	A-Excellent
Grease	N/A
Heptane	A-Excellent
Hexane	A-Excellent
Honey	A-Excellent
Hydraulic Oil (Petro)	A-Excellent
Hydraulic Oil (Synthetic)	A-Excellent
Hydrazine	A-Excellent
Hydrobromic Acid 100%	D-Severe Effect
Hydrobromic Acid 20%	D-Severe Effect
Hydrochloric Acid 100%	D-Severe Effect
Hydrochloric Acid 20%	D-Severe Effect
Hydrochloric Acid 37%	D-Severe Effect
Hydrochloric Acid, Dry Gas	D-Severe Effect
Hydrocyanic Acid	B1-Good
Hydrocyanic Acid (Gas 10%)	N/A
Hydrofluoric Acid 100%	B1-Good
Hydrofluoric Acid 20%	D-Severe Effect
Hydrofluoric Acid 50%	D-Severe Effect
Hydrofluoric Acid 75%	D-Severe Effect
Hydrofluosilicic Acid 100%	D-Severe Effect
Hydrofluosilicic Acid 20%	C2-Fair
Hydrogen Gas	A-Excellent
Hydrogen Peroxide 10%	B2-Good
Hydrogen Peroxide 100%	B2-Good
Hydrogen Peroxide 30%	B2-Good
Hydrogen Peroxide 50%	B2-Good

Chemical	Compatibility
Hydrogen Sulfide (aqua)	C-Fair
Hydrogen Sulfide (dry)	C1-Fair
Hydroquinone	B-Good
Hydroxyacetic Acid 70%	N/A
Ink	C-Fair
Iodine	D-Severe Effect
Iodine (in alcohol)	N/A
Iodoform	A-Excellent
Isooctane	A1-Excellent
Isopropyl Acetate	C-Fair
Isopropyl Ether	A-Excellent
Isotane	N/A
Jet Fuel (JP3, JP4, JP5)	A-Excellent
Kerosene	A-Excellent
Ketones	A-Excellent
Lacquer Thinners	A1-Excellent
Lacquers	A1-Excellent
Lactic Acid	B1-Good
Lard	A-Excellent
Latex	A2-Excellent
Lead Acetate	B-Good
Lead Nitrate	B1-Good
Lead Sulfamate	C-Fair
Ligroin	N/A
Lime	A-Excellent
Linoleic Acid	B-Good
Lithium Chloride	A1-Excellent
Lithium Hydroxide	B-Good
Lubricants	A2-Excellent
Lye: Ca(OH)2 Calcium Hydroxide	B1-Good
Lye: KOH Potassium Hydroxide	B-Good
Lye: NaOH Sodium Hydroxide	B-Good
Magnesium Bisulfate	A1-Excellent
Magnesium Carbonate	B-Good
Magnesium Chloride	D-Severe Effect
Magnesium Hydroxide	B-Good
Magnesium Nitrate	B-Good
Magnesium Oxide	A-Excellent
Magnesium Sulfate (Epsom Salts)	A-Excellent
Maleic Acid	A-Excellent
Maleic Anhydride	A-Excellent
Malic Acid	A-Excellent
Manganese Sulfate	B-Good
Mash	A-Excellent
Mayonnaise	C-Fair
Melamine	N/A
Mercuric Chloride (dilute)	D-Severe Effect
Mercuric Cyanide	C-Fair
Mercurous Nitrate	A1-Excellent
Mercury	A-Excellent
Methane	A-Excellent
Methanol (Methyl Alcohol)	A-Excellent
Methyl Acetate	A-Excellent
Methyl Acetone	A-Excellent
Methyl Acrylate	A-Excellent
Methyl Alcohol 10%	A-Excellent
Methyl Bromide	A-Excellent
Methyl Butyl Ketone	A-Excellent
Methyl Cellosolve	B-Good
Methyl Chloride	A-Excellent
Methyl Dichloride	N/A
Methyl Ethyl Ketone	A-Excellent
Methyl Ethyl Ketone Peroxide	N/A
Methyl Isobutyl Ketone	B-Good
Methyl Isopropyl Ketone	A-Excellent
Methyl Methacrylate	B-Good
Methylamine	A-Excellent
Methylene Chloride	B-Good
Milk	A-Excellent
Mineral Spirits	A-Excellent
Molasses	A-Excellent
Monochloroacetic acid	A1-Excellent
Monoethanolamine	A-Excellent
Morpholine	N/A
Motor oil	A1-Excellent
Mustard	A-Excellent
Naphtha	A-Excellent
Naphthalene	A-Excellent
Natural Gas	A-Excellent
Nickel Chloride	D-Severe Effect
Nickel Nitrate	B-Good
Nickel Sulfate	B-Good
Nitrating Acid (<15% HNO3)	C-Fair
Nitrating Acid (>15% H2SO4)	C-Fair
Nitrating Acid (S1% Acid)	C-Fair
Nitrating Acid (S15% H2SO4)	C-Fair
Nitric Acid (20%)	A-Excellent
Nitric Acid (50%)	A2-Excellent
Nitric Acid (5-10%)	A-Excellent
Nitric Acid (Concentrated)	A1-Excellent
Nitrobenzene	B-Good
Nitrogen Fertilizer	N/A
Nitromethane	A-Excellent
Nitrous Acid	B-Good
Nitrous Oxide	B-Good
Oils: Aniline	A-Excellent

