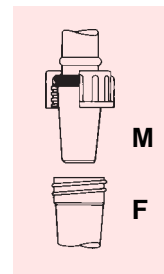




Aldrich Schlenk-type Glassware

Designed for small-scale manipulation of air- and moisture-sensitive reagents

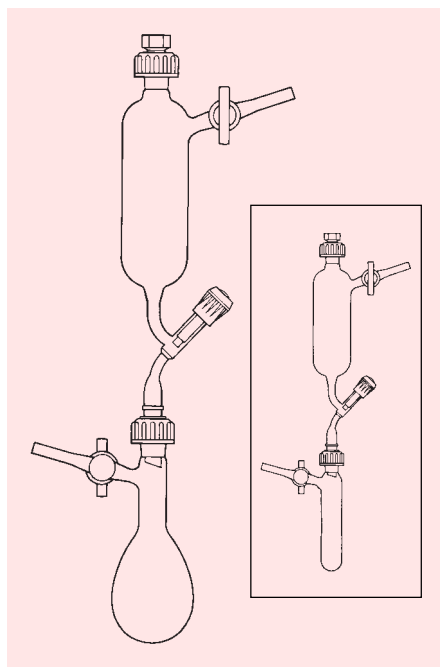
Aldrich Schlenk-type glassware features threaded B ground glass joints. They require no grease, thus eliminating it as a potential contaminant, and need no cumbersome clamps. The joints consist of a ground glass male joint (**M**) and a ground glass interior female joint (**F**) with exterior threads that allow the male portion to be secured by a septum-type plastic cap using an "O"-ring compression seal. (Cap and "O"-ring are included with all threaded male joints.) Screw-threaded joints may be used interchangeably with ordinary B joints when a tight seal is not required for the reaction. Most pieces have stopcock side arms which permit the evacuation of air and the introduction of an inert gas. A high vacuum is not necessary since the purge cycle is repeated a number of times.



The purge cycle is effective and convenient when using the Gas Manifold System (see back page for details). This combined with the versatility of Aldrich Schlenk-type glassware makes the manipulation of air- and moisture-sensitive reagents easier and safer.

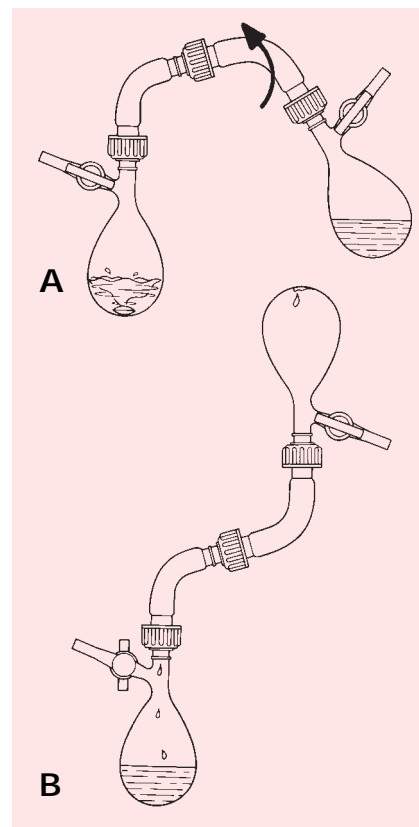
A thorough inspection of all glassware prior to use is highly recommended.

Addition of Liquids



An air-free solvent may be added to a solid in a Schlenk-type storage flask. With a cap over the bottom, the dropping funnel must first be purged to ensure that the bore of the lower stopcock and the dead space inside the joint are air-free. Following the purge, the oxygen-free solvent is either distilled directly into the dropping funnel or transferred to the funnel under a blanket of an inert gas. The connection between the dropping funnel and the storage flask must be made rapidly, with a brisk flow of inert gas maintained through the flask. If possible, the connection is followed with a quick purge cycle. The smaller illustration shows the addition of a stored solution to a reaction tube.

*Set-up for the addition of liquids consists of an **Addition funnel** and **Reaction flask**. Smaller illustration is with a **Reaction tube**.*

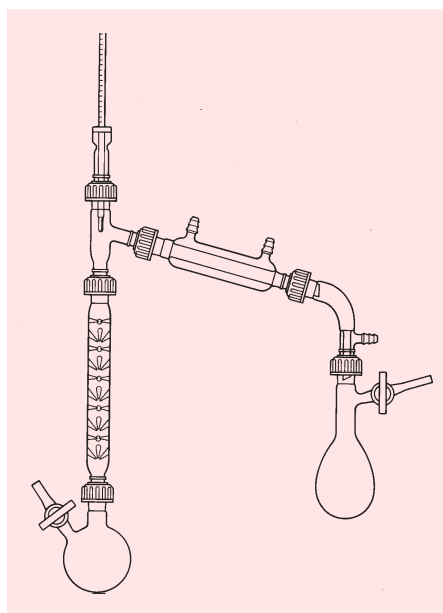


Chemical Reaction

A reagent solution may be added to a stirred reactant solution or suspension using the apparatus illustrated at right. The starting set-up **A** is assembled by purging both flasks with a brisk flow of inert gas while connecting the bent adapters. After securing the reaction flask and initiating stirring, the apparatus is slowly rotated about the joint between the two adapters, allowing the reagent solution to flow into the reaction flask (**B**).

