ABI 390Z DNA Synthesizer

Site Preparation and Safety Guide

Applied Biosystems

For Research Use Only. Not for use in diagnostic procedures.

Contents

1 Site Preparation

2 Instrument Safety

3 Chemical Safety

A Acronyms and Abbreviations

Site Preparation 1

Before You Start…

Preinstallation Before the instrument is installed, the installation site must be prepared so that the instrument can operate correctly and safely. Careful attention to the requirements presented here will simplify the installation procedure.

Operator Training Training of operators is one of the primary goals of installation. Persons who are to be trained to operate the instrument should set aside two uninterrupted days to work with the Applied Biosystems service representative. If this is not possible, the installation should be rescheduled.

Performance Verification Calibration of the instrument and verification of performance will be performed by an Applied Biosystems service representative during the installation.

Ordering Supplies Reagents shipped with this instrument will be consumed during the process of setup and verification. Before installation, be sure to order additional chemicals and other supplies necessary for the ongoing operation of the instrument.

Unpacking Do not unpack instruments. Inspect instrument cartons and report any damage to your Applied Biosystems service representative. For information and instructions about unpacking the Installation Chemical Kit, see “Items Shipped with this Product” later in this chapter.

Technical Support

Contacting Technical Support

You can contact Applied Biosystems for technical support by telephone or fax, by e-mail, or through the Internet. You can order Applied Biosystems user documents, MSDSs, certificates of analysis, and other related documents 24 hours a day. In addition, you can download documents in PDF format from the Applied Biosystems Web site (please see the section "To Obtain Documents on Demand" following the telephone information below).

To Contact Technical Support by E-Mail

Contact technical support by e-mail for help in the following product areas:

Product Area	E-mail address
Genetic Analysis (DNA Sequencing)	galab@appliedbiosystems.com
Sequence Detection Systems and PCR	pcrlab@appliedbiosystems.com
Protein Sequencing, Peptide and DNA Synthesis	corelab@appliedbiosystems.com
Biochromatography, PerSeptive DNA, PNA and Peptide Synthesis systems, CytoFluor®, FMAT™, Voyager™, and Mariner™ Mass Spectrometers	tsupport@appliedbiosystems.com
LC/MS (Applied Biosystems/MDS Sciex)	apisupport@sciex.com or api3-support@sciex.com
Chemiluminescence (Tropix)	tropix@appliedbiosystems.com

Hours for Telephone Technical Support

In the United States and Canada, technical support is available at the following times:

Product	Hours
Chemiluminescence	8:30 a.m. to 5:30 p.m. Eastern Time
Framingham support	8:00 a.m. to 6:00 p.m. Eastern Time
All Other Products	5:30 a.m. to 5:00 p.m. Pacific Time

To Contact Technical Support by Telephone or Fax

In North America

To contact Applied Biosystems Technical Support, use the telephone or fax numbers given below. (To open a service call for other support needs, or in case of an emergency, dial **1-800-831-6844** and press **1**.)

Product or Product Area	Telephone Dial...	Fax Dial...
ABI PRISM® 3700 DNA Analyzer	**1-800-831-6844**, then press **8**	**1-650-638-5981**
DNA Synthesis	**1-800-831-6844**, then press **21**	**1-650-638-5981**
Fluorescent DNA Sequencing	**1-800-831-6844**, then press **22**	**1-650-638-5981**
Fluorescent Fragment Analysis (includes GeneScan® applications)	**1-800-831-6844**, then press **23**	**1-650-638-5981**

Product or Product Area	Telephone Dial...	Fax Dial...
Integrated Thermal Cyclers (ABI PRISM® 877 and Catalyst 800 instruments)	**1-800-831-6844**, then press **24**	**1-650-638-5981**
ABI PRISM® 3100 Genetic Analyzer	**1-800-831-6844**, then press **26**	**1-650-638-5981**
BioInformatics (includes BioLIMS®, BioMerge™, and SQL GT™ applications)	**1-800-831-6844**, then press **25**	**1-505-982-7690**
Peptide Synthesis (433 and 43X Systems)	**1-800-831-6844**, then press **31**	**1-650-638-5981**
Protein Sequencing (Procise® Protein Sequencing Systems)	**1-800-831-6844**, then press **32**	**1-650-638-5981**
PCR and Sequence Detection	**1-800-762-4001**, then press **1** for PCR, **2** for the 7700 or 5700, **6** for the 6700 or dial **1-800-831-6844**, then press **5**	**1-240-453-4613**
Voyager™ MALDI-TOF Biospectrometry and Mariner™ ESI-TOF Mass Spectrometry Workstations	**1-800-899-5858**, then press **13**	**1-508-383-7855**
Biochromatography (BioCAD® Workstations and Poros® Perfusion Chromatography Products)	**1-800-899-5858,** then press **14**	**1-508-383-7855**
Expedite™ Nucleic acid Synthesis Systems	**1-800-899-5858**, then press **15**	**1-508-383-7855**
Peptide Synthesis (Pioneer™ and 9050 Plus Peptide Synthesizers)	**1-800-899-5858**, then press **15**	**1-508-383-7855**
PNA Custom and Synthesis	**1-800-899-5858**, then press **15**	**1-508-383-7855**
FMAT™ 8100 HTS System and Cytofluor® 4000 Fluorescence Plate Reader	**1-800-899-5858**, then press **16**	**1-508-383-7855**
Chemiluminescence (Tropix)	**1-800-542-2369** (U.S. only), or **1-781-271-0045**	**1-781-275-8581**
Applied Biosystems/MDS Sciex	**1-800-952-4716**	**1-650-638-6223**

Outside North America

Region	Telephone Dial...	Fax Dial...
Africa and the Middle East		
Africa (English Speaking) and West Asia (Fairlands, South Africa)	**27 11 478 0411**	**27 11 478 0349**
South Africa (Johannesburg)	**27 11 478 0411**	**27 11 478 0349**
Middle Eastern Countries and North Africa (Monza, Italia)	**39 (0)39 8389 481**	**39 (0)39 8389 493**
Eastern Asia, China, Oceania		
Australia (Scoresby, Victoria)	**61 3 9730 8600**	**61 3 9730 8799**