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Chemical	Compatibility
Oils: Anise	N/A
Oils: Bay	N/A
Oils: Bone	N/A
Oils: Castor	A-Excellent
Oils: Cinnamon	A-Excellent
Oils: Citric	A-Excellent
Oils: Clove	A-Excellent
Oils: Coconut	A-Excellent
Oils: Cod Liver	A-Excellent
Oils: Corn	A-Excellent
Oils: Cottonseed	A-Excellent
Oils: Creosote	B-Good
Oils: Diesel Fuel Oil (20, 30, 40, 50)	A-Excellent
Oils: Fuel Oil (1, 2, 3, 5A, 5B, 6)	A-Excellent
Oils: Ginger	D-Severe Effect
Oils: Hydraulic Oil (Petro)	A-Excellent
Oils: Hydraulic Oil (Synthetic)	A-Excellent
Oils: Lemon	A-Excellent
Oils: Linseed	A-Excellent
Oils: Mineral	A-Excellent
Oils: Olive	A-Excellent
Oils: Orange	A-Excellent
Oils: Palm	A-Excellent
Oils: Peanut	A-Excellent
Oils: Peppermint	A-Excellent
Oils: Pine	A-Excellent
Oils: Rapeseed	A-Excellent
Oils: Rosin	A1-Excellent
Oils: Sesame Seed	A-Excellent
Oils: Silicone	A-Excellent
Oils: Soybean	A-Excellent
Oils: Sperm (whale)	A-Excellent
Oils: Tanning	A-Excellent
Oils: Transformer	A-Excellent
Oils: Turbine	A-Excellent
Oleic Acid	A-Excellent
Oleum 100%	A-Excellent
Oleum 25%	B2-Good
Oxalic Acid (cold)	B-Good
Ozone	B-Good
Palmitic Acid	B1-Good
Paraffin	A-Excellent
Pentane	C-Fair
Perchloric Acid	C-Fair
Perchloroethylene	B-Good
Petrolatum	A-Excellent
Petroleum	A1-Excellent
Phenol (10%)	B-Good
Phenol (Carbolic Acid)	B-Good
Phosphoric Acid (>40%)	D-Severe Effect
Phosphoric Acid (crude)	D-Severe Effect
Phosphoric Acid (molten)	N/A
Phosphoric Acid (S40%)	D-Severe Effect
Phosphoric Acid Anhydride	N/A
Phosphorus	A2-Excellent
Phosphorus Trichloride	A1-Excellent
Photographic Developer	A-Excellent
Photographic Solutions	D-Severe Effect
Phthalic Acid	B2-Good
Phthalic Anhydride	A-Excellent
Picric Acid	B-Good
Plating Solutions, Antimony Plating 130°F	A-Excellent
Plating Solutions, Arsenic Plating 110°F	A-Excellent
Plating Solutions (Brass): High-Speed Brass Bath 110°F	N/A
Plating Solutions (Brass): Regular Brass Bath 100°F	A-Excellent
Plating Solutions (Bronze): Cu-Cd Bronze Bath R.T.	A-Excellent
Plating Solutions (Bronze): Cu-Sn Bronze Bath 160°F	A-Excellent
Plating Solutions (Bronze): Cu-Zn Bronze Bath 100°F	A-Excellent
Plating Solutions (Cadmium): Cyanide Bath 90°F	N/A
Plating Solutions (Cadmium): Fluoborate Bath 100°F	A-Excellent
Plating Solutions, (Chromium): Barrel Chrome Bath 95°F	N/A
Plating Solutions, (Chromium): Black Chrome Bath 115°F	N/A
Plating Solutions, (Chromium): Chromic-Sulfuric Bath 130°F	N/A
Plating Solutions, (Chromium): Fluoride Bath 130°F	N/A
Plating Solutions, (Chromium): Fluosilicate Bath 95°F	N/A
Plating Solutions (Copper) (Acid): Copper Fluoborate Bath 120°F	A-Excellent
Plating Solutions (Copper) (Acid): Copper Sulfate Bath R.T.	N/A
Plating Solutions (Copper) (Cyanide): Copper Strike Bath 120°F	N/A
Plating Solutions (Copper) (Cyanide): High-Speed Bath 180°F	N/A
Plating Solutions (Copper) (Cyanide): Rochelle Salt Bath 150°F	N/A
Plating Solutions (Copper) (Misc): Copper (Electroless)	N/A
Plating Solutions (Copper) (Misc): Copper Pyrophosphate	N/A
Plating Solutions (Gold): Acid 75°F	N/A
Plating Solutions (Gold): Cyanide 150°F	N/A
Plating Solutions (Gold): Neutral 75°F	N/A
Plating Solutions, Indium Sulfamate Plating R.T.	N/A
Plating Solutions (Iron): Ferrous Am Sulfate Bath 150°F	N/A
Plating Solutions (Iron): Ferrous Chloride Bath 190°F	N/A
Plating Solutions (Iron): Ferrous Sulfate Bath 150°F	N/A
Plating Solutions (Iron): Fluoborate Bath 145°F	N/A