*Set-up consists of two **Reaction flasks** and two **Bent adapters**.*

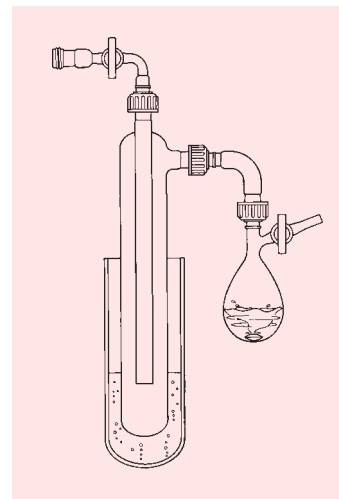
Distillation



Distillation under inert atmosphere and/or reduced pressure is easily accomplished using this apparatus. After assembly, the apparatus is purged thoroughly with inert gas. Following distillation, the flask containing the purified product is disconnected from the bent adapter while flushing the flask with a rapid flow of inert gas, then capped for storage.

If a sensitive material is being distilled, a flask with a side arm may be used in place of the round bottom flask. In this case, the apparatus and flask are pre-flushed with inert gas, then connected while purging each with a flow of inert gas.

Set-up: a round bottom flask connected to a Vigreux distilling column, 3-way connecting adapter, Liebig condenser, Vacuum distillation adapter, and a Reaction and storage flask.



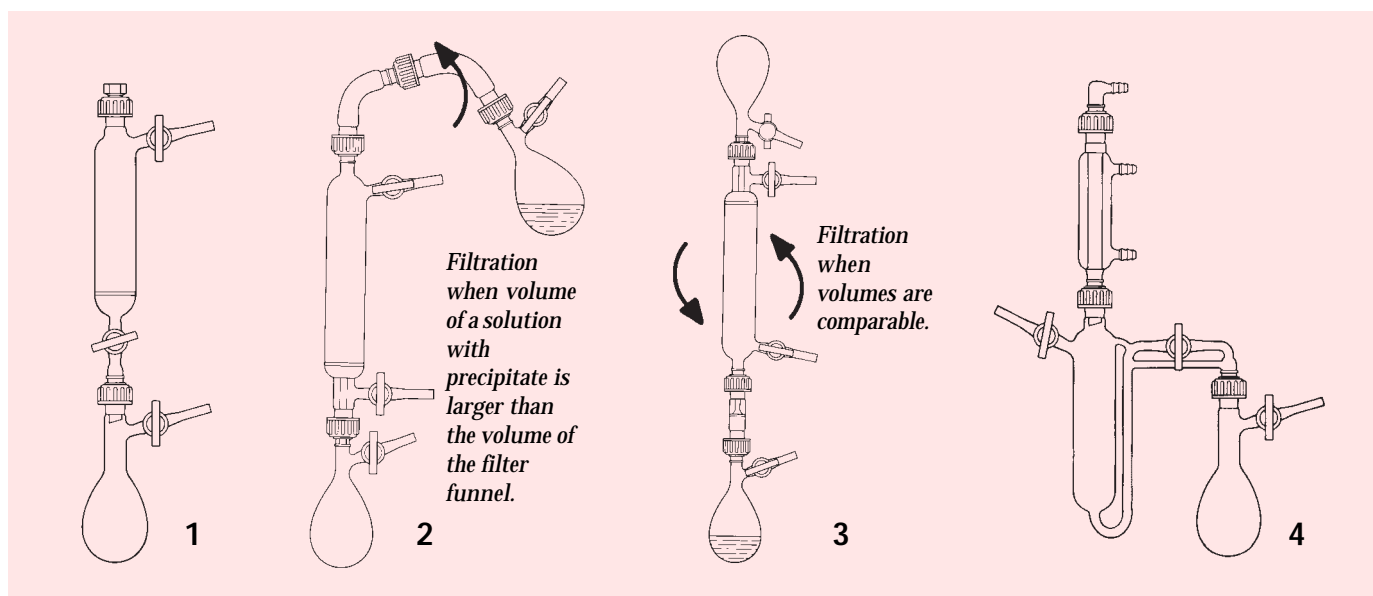
Drying/Evaporation

This apparatus is useful for removing solvents from temperature-sensitive materials, especially over long periods of time.

A Storage and reaction flask via a Bent adapter is connected to a Cold trap equipped with a Connecting adapter (in-line with glass stopcock).

Extraction and Filtration

Set-ups for the extraction and filtration of solids are illustrated below. Several purge cycles must be made prior to operation. To maintain the inert atmosphere and prevent pressure build-up, a nitrogen line and pressure-relief valve are recommended (see back page for more information and diagram on the set-up for a typical gas manifold system). Set-up 4 allows for the immersion of the entire filter unit into a Dewar bath for low-temperature extraction.



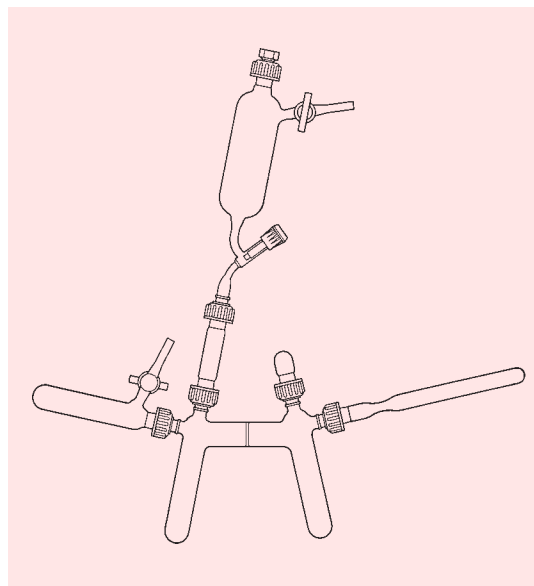
Examples 1, 2, and 3 are arrangements of Flasks and a Filter funnel. 2 also uses two Angled adapters and 3 uses a Straight adapter. Set-up 4 has a Low-temperature filter funnel connected to a Liebig condenser, equipped with a Vacuum adapter; and a Reaction and storage flask.