Region	Telephone Dial...	Fax Dial...
China (Beijing)	**86 10 64106608**	**86 10 64106617**
Hong Kong	**852 2756 6928**	**852 2756 6968**
Korea (Seoul)	**82 2 593 6470/6471**	**82 2 593 6472**
Malaysia (Petaling Jaya)	**60 3 758 8268**	**60 3 754 9043**
Singapore	**65 896 2168**	**65 896 2147**
Taiwan (Taipei Hsien)	**886 2 22358 2838**	**886 2 2358 2839**
Thailand (Bangkok)	**66 2 719 6405**	**66 2 319 9788**
Europe		
Austria (Wien)	**43 (0)1 867 35 75 0**	**43 (0)1 867 35 75 11**
Belgium	**32 (0)2 712 5555**	**32 (0)2 712 5516**
Czech Republic and Slovakia (Praha)	**420 2 61 222 164**	**420 2 61 222 168**
Denmark (Naerum)	**45 45 58 60 00**	**45 45 58 60 01**
Finland (Espoo)	**358 (0)9 251 24 250**	**358 (0)9 251 24 243**
France (Paris)	**33 (0)1 69 59 85 85**	**33 (0)1 69 59 85 00**
Germany (Weiterstadt)	**49 (0) 6150 101 0**	**49 (0) 6150 101 101**
Hungary (Budapest)	**36 (0)1 270 8398**	**36 (0)1 270 8288**
Italy (Milano)	**39 (0)39 83891**	**39 (0)39 838 9492**
Norway (Oslo)	**47 23 12 06 05**	**47 23 12 05 75**
Poland, Lithuania, Latvia, and Estonia (Warszawa)	**48 (22) 866 40 10**	**48 (22) 866 40 20**
Portugal (Lisboa)	**351 (0)22 605 33 14**	**351 (0)22 605 33 15**
Russia (Moskva)	**7 095 935 8888**	**7 095 564 8787**
South East Europe (Zagreb, Croatia)	**385 1 34 91 927**	**385 1 34 91 840**
Spain (Tres Cantos)	**34 (0)91 806 1210**	**34 (0)91 806 1206**
Sweden (Stockholm)	**46 (0)8 619 4400**	**46 (0)8 619 4401**
Switzerland (Rotkreuz)	**41 (0)41 799 7777**	**41 (0)41 790 0676**
The Netherlands (Nieuwerkerk a/d IJssel)	**31 (0)180 331400**	**31 (0)180 331409**
United Kingdom (Warrington, Cheshire)	**44 (0)1925 825650**	**44 (0)1925 282502**
All other countries not listed (Warrington, UK)	**44 (0)1925 282481**	**44 (0)1925 282509**
Japan		
Japan (Hacchobori, Chuo-Ku, Tokyo)	**81 3 5566 6230**	**81 3 5566 6507**
Latin America		
Del.A. Obregon, Mexico	**305-670-4350**	**305-670-4349**

To Reach Technical Support Through the Internet

We strongly encourage you to visit our Web site for answers to frequently asked questions and for more information about our products. You can also order technical documents or an index of available documents and have them faxed or e-mailed to you through our site. The Applied Biosystems Web site address is

http://www.appliedbiosystems.com/techsupp

To submit technical questions from North America or Europe:

Step	Action
1	Access the Applied Biosystems Technical Support Web site.
2	Under the **Troubleshooting** heading, click **Support Request Forms,** then select the relevant support region for the product area of interest.
3	Enter the requested information and your question in the displayed form, then click **Ask Us RIGHT NOW** (blue button with yellow text).
4	Enter the required information in the next form (if you have not already done so), then click **Ask Us RIGHT NOW**. You will receive an e-mail reply to your question from one of our technical experts within 24 to 48 hours.

To Obtain Documents on Demand

Free, 24-hour access to Applied Biosystems technical documents, including MSDSs, is available by fax or e-mail or by download from our Web site.

To order documents...	Then...
by index number	a. Access the Applied Biosystems Technical Support Web site at **http://www.appliedbiosystems.com/techsupp** b. Click the **Index** link for the document type you want, then find the document you want and record the index number. c. Use the index number when requesting documents following the procedures below.
by phone for fax delivery	a. From the U.S. or Canada, call **1-800-487-6809,** or from outside the U.S. and Canada, call **1-858-712-0317**. b. Follow the voice instructions to order the documents you want. **Note** There is a limit of five documents per request.
through the Internet for fax or e-mail delivery	a. Access the Applied Biosystems Technical Support Web site at **http://www.appliedbiosystems.com/techsupp** b. Under **Resource Libraries**, click the type of document you want. c. Enter or select the requested information in the displayed form, then click **Search**. d. In the displayed search results, select a check box for the method of delivery for each document that matches your criteria, then click **Deliver Selected Documents Now** (or click the PDF icon for the document to download it immediately). e. Fill in the information form (if you have not previously done so), then click **Deliver Selected Documents Now** to submit your order. **Note** There is a limit of five documents per request for fax delivery but no limit on the number of documents you can order for e-mail delivery.

Preinstallation Checklist

About this Checklist Use this checklist to ensure that all preparations have been made for installation. A service representative will contact you to verify that everything is checked off before the installation date.

Checklist Check off and enter date to ensure that all preparations have been made.

390Z DNA Synthesizer Preinstallation Checklist

√ if ready	Date Confirmed	Components
		General
		Received instrument(s) and verified that cartons are intact.
		Read this *Site Preparation and Safety Manual*, including MSDSs.
		Verified that instrument(s), serial number(s), and system configuration, as shown on the packing list, are the same as ordered.
		Set aside two uninterrupted days for in-lab training during installation.
		Unpacked and stored contents of Installation Chemical Kit.
		Electrical
		A dedicated 2.0 kVA power line and ground, or a 2.0 kVA power line with a line conditioner or UPS, is in place.
		A standard power outlet receptacle is within 2.5 m (8 ft.) of the instrument location.
		Instrument voltage, if specified on the packing list, matches the voltage available in the laboratory.
		Laboratory
		Laboratory bench is of correct dimensions to accommodate the system and is situated so that the instrument is accessible to the installer on all four sides.
		Laboratory safety requirements, as specified in this manual, have been met.
		Laboratory environmental requirements, as specified in this manual, have been met.
		Room ventilation accommodates instrument heat output.
		Deionized water is on site.
		Proper waste disposal method for hazardous chemical waste has been established.
		Fume hood or ventilation duct system is located within 3 m (10 ft.) of the instrument.
		Equipment
		Waste Bottle with secondary containment
		Macintosh-compatible printer, if not ordered with instrument
		A two-stage pressure regulator with dual gauges (output range: 0–80 psi, high pressure range: 0–3000 psi), and a Compressed Gas Association (CGA) 580 cylinder adapter for each gas cylinder

390Z DNA Synthesizer Preinstallation Checklist *(continued)*

√ if ready	Date Confirmed	Components
		Approved strap or clamp to safely secure gas cylinders to the wall or bench/table
		Consumable Supplies
		Additional Applied Biosystems reagent kits
		Additional computer supplies (paper, disks, etc.)
		Chemically resistant disposable gloves
		Two Argon gas cylinders of 99.998% purity or greater
		Ammonium hydroxide (concentrated, analytical grade)
		Acetonitrile (low water, HPLC-grade)

Items Shipped with this Instrument

Summary

The 390Z DNA/RNA Synthesizer is shipped with the following:

- user's manual
- Installation Chemical Kit (P/N 401344)
- Apple Macintosh PowerPC computer system

Do not unpack any cartons related to the instrument itself. This will protect you from liability if any damage occurred during shipping.

IMPORTANT You must unpack the Installation Chemical Kit and store the components as specified in Table 1-1.