Chemical	Compatibility
Plating Solutions (Iron): Sulfamate 140°F	N/A
Plating Solutions (Iron): Sulfate-Chloride Bath 160°F	N/A
Plating Solutions, Lead Fluoborate Plating	N/A
Plating Solutions, (Nickel): Electroless 200°F	N/A
Plating Solutions, (Nickel): Fluoborate 100-170°F	N/A
Plating Solutions, (Nickel): High-Chloride 130-160°F	N/A
Plating Solutions, (Nickel): Sulfamate 100-140°F	N/A
Plating Solutions, (Nickel): Watts Type 115-160°F	N/A
Plating Solutions (Rhodium) 120°F	N/A
Plating Solutions, (Silver) 80-120°F	N/A
Plating Solutions, Tin-Fluoborate Plating 100°F	N/A
Plating Solutions, Tin-Lead Plating 100°F	N/A
Plating Solutions (Zinc): Acid Chloride 140°F	N/A
Plating Solutions (Zinc): Acid Fluoborate Bath R.T.	N/A
Plating Solutions (Zinc): Acid Sulfate Bath 150°F	N/A
Plating Solutions (Zinc): Alkaline Cyanide Bath R.T.	N/A
Potash (Potassium Carbonate)	B-Good
Potassium Bicarbonate	B-Good
Potassium Bromide	B-Good
Potassium Chlorate	B1-Good
Potassium Chloride	B1-Good
Potassium Chromate	B1-Good
Potassium Cyanide Solutions	B1-Good
Potassium Dichromate	B-Good
Potassium Ferricyanide	B1-Good
Potassium Ferrocyanide	B-Good
Potassium Hydroxide (Caustic Potash)	B-Good
Potassium Hypochlorite	C1-Fair
Potassium Iodide	A1-Excellent
Potassium Nitrate	B-Good
Potassium Oxalate	B-Good
Potassium Permanganate	B1-Good
Potassium Sulfate	B1-Good
Potassium Sulfide	B-Good
Propane (liquefied)	A-Excellent
Propylene	B1-Good
Propylene Glycol	B-Good
Pyridine	A-Excellent
Pyrogallic Acid	B2-Good
Resorcinal	N/A
Rosins	A1-Excellent
Rum	A-Excellent
Rust Inhibitors	A-Excellent
Salad Dressings	A-Excellent
Salicylic Acid	B2-Good
Salt Brine (NaCl saturated)	B1-Good
Sea Water	C-Fair
Shellac (Bleached)	A-Excellent
Shellac (Orange)	A-Excellent
Silicone	A-Excellent
Silver Bromide	D-Severe Effect
Silver Nitrate	B-Good
Soap Solutions	A-Excellent
Soda Ash (see Sodium Carbonate)	A-Excellent
Sodium Acetate	B-Good
Sodium Aluminate	A-Excellent
Sodium Benzoate	N/A
Sodium Bicarbonate	A-Excellent
Sodium Bisulfate	D-Severe Effect
Sodium Bisulfite	B1-Good
Sodium Borate (Borax)	B2-Good
Sodium Bromide	C-Fair
Sodium Carbonate	A-Excellent
Sodium Chlorate	A-Excellent
Sodium Chloride	B-Good
Sodium Chromate	B1-Good
Sodium Cyanide	A1-Excellent
Sodium Ferrocyanide	B-Good
Sodium Fluoride	D-Severe Effect
Sodium Hydrosulfite	N/A
Sodium Hydroxide (20%)	B-Good
Sodium Hydroxide (50%)	B-Good
Sodium Hydroxide (80%)	C-Fair
Sodium Hypochlorite (<20%)	C-Fair
Sodium Hypochlorite (100%)	D-Severe Effect
Sodium Hyposulfate	A-Excellent
Sodium Metaphosphate	A-Excellent
Sodium Metasilicate	A-Excellent
Sodium Nitrate	B1-Good
Sodium Perborate	B-Good
Sodium Peroxide	A-Excellent
Sodium Polyphosphate	B-Good
Sodium Silicate	A-Excellent
Sodium Sulfate	B-Good
Sodium Sulfide	B-Good
Sodium Sulfite	B-Good
Sodium Tetraborate	A2-Excellent
Sodium Thiosulfate (hypo)	A2-Excellent
Sorghum	A-Excellent
Soy Sauce	A-Excellent
Stannic Chloride	D-Severe Effect
Stannic Fluoborate	N/A
Stannous Chloride	C2-Fair
Starch	A-Excellent
Stearic Acid	B-Good
Stoddard Solvent	A-Excellent