Filtration/Recrystallization

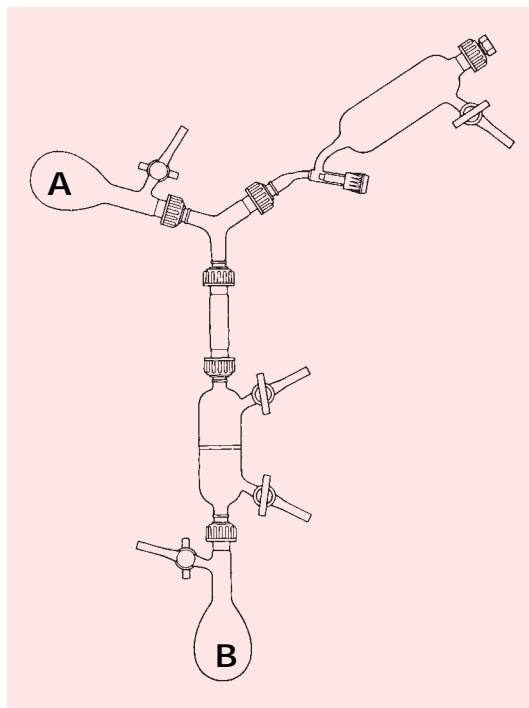
The H-Schlenk tube permits low-temperature filtration if a large cooling bath is used. This versatile piece of apparatus may be configured for a variety of uses, including routine filtrations and recrystallizations.

The example set-up at right illustrates the latter application. Solid material to be recrystallized is transferred from the reaction and storage tube (far left) into the left leg of the H-Schlenk tube. Solvent is added from the dropping funnel and the material is dissolved. The solution is filtered into the right leg of the H-Schlenk tube and the material recrystallized, followed by filtration of the mother liquor back into the left leg of the H-tube. After washing with fresh solvent (if necessary) and drying the product under reduced pressure, the purified material is finally transferred (see following page) to the sealing tube (far right) for long-term storage, or to another reaction and storage tube for further manipulation.

Attached to a **Double-tube recrystallizer (H-Schlenk tube)** are a **Reaction and storage tube**, a **Dropping funnel with Straight adapter**, and a **Sealing Tube**.



Filtration/Washing



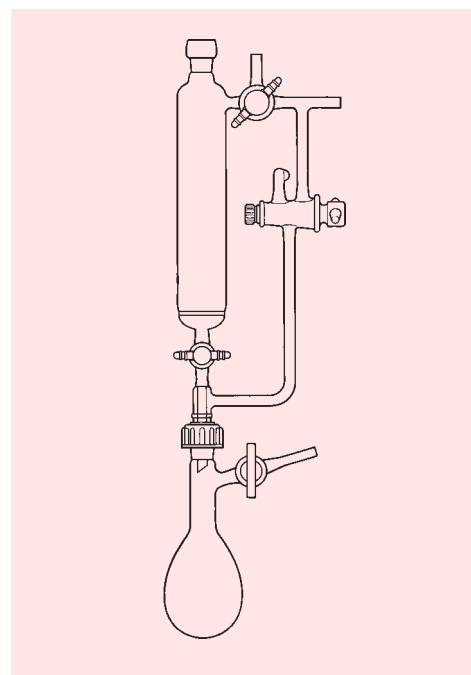
A precipitate may be collected and washed as follows: the entire apparatus less flask **A** is assembled and purged with inert gas. Flask **A**, containing the suspended solid, is attached to the apparatus while flushing with inert gas. Securing the apparatus into the position illustrated and partially evacuating flask **B** allows collection of the solid on the filter. The solid is washed by rinsing with fresh solvent contained in the addition funnel.

The bottom **Flask** is connected to a **Double-ended filter** then to a **Straight adapter** followed by a **3-way connecting adapter** which is then connected to a **Flask** and to an **Addition funnel** outfitted with a **Glass stopper**.