Hazardous Chemicals Warning

! WARNING ! Some chemicals used with Applied Biosystems instruments are hazardous and can cause injury, illness, or death. Always read the appropriate Waste Profiles and MSDSs before interacting with the instrument and chemicals in any way. Hazardous Chemical Warnings are prominently displayed on the labels of all hazardous materials.

Before unpacking the Installation Chemical Kit, storing chemicals, or interacting with the chemicals and instrument, read Chapter 3, "Chemical Safety," of this manual. Chapter 3 contains the Waste Profiles and Material Safety Data Sheets (MSDSs) that pertain to this instrument.

Installation Chemical Kit

Unpack the Installation Chemical Kit upon receipt. The Installation Chemical Kit is intended to be used during installation to verify instrument performance.

Store the chemicals and reagents as indicated in the table below.

Table 1-1 Installation Chemical Kit Components (P/N 401344)

P/N	Description	Storage Conditions
400226	Reaction Vessel Filters, 30–60 µm filters	Room temp
401154	Reaction Vessel Filters, 10–20 µm filters	Room temp
400394	CPG bulk, 500 Å, derivitized, dA^{bz}, 20–40 µmol/g	Room temp
400395	CPG bulk, 500 Å, derivitized, dC^{bz}, 20–40 µmol/g	Room temp
400396	CPG bulk, 500 Å, derivitized, dG^{ibu}, 20–40 µmol/g	Room temp
400397	CPG bulk, 500 Å, derivitized, T, 20–40 µmol/g	Room temp
401166	DNA phosphoramidite dA^{bz}	In a dessicator at <25 °C
401167	DNA phosphoramidite dC^{bz}	In a dessicator at <25 °C
401168	DNA phosphoramidite dG^{ibu}	In a dessicator at <25 °C
401169	DNA phosphoramidite T	In a dessicator at <25 °C
400142	Dichloromethane (DCM), HPLC-Grade	Room temp
401269	1-Methylimidazole/Tetrahydrofuran	Room temp
402221	Acetic Aanhydride/Lutidine/Tetrahydrofuran	Room temp

Table 1-1 Installation Chemical Kit Components (P/N 401344) *(continued)*

P/N	Description	Storage Conditions
401271	Tetrazole/Acetonitrile	Room temp[a]
402191	Iodine/Water/Pyridine/Tetrahydrofuran	4 °C
401462	Dichloroacetic Acid/Dichloromethane	Room temp
630017	Clean bottles	Room temp

a. Temperatures below 16 °C (60 °F) cause tetrazole to precipitate from solution

Items Needed but Not Supplied

Resupply

The Installation Chemical Kit components are completely consumed during the installation and initial testing of the instrument. To ensure an uninterrupted supply of reagents and eliminate the higher transportation costs of rush shipments, you should order additional chemicals and supplies in advance.

Equipment and Supplies

In addition to the Installation Chemical Kit, the following equipment and supplies are needed for operation of the 390Z DNA/RNA Synthesizer:

- Waste bottle with secondary containment
- Macintosh-compatible printer, if not ordered with instrument
- A two-stage pressure regulator with dual gauges (output range: 0–80 psi; high pressure range: 0–3000 psi), and a Compressed Gas Association (CGA) 580 cylinder adapter for each gas cylinder
- Approved strap or clamp to safely secure gas cylinders to the wall, bench, table, or cart
- Additional Applied Biosystems reagent kits
- Additional computer supplies (paper, disks, etc.)
- Chemically resistant disposable gloves, lab coats, and safety glasses or goggles
- Fraction collector (optional)
- Two Argon gas cylinders of 99.998% purity or greater
- Ammonium hydroxide (concentrated, analytical-grade)
- Acetonitrile (low water, HPLC-grade)

IMPORTANT Always order HPLC-grade Acetonitrile with a low water content (≤100 ppm [0.01%]). Acetonitrile with a high water content is a common cause of synthesis failure.

Laboratory Safety

Onsite Representative

Your laboratory has specific safety practices and policies designed to protect laboratory personnel from the potential hazards, both obvious and hidden, that are present.

We request that a representative from your laboratory be in the vicinity and available to our engineer at all times while he or she is on-site.

Required Safety Equipment

The following safety equipment should be available:

- fire extinguisher (Halon)
- eye wash
- safety shower
- eye and hand protection
- adequate ventilation
- first aid equipment
- spill clean-up equipment
- protection from sources of radiation (lasers, radioisotopes, contaminated equipment, radioactive wastes, etc.) that may be present in the area where our engineer will be working.

Laboratory Space Required

Dimensions and Weight

The 390Z DNA/RNA Synthesizer and the Macintosh computer have the following dimensions:

Component	Width	Depth	Height	Total Weight
Instrument	92 cm (36 in.)	76 cm (30 in.)	66 cm (26 in.)	88.9 kg (196 lb.)
Computer	35.5 cm (14 in.)	43.0 cm (17 in.)	45.5 cm (18 in.)	

Location of Instrument

The 390Z DNA/RNA Synthesizer must be located within 3 m (10 ft.) of a fume hood or ventilation duct system. The instrument requires a laboratory bench or sturdy table of correct dimensions to accommodate the system.The instrument must be accessible to the installer on all four sides.

The Apple Macintosh computer and printer should be on the same table as the 390Z DNA/RNA Synthesizer. If this is impractical, the computer must be located within 2 m (6 ft.) of the instrument's left side panel.

IMPORTANT The operator should be able to reach the instrument while viewing the computer screen.

Clearance

A clearance of 15 cm (6 in.) is needed at the rear of the instrument to provide adequate ventilation. Additional clearance is required for servicing. Do not block access to the rear of the instrument.

Sufficient space within approximately 1.5 m (5 ft.) of the instrument is needed to safely secure at least one size 1A Argon gas cylinder.

Note Additional information pertaining to the safe securing and connection of the gas cylinders is provided in this guide in Chapter 2, "Instrument Safety)."

Sufficient space to the right side of the instrument is needed for 13 external reagent bottles The bottles must be placed in safety containers at the same height as the instrument. Do not place them on the floor or on a shelf. Space is also needed to the right side of the instrument for the fraction collector.

! WARNING ! Never place the fraction collector on top of the instrument. The fraction collector can fall off resulting in injury, spilled chemicals, damage to equipment, and lost data.

continued on next page

Typical Laboratory Layout

A typical laboratory layout for the 390Z DNA/RNA Synthesizer and accessory equipment is shown in Figure 1-1.