IKA Flow Anhang B // Appendix B

Chemical	Compatibility
Styrene	A-Excellent
Sugar (Liquids)	A-Excellent
Sulfate (Liquors)	B-Good
Sulfur Chloride	D-Severe Effect
Sulfur Dioxide	D-Severe Effect
Sulfur Dioxide (dry)	D-Severe Effect
Sulfur Hexafluoride	N/A
Sulfur Trioxide	A-Excellent
Sulfur Trioxide (dry)	D-Severe Effect
Sulfuric Acid (<10%)	D-Severe Effect
Sulfuric Acid (10-75%)	D-Severe Effect
Sulfuric Acid (75-100%)	C-Fair
Sulfuric Acid (cold concentrated)	C-Fair
Sulfuric Acid (hot concentrated)	D-Severe Effect
Sulfurous Acid	B1-Good
Sulfuryl Chloride	N/A
Tallow	A-Excellent
Tannic Acid	B1-Good
Tanning Liquors	A2-Excellent
Tartaric Acid	C2-Fair
Tetrachloroethane	B-Good
Tetrachloroethylene	N/A
Tetrahydrofuran	A-Excellent
Tin Salts	N/A
Toluene (Toluol)	A-Excellent
Tomato Juice	A-Excellent
Trichloroacetic Acid	D-Severe Effect
Trichloroethane	B-Good
Trichloroethylene	B-Good
Trichloropropane	A-Excellent
Tricresylphosphate	B-Good
Triethylamine	A-Excellent
Trisodium Phosphate	B-Good
Turpentine	A-Excellent
Urea	B-Good
Uric Acid	B-Good
Urine	A-Excellent
Varnish	A-Excellent
Vegetable Juice	A-Excellent

Chemical	Compatibility
Vinegar	A-Excellent
Vinyl Acetate	B-Good
Vinyl Chloride	B2-Good
Water, Acid, Mine	B-Good
Water, Deionized	A1-Excellent
Water, Distilled	A-Excellent
Water, Fresh	A-Excellent
Water, Salt	B-Good
Weed Killers	A-Excellent
Whey	A-Excellent
Whiskey & Wines	A-Excellent
White Liquor (Pulp Mill)	A-Excellent
White Water (Paper Mill)	A-Excellent
Xylene	B-Good
Zinc Chloride	B-Good
Zinc Hydrosulfite	A-Excellent
Zinc Sulfate	B1-Good

Please note that these charts are for general reference only. We have aggregated this data from dozens of original sources and any single piece of data cannot be guaranteed. Additionally, many factors affect the chemical resistance of a given plastic product including the concentration/purity of the chemical, working temperature, wall thickness and condition of the container, etc. It is **your responsibility** to test a container and chemical together ensure compatibility under your unique circumstances.

Visit www.cplabsafety.com/chemical-compatibility-charts for up to date information.

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