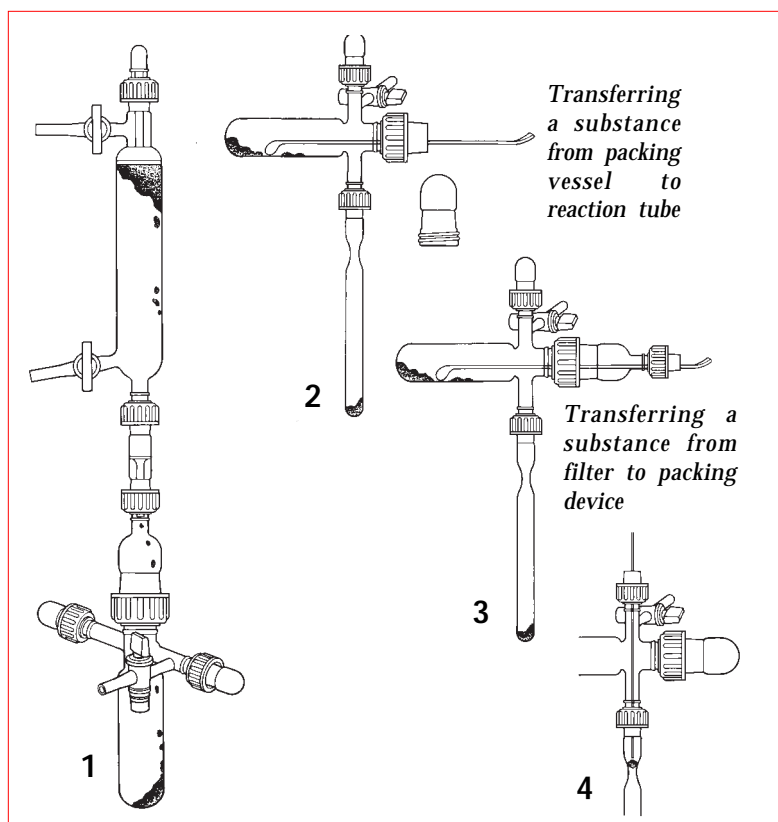
Filtration/Washing/Degassing

An air-sensitive sample dispersed in a wash solvent is loaded via syringe at the top inlet through a septum. Vacuum and inert gas pressure produces the washing action. The stopcocks on the side arm then redirect the inert gas for filtration. Repeat this process with fresh solvent as required.

The **Filter/Washer/Degasser** unit uses a **Septum** at the top, and is attached to a **Reaction flask**.

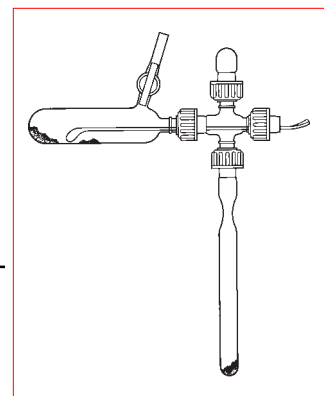


Transfer of Solids



The transfer of solids from a filter to sealing tubes can be accomplished as follows. First, the solids are transferred from the filtration apparatus to a solid transfer vessel as shown in 1. While purging the solid transfer vessel with inert gas through the sidearm, the filtration apparatus is removed. After attaching a sealing tube to the transfer vessel, the solids may be pushed into the sealing tube with a spatula as in 2 and 3. Solids caught in the neck of the sealing tube can be pushed into the tube by entering through the side arm of the solid transfer vessel as in 4.

Set up 1 has a **Solid transfer vessel** attached to a **Filter funnel** via a **Reducing adapter**. 2 shows a **Sealing tube** attached to the side arm of the **Solid transfer vessel**. 3 is the same as 2 but in addition uses a **Reducing adapter** to minimize exposure.



Transfer of Solids (alternate method)

Solids are easily transferred under inert atmosphere using the apparatus illustrated at right. While admitting a flow of inert gas through the storage tube sidearm, solids can be moved from the storage tube to a sealing tube with a spatula.

Set up consist of a **Storage tube** attached to a **Sealing tube** via a **4-way adapter**.

Aldrich All-In-One Lab Glassware Kit

A complete set of reaction and distillation glassware with threaded B14/20 joints.

Kit comes in a foamed lined storage case.

Cat. No. Z16,689-8



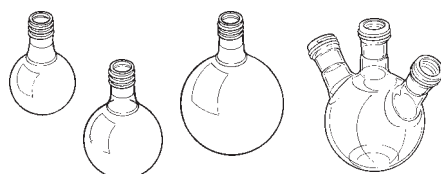
Contents:

Round-bottom flasks-
25, 50, 100 mL

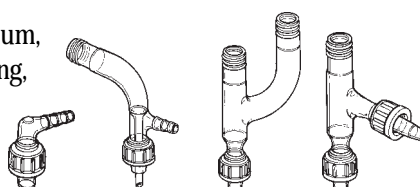
3-neck round-bottom flask-
100 mL



Drying tube
Glass stopper (2)



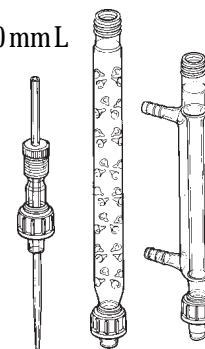
Adapters- vacuum,
vacuum-distilling,
connecting,
Claisen,
thermometer



Gas inlet tube

Vigreux distilling column- 150 mm L

Liebig condenser- 100 mm L

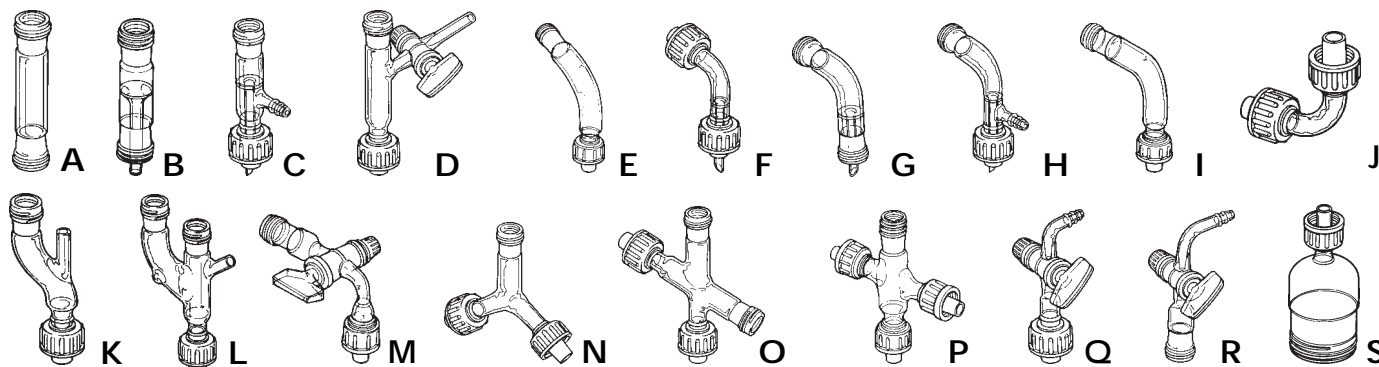


For additional information and replacement parts see the Aldrich Catalog.