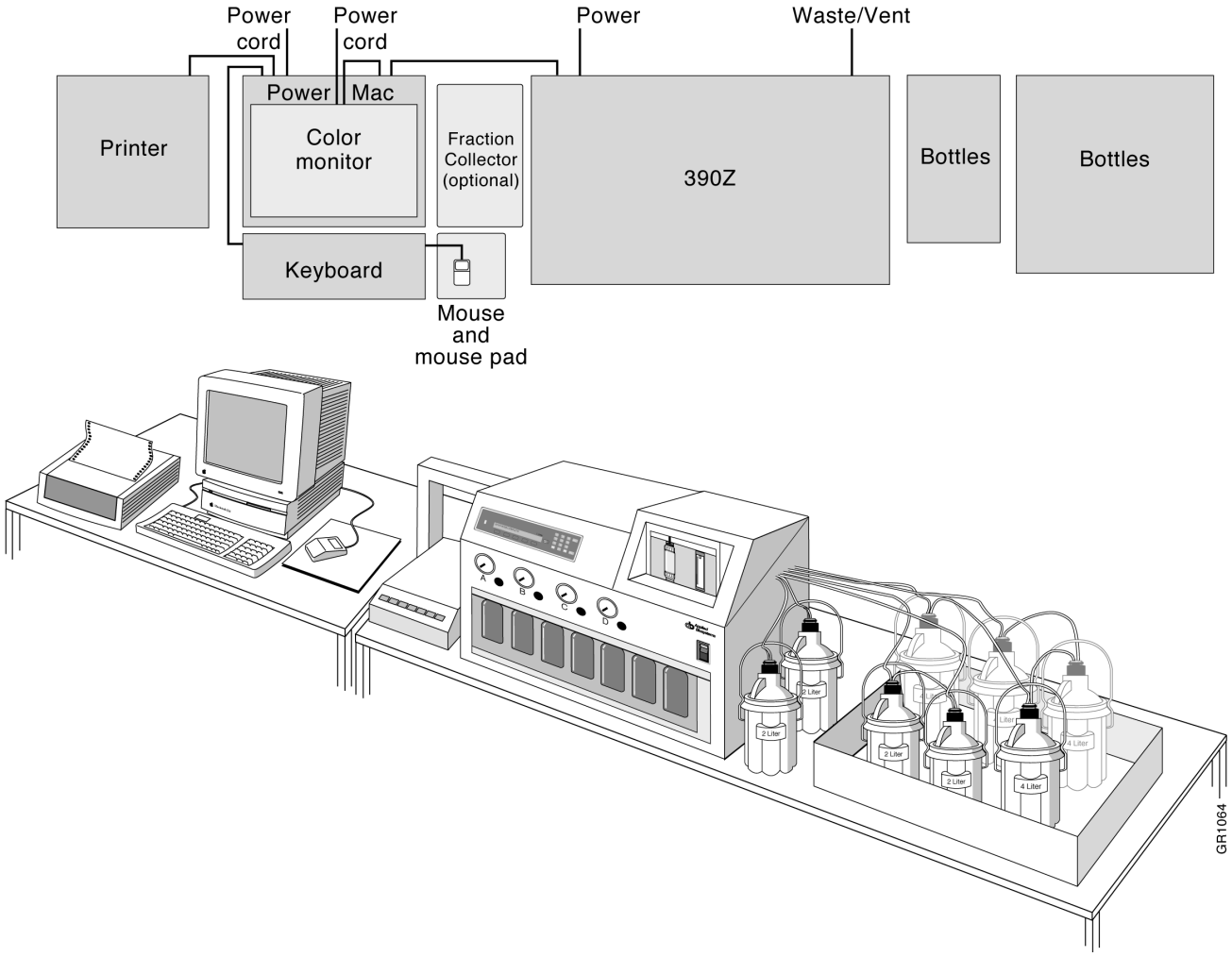

Figure 1-1 Typical laboratory layout for the 390Z DNA/RNA Synthesizer

Electrical Requirements

Power The electrical receptacle should have a dedicated 2.0 kVA power line and ground or a 2.0 kVA power line with a line conditioner or uninterruptible power supply (UPS). The electrical receptacle must be located within 2.5 m (8 ft.) of the instrument rear panel. The following table specifies the electrical operating range for various parts of the world.

Location	Volts (AC)	Frequency
Japan	100 ± 10%	50/60 Hz ± 1%
USA/Canada	120 ± 10%	50/60 Hz ± 1%
Europe (pre-1992)	220 ± 10%	50/60 Hz ± 1%
EC	230 ± 10%	50/60 Hz ± 1%
UK (pre-1992)	240 + 6%/–10%	50/60 Hz ± 1%
Australia	240 + 6%/–10%	50/60 Hz ± 1%

Grounding Certain types of electrical noise are greatly exaggerated by poor or improper electrical ground connections. To prevent these problems, it is very important to have a dedicated line and ground between the instrument and building main electrical service.

Power Cords In the USA, Canada, and Japan, the instrument is supplied with a detachable cord equipped with a standard three-prong plug.

In Europe and Australia, the instrument is supplied with an detachable electrical cord equipped with a standard EC plug.

The Macintosh computer can be plugged into any standard electrical receptacle after it has been configured for the proper voltage.

Voltage Quality Line voltage must be within ±10% of the nominal value. High or low voltages may have adverse effects on the electronic components of the instrument. In areas where the supplied power is subject to fluctuations exceeding these limits, a power line regulator may be required.

Voltage Spikes Short-duration, high-voltage spikes often cause random failures in microprocessor controlled instrumentation. These spikes can be caused by other devices using the same power source (refrigerators, air conditioners, and centrifuges) or by outside influences such as lightning. A dedicated line and ground between the instrument and building main electrical service are necessary to prevent such problems.

If your environment contains devices that are electrically noisy or you are in an area with frequent electrical storms, a line conditioner with a recommended capacity of 2.0 kVA will enhance the reliability of your system. This may be lower depending on the conditioner or power supply design.

continued on next page

Power Outages

The instrument has been designed to recover from short periods of power outage (loss) and continue operation, provided that the line voltage does not become excessively noisy before the outage. If increased protection during a power outage is desired, you may want to install an uninterruptible power supply (UPS). We recommend a capacity of 2.0 kVA. The UPS will involve a higher cost than a line conditioner.

Laboratory Environmental Requirements

Altitude

This instrument is for indoor use only and for altitudes not exceeding 2,000 meters (6,500 ft.) above sea level.

Temperature and Humidity

The laboratory temperature should be maintained between 15–30 °C (59–85 °F). The instrument can tolerate up to 80% relative humidity. Avoid placing the instrument adjacent to heaters or cooling ducts.

Pollution

The installation category (overvoltage category) for this instrument is II, and it is classified as portable equipment. The instrument has a pollution degree rating of 2, and may be installed in an environment that has non-conductive pollutants only.

Heat

The thermal output of the instrument is 8800 Btu/h (~2,600 W). Consult your facilities department regarding ventilation requirements for this level of heat output.

Emission/ Immunity Statement

CE

For our European customers, any product marked with the CE label meets the European requirements for emission and immunity as defined in the EMC Directive 89/336/EEC. This product has been evaluated to the Standard for Emissions for Industrial Scientific Equipment (EN 55011 – Class A), and to the Standard for Generic Immunity (EN50082-1).

Laboratory Ventilation

Venting

This instrument produces toxic gaseous waste that must be ventilated either through a fume hood to a duct or directly to the duct. The fume hood or duct must be located within 25.4 cm (10 ft.) of the instrument. The information presented here reflects U.S. regulations and practices for venting waste from Applied Biosystems instruments to a fume hood or to a duct.