Aldrich Schlenk-type Glassware

Features threaded C ground glass joints. Joints consist of female (F) C joint with external screw threads and a corresponding male (M) C joint with a threaded plastic nut and "O"-ring that seals the joint. Aldrich Schlenk-type glassware is also compatible with the Aldrich All-In-One Lab Glassware Kit.

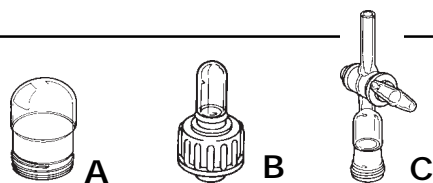
Adapters



Description	c Joint	Type	Cat. No.	Description	c Joint	Type	Cat. No.
A. Straight adapter	14/20	2-F	Z17,321-5	K. Offset adapter with septum inlet	14/20	1-M, 1-F	Z23,346-3
B. Straight adapter with drip-tip	14/20	2-F	Z22,044-2	L. Claisen adapter with septum inlet* adapter and bulb on side arm	14/20	1-M, 2-F	Z23,345-5
C. Straight adapter with drip-tip and vacuum take-off	29/32	2-F	Z22,045-0	M. Adapter with glass stopcock	14/20	1-M, 1-F	Z22,024-8
D. Straight adapter with glass stopcock on side arm	14/20	1-M, 1-F	Z17,301-0		29/32	1-M, 1-F	Z22,025-6
Straight adapter with Teflon stopcock on side arm	14/20	1-M, 1-F	Z17,311-8	N. Three-way adapter	14/20	2-M, 1-F	Z17,332-0
E. 105°-Bent adapter	14/20	1-M, 1-F	Z22,018-3	O. Four-way adapter	14/20	1-M, 2-F	Z17,333-9
F. 105°-Bent adapter	29/32	1-M, 1-F	Z22,019-1	P. Four-way adapter for solid transfer vessel	14/20	2-M, 2-F	Z17,334-7
G. 105°-Bent adapter	14/20	2-M	Z17,300-2		14/20	3-M, 1-F	Z22,038-8
H. 105°-Bent adapter with hose barb	14/20	2-F	Z17,299-5		14/20	3-M; 29/32 1-F	Z22,039-6
I. 90°-Bent adapter	14/20	1-M, 1-F	Z16,744-4	Q. 90°-Bent adapter with glass stopcock and hose barb	14/20	1-M	Z17,313-4
J. 75°-Bent adapter	14/20	1-M, 1-F	Z22,012-4	R. 90°-Bent adapter with glass stopcock and hose barb	14/20	1-F	Z17,302-9
	29/32	1-M, 1-F	Z22,013-2	S. Reducing adapter - use with solid transfer vessel			
	14/20	2-M	Z17,303-7	Minimizes entry joint size when working with extremely air- or moisture-sensitive samples.	45/40F to 14/20M		Z22,036-1
	14/20	2-F	Z17,304-5		29/32F to 14/20M		Z22,035-3

* O.d. of inlet is 9 mm, use with septum Z10,072-2 (white) or Z12,435-4 (red).

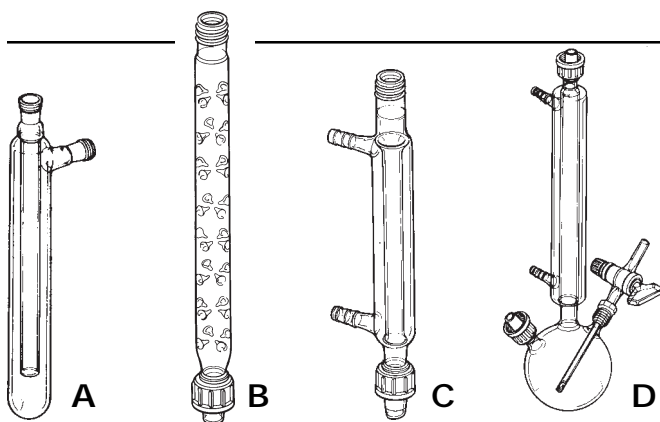
Caps



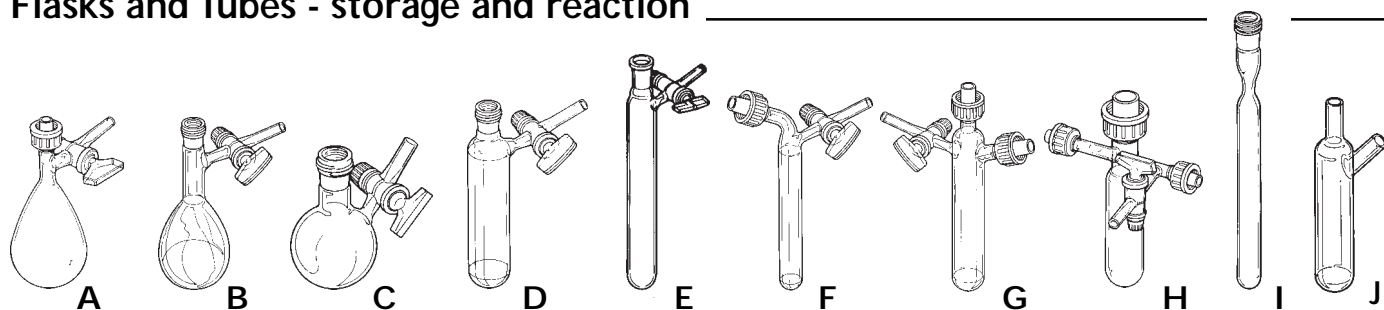
Description	c Joint	Type	Cat. No.
A. Female joint cap	14/20	F	Z17,342-8
	29/32	F	Z22,033-7
	45/40	F	Z22,032-9
B. Male joint cap	14/20	M	Z23,085-5
	29/32	M	Z23,086-3
C. Joint cap with stopcock	14/20	F	Z17,339-8

Cold Traps, Columns and Condensers

Description	Cat. No.
A. Cold trap for isothermic evaporation	
14/20F top joint, 14/20F side joint	Z22,041-8
29/32F top joint, 14/20F side joint	Z22,042-6
B. Vigreux distilling column	
150-mm long, 14/20, 1-M, 1-F	Z16,751-7
C. Liebig condenser	
100-mm long, 14/20, 1-M, 1-F	Z16,752-5
D. Deoxygenation apparatus	
One-piece condenser/flask unit for degassing solvents. Flask has angled B joint and 7-mm gas dispersion tube (porosity 25-50 μm) with glass stopcock.	
with 250 mL flask capacity, 14/20 B joint	Z22,046-9
with 500 mL flask capacity, 29/32 B joint	Z22,047-7

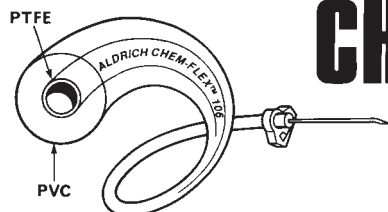


Flasks and Tubes - storage and reaction



	Capacity (mL)	c Joint	Cat. No.		Capacity (mL)	c Joint	Cat. No.
A. Reaction flask with glass stopcock on side arm	25	14/20M	Z22,026-4	F. Storage tube with glass stopcock on side arm, connects to filter funnels for transfer	25	14/20M	Z17,315-0
	50	14/20M	Z22,028-0		50	14/20M	Z17,327-4
	100	14/20M	Z22,030-2		75	14/20M	Z17,328-2
	25	29/32M	Z22,027-2	G. Reaction vessel with glass stopcock on side arm			
	50	29/32M	Z22,029-9		50	14/20M	Z17,330-4
	100	29/32M	Z22,031-0		100	14/20M	Z17,331-2
B. Reaction and storage flask, Kjeldahl, with glass stopcock on side arm	25	14/20F	Z17,323-1	H. Solid-transfer vessel for transferring and packaging air-sensitive solid compounds under inert atmosphere, has two side arms with 14/20M joints and a gas inlet with glass stopcock	75	14/20M entry joint	Z22,059-0
	50	14/20F	Z17,325-8		75	29/32M entry joint	Z22,021-3
	100	14/20F	Z17,326-6	I. Sealing tube for use with solid-transfer vessel	15	14/20F	Z22,043-4
C. Solvent storage flask with glass stopcock on side arm	50	14/20F	Z17,306-1	J. Storage ampule with septum inlet*	15	single inlet	Z23,341-2
	100	14/20F	Z17,308-8		25	single inlet	Z23,342-0
	250	14/20F	Z17,309-6		50	single inlet	Z23,340-4
D. Reaction and storage tube with glass stopcock on side arm	25	14/20F	Z17,312-6		15	dual inlet	Z23,338-2
	25	14/20M	Z17,319-3		25	dual inlet	Z23,339-0
	50	14/20F	Z17,322-3		50	dual inlet	Z23,340-4
	50	14/20M	Z17,329-0				
	50	29/32M	Z23,089-8				
E. Quartz reaction vessel with glass stopcock on side arm	25- o.d. x 200-mm L	14/20F (not threaded)	Z20,261-4				

* O.d. of inlet is 9 mm, use with septum Z10,072-2 (white) or Z12,435-4 (red).



CHEM-FLEX™ TUBING

- **chemically inert**
- **extra strong yet flexible**
- **resists crushing and kinking**
- **cut-marks at 6 inch intervals**
- **available in 25ft & 50ft lengths**
- **color-coded for high visibility in the lab**

Developed by Aldrich for the safe transfer of aggressive solvents, air-sensitive liquids and gases. Chemists can now fabricate their own transfer lines with CHEM-FLEX tubing easily and economically. CHEM-FLEX is constructed of a thin inner-tube of PTFE sheathed in clear PVC. Suitable for many applications where standard PTFE tubing is used.

Description	I.d. (in.)	O.d. (in.)	Cat. No.
CHEM-FLEX 106*/Red	0.106	0.380	Z22,251-8
CHEM-FLEX 125/Blue	0.125(K)	0.400	Z22,252-6
CHEM-FLEX 187/Green	0.187(P)	0.470	Z22,253-4
CHEM-FLEX 250/Black	0.250(I)	0.525	Z22,254-2

*Application note: CHEM-FLEX 106 tubing is designed specifically for use with 12 gauge transfer needles and is suitable for small volume transfers of products packed in Aldrich Sure/Seal bottles.