! WARNING ! Some Applied Biosystems instruments use chemicals that are hazardous. Always mix and prepare hazardous materials under an operating fume hood.

CAUTION Dispose of all waste in accordance with all applicable local, state, and federal environmental health and safety regulations and laws.

Fume Hood

Following are important points about the fume hood:

- The fume hood should operate continuously, including nights and weekends, because vented waste bottle contents can escape to surroundings.
- The fume hood must be constructed of materials that are compatible with the waste materials/chemicals being generated or exhausted.
- The fume hood should be located away from air currents generated by air conditioning ducts, fans, windows, doors, and moving equipment and persons.
- The fume hood exhaust vent should be located where gaseous waste cannot be drawn back in the building.
- A sign or label should be present that shows where to locate the fume hood sash so as to give an average flow of 100 ft./min. (linear) face velocity. The minimum velocity flow at any point in the hood must be 80 ft./min. (linear). The maximum flow must not exceed 125 ft./min. (linear).
- The fume hood must meet local, state, and federal health and safety requirements. Refer to current fume hood standards established by the American Society of Heating, Refrigeration, Air conditioning engineers (ASHRAE), American Conference of Governmental Industrial Hygienists (ACGIH), and Occupational Safety and Health Agency (OSHA).
- Check and record face velocity at least yearly.
- Inspect and maintain exhaust system, including fans and motors at least yearly.

Duct System

It is important that the duct system:

- operate continuously, including nights and weekends, because vented waste bottle contents can escape to surroundings.
- be constructed of PVDF tubing or other materials compatible with the waste materials being generated.
- not come in contact with strong oxidizers, bases, or other chemicals that are incompatible with gaseous waste.
- allow vapor or gas movement of 1000–2000 ft./min. (5.5–11 m/s).

! WARNING ! Do not connect the waste vent to a ductless hood or to a system that purifies, filters air, and returns it to the room.

Instrument Safety 2

Instrument Safety

Safe Operation

Before operating the instrument, read the information in this section concerning hazards and potential hazards. Ensure that anyone involved with the operation of the instrument is instructed in both general safety practices for laboratories and specific safety practices for the instrument.

User Attention Words

Four user attention words appear in the text of all documentation for Applied Biosystems products. Each word implies a particular level of observation or action that is significant to user safety or proper instrument operation.

Note Calls attention to useful information.

IMPORTANT Indicates information that is necessary for proper instrument operation.

CAUTION **Cautions the user that a potentially hazardous situation could occur, causing injury to the user or damage to the instrument, if this information is ignored.**

! WARNING ! **Warns the user that serious physical injury or death to the user or other persons could result if these precautions are not taken.**

Instrument Labeling

Safety Labels

Safety labels are located on the instrument. Each label consists of a Signal Word panel and a Message Panel. A Safety Alert Symbol indicates a potential personal safety hazard. If multiple hazards exist, the signal word corresponding to the greatest hazard is used.

Signal Words

- **DANGER** indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury (most extreme).
- **CAUTION** indicates a potentially hazardous situation that could result in minor or moderate injury to the user or damage to the instrument.
- **WARNING** indicates a potentially hazardous situation that could result in death or serious injury.

Labels That May Be Found On Your Instrument

The following Danger, Caution, and Warning labels, listed in English and French below, may be found on your instrument.

English	French
CAUTION: Hazardous chemicals. Read the Material Safety Data Sheets before handling.	Attention: Produits chimiques dangeureux. Lire les fiches techniques de sûreté de matériels avant la manipulation des produits.
CAUTION: Hazardous waste. Read the Waste Profile before handling or disposal.	Attention: Déchets dangeureux. Lire les renseignements sur les déchets avant de manipuler ou d'eliminer.
WARNING: Risk of electric shock. Disconnect power cord from supply before replacing fuses or removing power supply module from instrument.	Avertissement: Risque de choc électrique. D'électrique. D'ébrancher le cordon d'alimentation avant de remplacer les fusibles ou de retirer le block d'alimentation de l'instrument.
WARNING: For continued protection against risk of fire, replace only with Listed and Certified fuse of the specified type and ratings.	Avertissement: Pour assurer une protection continue contre les risques d'incendie, remplacer les fusibles uniquement par des fusibles énumérés et certifiés du type de courant nominal specifiés.
WARNING: HOT LAMP.	Avertissement: LAMPE CHAUDE.
WARNING: HOT. Replace lamp with an Applied Biosystems lamp.	Composants chauds. Remplacer la lampe par une lampe Applied Biosystems.
WARNING: Disconnect supply cord before opening. Grounding circuit continuity is vital for safe operation of equipment. Never operate equipment with grounding conductor disconnected.	Avertissement: Débrancher la corde d'approvisionnement avant l'ouverture. La continuité de circuit au sol est essentiel pour l'exploitation sûre du matériel. N'actionnez jamais le matériel avec le conducteur debranché.
WARNING: For protection against fire hazard, replace only same type and rating of fuse.	Avertissement: Afin d'assurer la protection contre les risques d'incendie, remplacer uniquement par un fusible de même type et de même courant nominal.
CAUTION: HOT.	Attention: Surface chaude.
DANGER: High voltage.	Danger: Haut Voltage.
WARNING: To reduce the chance of electrical shock, do not remove covers that require tool access. No user serviceable parts are inside. Refer servicing to Applied Biosystems qualified service personnel.	Avertissement: Pour réduire la chance du choc électrique ne retirez pas les couvertures qui exigent l'accès d'outil. Aucune pièce utile d'ulitisateur n'est intérieur. Référez l'entretien au personnel de service de Applied Biosystems.
DANGER: Laser radiation when open and interlock defeated. Avoid direct exposure to beam.	Danger: Rayonnement de Laser si ouvert et couplage a défait. Evitez l'exposition directe au faisceau.
CAUTION: Moving parts.	Attention: Pièces mobiles.

Safety Alert Symbols

Electrical Symbols

The following chart is an illustrated glossary of all electrical symbols that are used on Applied Biosystems instruments. Wherever such symbols on instruments, please observe appropriate safety procedures.

	This symbol indicates the **on** position of the main power switch.
	This symbol indicates the **off** position of the main power switch.
	This symbol indicates the **on/off** position of a push-push main power switch.
	This terminal may be connected to another instrument's signal ground reference. This is not a protected ground terminal.
	This protective grounding terminal must be connected to earth ground before any other electrical connections are made to the instrument.
	This terminal either receives or delivers alternating current or voltage.
	This terminal can receive or supply an alternating and a direct current or voltage.
	CAUTION **This symbol indicates the presence of high voltage and warns the user to proceed with caution.**
	CAUTION **This symbol alerts you to consult the manual for further information and to proceed with caution.**

Non-electrical Symbols

The following is an illustrated glossary of all non-electrical safety alert symbols found on Applied Biosystems instruments.