Tubing clamps

Noncorroding, lightweight nylon clamps secure CHEM-FLEX tubing to transfer needles and fittings.

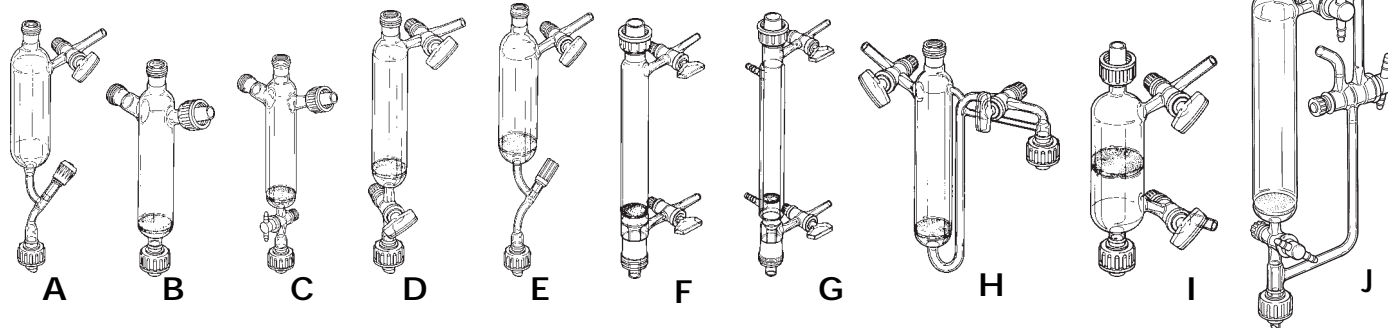
Tubing size	Diameter range(in.)	Cat. No.
CHEM-FLEX 106,125	23/64 to 25/64	Z22,417-0
CHEM-FLEX 187	25/64 to 15/32	Z22,418-9
CHEM-FLEX 250	15/32 to 17/32	Z22,419-7

CHEM-FLEX transfer needle

Two 12-gauge SS needles (6 and 18 in.) connected to 30-in. of CHEM-FLEX 106 tubing with nylon clamps, ready for use. Liquid comes in contact with Teflon and SS only during transfer. Z23,102-9

Request Technical Information Bulletin No. AL-192 for a complete listing of fittings and accessories.

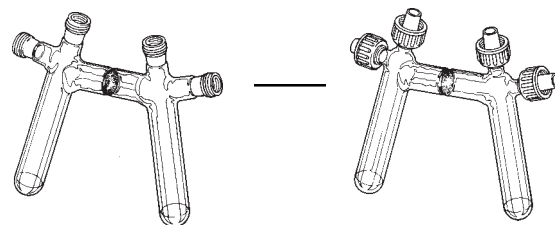
Funnels and Filters



Capacity (mL)	c Joint	Cat. No.	Capacity (mL)	c Joint	Cat. No.
A. Addition funnel with Rotaflo stopcock, and glass stopcock on side arm 100 14/20, 1-M, 1-F Z17,349-5			G. Jacketed filter funnel for hot and cold filtrations, and fast drying of precipitates, has drip tip and two side arms - each with glass stopcock, male top joint and female bottom joint, frit porosity 25-50 μm 50 14/20 Z22,016-7 50 29/32 Z22,017-5		
B. Filter tube, frit porosity 25-50 μm 75 14/20, 2-M, 2-F Z17,316-9 - with glass stopcock 25 14/20, 2-M, 2-F Z17,320-7 75 14/20, 2-M, 2-F Z17,344-4			H. Low temperature filter funnel, lower outlet is bent to allow for immersion of entire unit into a Dewar bath, has female top joint and male bottom joint, frit porosity 25-50 μm 75 14/20 Z17,335-5		
C. Filter tube with Teflon stopcock 25 14/20, 2-M, 2-F Z17,345-2 75 14/20, 2-M, 2-F Z17,346-0			I. Double-ended filter with a glass stopcock on each of the two side arms, frit porosity 25-50 μm 60 14/20, 2-M Z17,347-9		
D. Filter funnel with drip tip and two glass stopcocks - one on side arm, frit porosity 25-50 μm 75 14/20, 1-M, 1-F Z17,318-5			J. Filter/Washer/Degasser has septum inlet,* drip tip, and Teflon stopcocks on side arm, female top joint and male bottom joint, frit porosity 25-50 μm 100 14/20 Z23,228-9		
E. Filter funnel with Rotaflo stopcock on lower outlet (3mm), upper side arm has glass stopcock, frit porosity 25-50 μm 100 14/20, 1-M, 1-F Z17,348-7			* O.d. of inlet is 9 mm, use with septum Z10,072-2 (white) or Z12,435-4 (red).		
F. Filter funnel with drip tip and two side arms - each equipped with a glass stopcock, has male top joint and female bottom joint, frit porosity 25-50 μm 100 14/20 Z22,014-0 100 29/32 Z22,015-9					

Recrystallizers

B Joint	Cat. No.
Double-tube recrystallizers, frit porosity 70-100 μm	
14/20, 4-F	Z17,337-1
14/20, 4-M	Z17,336-3

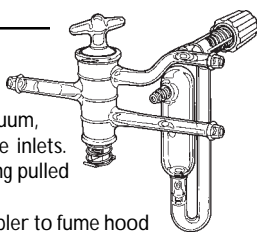


Valves

Aldrich Safe-Purge valve

For the safe and efficient purging of reaction vessels with inert or process gases. Vessel, vacuum, and purge gas lines connect to 10-mm o.d. valve inlets.