	CAUTION **This symbol illustrates a heater hazard. Proceed with caution when working around these areas to avoid being burned by hot components.**
	This symbol indicates that a laser is present inside the instrument.

Symboles des alertes de sécurité

Symboles électriques

Le tableau suivant donne la signification de tous les symboles électriques qui figurent sur les appareils Applied Biosystems. En présence de l'un de ces symboles, il est impératif de se conformer aux consignes de sécurité appropriées.

	Position *MARCHE* de l'interrupteur d'alimentation principal.
	Position *ARRÊT* de l'interrupteur d'alimentation principal.
	Positions MARCHE-ARRÊT de l'interrupteur d'alimentation principal à bouton poussoir.
	Borne pouvant être reliée à la mise à la terre d'un autre appareil. Ce n'est pas une borne de mise à la terre protégée.
	Borne de mise à la terre de protection devant être reliée à la terre avant d'effectuer tout autre raccordement électrique à l'appareil.
	Borne recevant ou fournissant une tension ou un courant de type alternatif.
	Borne pouvant recevoir ou fournir une tension ou un courant de types alternatif et continu.
	**ATTENTION Indique la présence d'une haute tension et avertit l'utilisateur de procéder avec précaution.**
	**ATTENTION Avertit l'utilisateur de la nécessité de consulter le manuel pour obtenir davantage d'informations et de procéder avec précaution.**

Symboles non électriques

Le tableau suivant donne la signification des symboles d'alertes de sécurité non électriques qui figurent sur les appareils Applied Biosystems.

	**ATTENTION Danger associé à la présence d'un appareil de chauffage. Procéder avec précaution pour éviter de se brûler au contact de pièces ou d'éléments chauds.**
	Indique que l'appareil renferme un laser.

Sicherheitswarnsymbole

Elektrische Symbole

Die folgende Tabelle enthält Beschreibungen aller auf den Instrumenten von Applied Biosystems verwendeten elektrischen Symbole. Wenn diese Symbole auf den Instrumenten erscheinen, beachten Sie bitte die entsprechenden Sicherheitsvorkehrungen.

	Dieses Symbol zeigt die *EIN*-Position des Hauptnetzschalters an.
	Dieses Symbol zeigt die *AUS*-Position des Hauptnetzschalters an.
	Dieses Symbol zeigt die EIN/AUS-Position eines Druck-Zug-Hauptnetzschalters an.
	Dieses Symbol zeigt an, daß ein Anschluß an die Betriebserde eines anderen Instruments angeschlossen werden kann. Dies ist kein geschützter Erdanschluß.
	Dieses Symbol zeigt einen geschützten Erdanschluß an, der geerdet werden muß, bevor andere elektrische Anschlüsse zum Instrument hergestellt werden.
	Ein mit diesem Symbol gekennzeichneter Anschluß kann Wechselstrom oder -spannung erhalten oder abgeben.
	Ein mit diesem Symbol gekennzeichneter Anschluß kann Wechselstrom oder -spannung und Gleichstrom oder -spannung erhalten oder abgeben.
	VORSICHT **Dieses Symbol zeigt das Vorliegen von Hochspannung an und warnt den Anwender, mit Vorsicht fortzufahren.**
	VORSICHT **Dieses Symbol fordert Sie auf, das Handbuch zwecks näherer Informationen zu konsultieren und mit Vorsicht fortzufahren.**

Nicht-elektrische Symbole

Die folgende Tabelle enthält Beschreibungen aller auf den Instrumenten von Applied Biosystems verwendeten nicht-elektrischen Symbole.

	VORSICHT **Dieses Symbol zeigt eine Gefahr durch die Heizung an. Gehen Sie mit Vorsicht vor, wenn Sie in der Nähe dieser Bereiche arbeiten, damit Sie sich nicht an heißen Komponenten verbrennen.**
	Dieses Symbol zeigt das Vorliegen eines Lasers im Innern des Instruments an.

Símbolos de alerta de seguridad

Símbolos eléctricos

En la siguiente tabla se muestra un glosario ilustrado de todos los símbolos eléctricos que se utilizan en los instrumentos de Applied Biosystems.

	Este símbolo indica la posición de *encendido* del interruptor principal.
	Este símbolo indica la posición de *apagado* del interruptor principal.
	Este símbolo indica la posición de encendido/apagado de un interruptor principal de presión.
	Este símbolo indica que existe la posibilidad de conectar esta terminal a la toma de tierra de referencia de otro instrumento. Esta no es una toma de tierra protegida.
	Este símbolo indica que la toma de tierra protegida debe ser conectada a tierra antes de realizar cualquier otro tipo de conexion eléctrica al instrumento.
	Una terminal marcada con este símbolo recibe o suministra corriente o tensión alterna.
	Una terminal marcada con este símbolo puede recibir o suministrar corriente o tensión alterna y continua.
	PRECAUCIÓN **Este símbolo indica la presencia de alta tensión y advierte al usuario que proceda con precaución.**
	PRECAUCIÓN **Este símbolo indica que consulte el manual para obtener más información y que proceda con precaución.**

Símbolos no eléctricos

A continuación se presenta un glosario ilustrado de todos los símbolos de seguridad y alerta no eléctricos que aparecen en los instrumentos de Applied Biosystems.

	PRECAUCIÓN **Este símbolo indica peligro de altas temperaturas. Proceda con cautela cuando trabaje cerca de estas zonas para evitar quemarse con componentes calientes.**
	Este símbolo indica que hay un láser dentro del instrumento.

Simboli degli allarmi di sicurezza

Simboli elettrici

La tabella seguente è un glossario illustrato di tutti i simboli elettrici utilizzati su strumenti Applied Biosystems. Ogni volta che tali simboli compaiono sugli strumenti, rispettare le procedure di sicurezza appropriate.

	Questo simbolo indica la posizione *ON* dell'interruttore di alimentazione generale.
	Questo simbolo indica la posizione *OFF* dell'interruttore di alimentazione generale.
	Questo simbolo indica la posizione ON/OFF di un interruttore di alimentazione generale a pulsante.
	Questo simbolo indica che un terminale può essere collegato al riferimento di terra del segnale di un altro strumento. Non è un terminale di terra protetto.
	Questo simbolo indica un terminale protettivo di messa a terra che deve essere collegato a terra prima di realizzare qualsiasi altro collegamento elettrico allo strumento.
	Un terminale contrassegnato con questo simbolo riceve o fornisce tensione o corrente alternata.
	Un terminale contrassegnato con questo simbolo può ricevere o fornire tensione o corrente alternata e continua.
	**ATTENZIONE questo simbolo indica la presenza di alta tensione e invita l'utente a procedere con cautela.**
	**ATTENZIONE questo simbolo invita l'utente a consultare il manuale per ulteriori informazioni e procedere con cautela.**

Simboli non elettrici

Segue un glossario illustrato dei simboli degli allarmi di sicurezza non elettrici trovati su strumenti Applied Biosystems.

	**ATTENZIONE questo simbolo illustra un rischio da alte temperature. Procedere con cautela quando si lavora in queste aree per evitare ustioni causate di componenti a temperature elevate.**
	Questo simbolo indica la presenza di laser nello strumento.