- built-in checkvalve prevents oil and air from being pulled into system
- rear hose connector vents toxic gases from bubbler to fume hood
- sturdy, high-performance construction



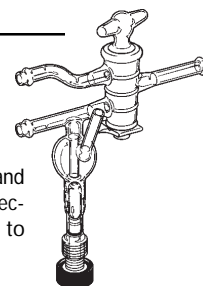
With manually adjustable Teflon valve
 With spring-loaded automatic valve

Z22,532-0
 Z22,533-9

Firestone* valve

A rapid, efficient, and foolproof purge valve for 100% replacement of air in reaction vessels. Automatically controls gas flow and pressure. No special fittings needed. Connect reaction vessel, house-vacuum, and purge gas to the Firestone Valve via 10-mm o.d. connections. Conserve expensive gases by decreasing flow to almost zero after purging.

Z10,361-6



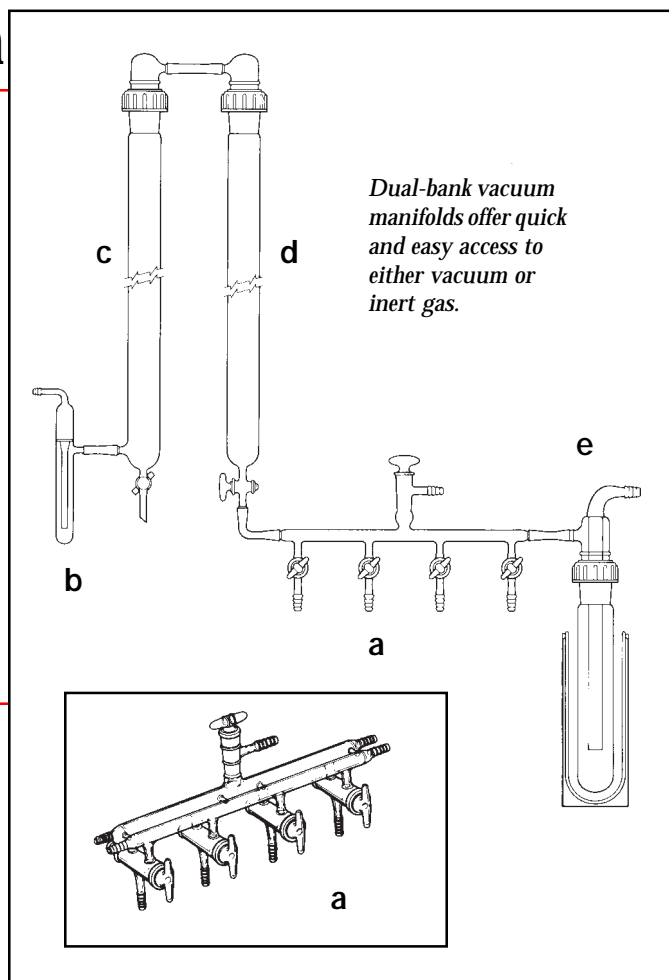
Handling Air-Sensitive Reagents

The Aldrich Sure/Seal™ packaging system provides a convenient method for storing and dispensing air-sensitive reagents.

For more information about Handling Air-Sensitive Reagents see Technical Information Bulletin No. AL-134.

Typical Gas Manifold System

When working with air- and moisture-sensitive reagents purging cycles are performed frequently, the use of a vacuum manifold with a pressure-relief valve is recommended. A standard purity nitrogen or argon cylinder is attached to a manifold (a), first through a bubbler (b) to serve as an approximate flow indicator, then through an oxygen removal tower (c) and a drying tower (d). The mechanical pump should be protected by a dry ice or liquid nitrogen cooled vacuum trap (e) with a relatively large volume. An Aldrich Safe-Purge™ or a Firestone* valve may also be used.



Products for Typical Gas Manifold System

a. Manifolds with pressure-relief valve

All glass, dual bank with vacuum-gauge port.

3-position	Z20,267-3
4-position	Z17,443-2
5-position	Z24,356-6

Also available:

Manifolds with hose connections

All glass, dual bank

3-position	Z20,268-1
4-position	Z20,270-3
5-position	Z24,357-4

Manifolds with screw-thread joints

With c14/20 greaseless, screw-threaded joints, 2-mm height vacuum glass stopcocks, and 4-mm T-bore inlet stopcock.

3-position	Z22,373-5
4-position	Z22,374-3

Manifold with trap

In-line trap with threaded c29/32 joint. System has four positions, one hose, one c14/20 joint, and two c24/40 joints with high vacuum Teflon valves. End cap with threaded c29/32 joint is removable for easy cleaning. Overall length is ~55.0cm.

Z21,973-8

b. Mineral oil bubbler

Hose barb connections, uses less than 10 mL mineral oil.

Z17,305-3

c. Catalyst tower (oxygen removal tower)

Threaded c 45/50, glass stopcock

Z17,425-4

d. Drying tower

Similar to catalyst tower but has a hose barb. Threaded c 45/50, glass stopcock.

Z17,424-6

e. Vacuum trap

Two-piece threaded c45/50 joint. Constructed for easy removal of condensates. 48- o.d. x 420-mm overall L; 13-mm o.d. hose barbs.

hose barbs at 180°	Z17,421-1
hose barbs at 90°	Z17,423-8

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Aldrich warrants that its products conform to the information contained in this and other Aldrich publications. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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