Símbolos de alerta de segurança

Símbolos elétricos

A tabela a seguir constitui um glossário ilustrado de todos os símbolos elétricos usados nos instrumentos Applied Biosystems. Sempre que um desses símbolos aparecer num instrumento, siga os procedimentos adequados de segurança.

	Este símbolo indica que o interruptor de energia elétrica está na posição *ligado*.
	Este símbolo indica que o interruptor de energia elétrica está na posição *desligado*.
	Este símbolo indica a posição ligado/desligado de um interruptor principal de energia elétrica do tipo botão de pressão.
	Este símbolo indica que um terminal pode estar conectado a uma referência de aterramento de sinal de um outro instrumento. Este não é um terminal terra protegido.
	Este símbolo indica que este é um terminal de aterramento de proteção, que deve ser ligado à terra antes de se fazer qualquer outra ligação elétrica ao instrumento.
	Um terminal marcado com este símbolo recebe ou transmite tensão ou corrente alternada.
	Um terminal marcado com este símbolo recebe ou fornece tensão ou corrente alternada ou contínua.
	**CUIDADO Este símbolo indica a presença de alta tensão e avisa o usuário para proceder com cuidado.**
	**CUIDADO Este símbolo serve como alerta, para que se consulte o manual a fim de se obter mais informações e que se proceda com cuidado.**

Símbolos não-elétricos

A seguir, apresentamos um glossário ilustrado de todos os símbolos de alerta de segurança não relacionados à eletricidade encontrados nos instrumento Applied Biosystems.

	**CUIDADO Este símbolo representa um perigo devido a aquecedor no local. Proceda com cuidado ao trabalhar em áreas próximas a aquecedores, para evitar queimaduras devidas ao contato com componentes quentes.**
	Este símbolo indica que há um laser dentro do instrumento.

安全上の警告マーク

電気に関するマーク

PE Biosystems 装置に使用されている全ての電気に関するマークを下表に示します。このようなマークが装置に表示されている場合は、安全上、該当する指示を必ず守ってください。

	主電源スイッチのオンの位置を示します。
	主電源スイッチのオフの位置を示します。
	押しボタン式主電源スイッチのオン / オフの位置を示します。
	この表示は、端子を別の機器のグランドに接続できることを示します。これはグランド保護端子ではありません。
	この装置に電気的接続を行う前に、アースに接続する必要があるグランド端子を示します。
	この表示のある端子は、交流電流または交流電圧を受信または供給します。
	この表示のある端子は、交流および直流電流または電圧を受信・供給することができます。
	警告　**高電圧のため注意が必要です。**
	警告　**詳細についてはマニュアルを参照した上で、注意して行ってください。**

電気以外のマーク

次に示すマークは PE Biosystems 装置で使用されている電気以外の安全上のマークです。

	警告　**このマークはヒータに関する危険を示します。この表示のある周囲で作業する場合は、部品が高温になっているため火傷を負わないように注意が必要です。**
	装置内にレーザを用いていることを示します。

安全警告符號

電源符號 下列為 PE 公司「生物系統部」儀器之電源符號所代表的意思：

	本符號表示主電源處於「開」的位置。
	本符號表示主電源處於「關」的位置。
	本符號表示按鍵式電源開關。
	本符號表示此端与另一儀器接地端相連接，但並非安全接地端。
	本符號表示此端需接好安全地線方可將此儀器插上電源。
	本符號表示可接受或提供交流電源。
	本符號表示可接受或提供交流以及直流電源。
	小心 **本符號表示此處有高壓電，小心處理。**
	小心 **本符號表示請查閱操作手冊並小心處理。**

非電源符號 下列為 PE 公司「生物系統部」儀器之非電源符號所代表的意思：

	小心 **此處燙熱，小心處理以免燙傷。**
	此符號表示儀器內含有雷射光（極光）。

안전 경보 기호

전기 기호

다음의 챠트는 PE Biosystems 기기에서 사용되는 모든 전기 기호들의 도해 해설입니다.

	이 기호는 주 전원 스위치가 *on* 임을 나타냅니다.
	이 기호는 주 전원 스위치가 *off* 임을 나타냅니다.
	이 기호는 푸쉬푸쉬 주 전원 스위치가 on/off 됨을 나타냅니다.
	이 기호는 전극이 다른 기기의 신호 접지 레퍼런스에 연결되었을 수 있음을 나타냅니다. 이것은 보호되는 접지 전극이 아닙니다.
	이 기호는 기기에 어떠한 전기 연결이 되기전에 접지로 반드시 연결되어야 하는 보호되는 접지 전극임을 나타냅니다.
	이 기호가 있는 전극은 교류 또는 전압을 받거나 보낼 수 있습니다.
	이 기호가 있는 전극은 교류 및 직류 또는 전압을 받거나 공급할 수 있습니다.
	주의 이 기호는 고압이 흐름을 나타내며 사용자들이 주의할 것을 경고합니다.
	주의 이 기호는 더 자세한 정보를 얻기 위해 설명서를 참고할 것을 알리며 주의할 것을 알려줍니다.

비 전기 기호

다음의 챠트는 PE Biosystems 기기에서 발견되는 비 전기 안전 경고의 도해 해설입니다.

	주의 이 기호는 가열 위험을 나타냅니다. 이 주변에서 작업할 때는 뜨거운 부품에 의한 화상을 피하기 위해 주의해야 합니다.
	이 기호는 레이저가 기기내에 존재함을 나타냅니다.

เครื่องหมายเตือนเพื่อความปลอดภัย

เครื่องหมายที่เกี่ยวข้องกับไฟฟ้า

แผนภูมิต่อไปนี้ ทำไว้เพื่ออธิบายความหมายของเครื่องหมายต่างๆ ที่ใช้ในเครื่องวัดชนิดต่างๆ ของ**PE Biosystems** โปรดปฏิบัติตามขั้นตอนที่เหมาะสมเพื่อรักษาความปลอดภัย ทุกครั้งที่เครื่องหมายประเภทนี้ได้ปรากฏบนเครื่องวัดชนิดใด

	เครื่องหมายนี้ แสดงตำแหน่งเปิด (**ON**) ของสวิทช์กำลังหลัก
	เครื่องหมายนี้ แสดงตำแหน่งปิด (**OFF**) ของสวิทช์กำลังหลัก
	เครื่องหมายนี้ แสดงตำแหน่งเปิด-ปิด (**ON/OFF**) ของสวิทช์กำลังหลักชนิดผลัก-ผลัก
	เครื่องหมายนี้ แสดงว่าขั้วต่อสามารถเชื่อมต่อกับสายดินร่วมกับสายดินของสัญญาณอ้างอิงของเครื่องวัดอีกเครื่องหนึ่ง ซึ่งไม่ใช่ขั้วต่อลงดินที่ได้รับการป้องกัน
	เครื่องหมายนี้ แสดงว่ามีขั้วต่อลงดินเพื่อความปลอดภัยอยู่อันหนึ่งที่ต้องเชื่อมต่อกับสายลงดินก่อนที่จะสามารถทำการต่อไฟอื่นใดกับเครื่องวัดนี้ได้
	ขั้วต่อที่ติดเครื่องหมายนี้ ได้รับหรือส่งกระแสหรือแรงดันสลับ
	ขั้วต่อที่ติดเครื่องหมายนี้ สามารถรับหรือจ่ายกระแสหรือแรงดันไฟฟ้าทั้งกระแสสลับและกระแสตรงได้
	**ระวัง เครื่องหมายนี้แสดงว่ามีกระแสแรงดันสูง และเตือนผู้ใช้เครื่องว่าจะต้องทำงานด้วยความระมัดระวัง**
	**ระวัง เครื่องหมายนี้มีไว้เพื่อเตือนผู้ใช้เครื่องว่า จะต้องดูรายละเอียดเพิ่มเติมในคู่มือ แล้วทำงานด้วยความระมัดระวัง**

เครื่องหมายที่ไม่เกี่ยวข้องกับไฟฟ้า

ข้อความต่อไปนี้ เขียนไว้เพื่ออธิบายความหมายของเครื่องหมายเตือนอันตรายต่างๆ ที่ไม่เกี่ยวข้องกับไฟฟ้า และปรากฏบนเครื่องวัดชนิดต่างๆ ของ **PE Biosystems**

	**ระวัง เครื่องหมายนี้ แสดงภาวะอันตรายที่เกิดจากเครื่องทำความร้อน จงใช้ความระมัดระวังในขณะที่ทำงานในบริเวณเหล่านี้ เพื่อหลีกเลี่ยงไม่ให้ถูกไหม้จากชิ้นส่วนใดๆ ที่ร้อนจัด**
	เครื่องหมายนี้ แสดงว่ามีเลเซอร์อยู่ภายในเครื่องวัดนี้

Input/Output Connections

Location The exact locations of the input/output connections on the 390Z DNA/RNA Synthesizer are shown in Figure 2-1. The input/output connections are labeled on the instrument.

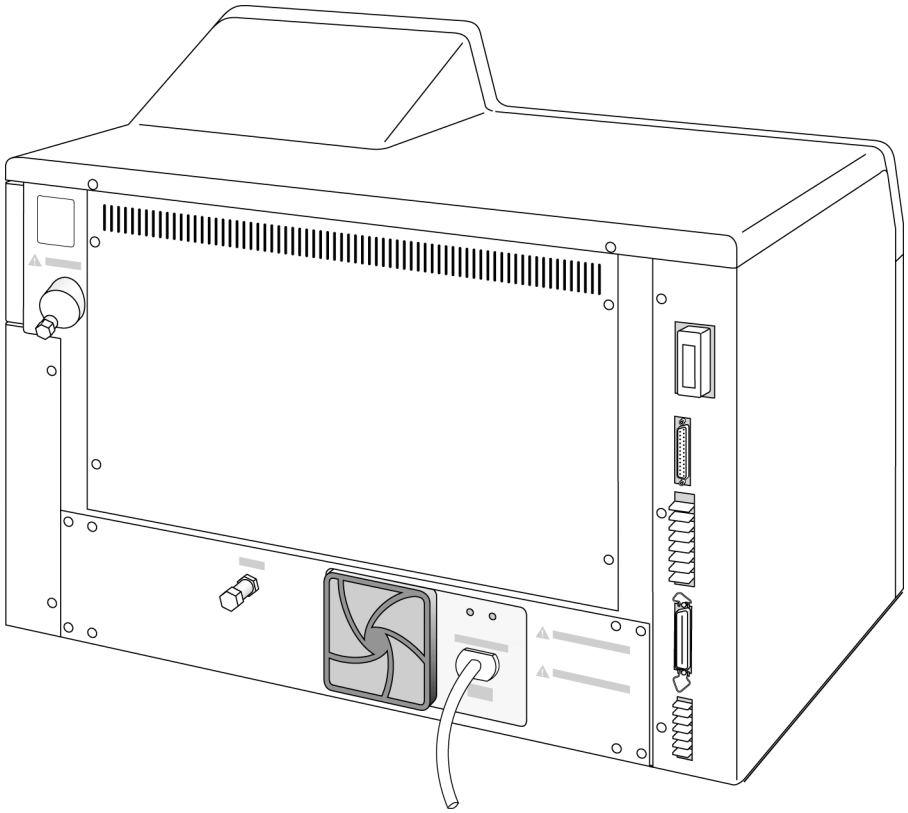

Figure 2-1 Input/output connections on the 390Z DNA/RNA Synthesizer

Gas Safety

Pressurized Gas Safety

! WARNING ! Pressurized gas cylinders are potentially explosive if not handled properly, and can cause great damage and severe injuries.

This instrument uses a pressurized gas cylinder for operation. Some kinds of rapidly leaking gas can displace normal atmosphere and cause suffocation. If knocked over, a pressurized gas cylinder can explode. Keep in mind the following when working with gas cylinders:

- Screw the gas cap on tightly when not in use and when transporting.
- Attach the cylinder firmly to a wall or gas cylinder cart by means of an approved strap or clamp.

Gaseous Waste Safety

! WARNING ! Handle all liquid, solid, and gaseous waste as potentially hazardous. Gaseous waste can cause injury, illness, or death.

Instruments that use gas cylinders for operation emit gaseous waste. Follow carefully the instructions provided in this chapter in the section entitled, “Disposing of Gaseous Waste and Exhaust,” and read the MSDSs and Waste Profiles in Chapter 3, “Chemical Safety.”

Keep in mind the following when working with instruments that use gas cylinders:

- Some gaseous waste is toxic.
- Vent according to instructions in the guide and all appropriate laws and regulations.

Disposing of Gaseous Waste

Instrument Waste and Exhaust System

The waste and exhaust system of the instrument is composed of a 3/8 in.-o.d. (0.95 cm) exhaust line attached to a 2.5-gal. (9.5 L) polyethylene bottle in a secondary container. This exhaust line conducts the waste fumes and gasses that enter the waste manifold to a fume hood or duct system for disposal.

Note In the 432 Peptide Synthesizer, the waste and exhaust system has a 1/4 in.-o.d. exhause line attached to a 1-gal (4 L) polyethylene bottle.

CAUTION **Be sure to place the waste bottle in a secondary container to minimize the possibility of leaks.**

The fume hood or duct system must be operating whenever the instrument power is on or when there is waste in the waste container.

Exhaust Line Tubing

- Exhaust line tubing should be polypropylene tubing of the shortest possible length and the straightest possible run. Tubing length should not exceed 15 ft (4.5 m).
- The exhaust line tubing should not have low points that can trap residue or condensation.
- The exhaust line tubing should be fastened securely. Use fasteners of polypropylene or Teflon. Do not use brass as it corrodes. Be careful not to puncture tubing.
- The tubing should be located away from sources of potential damage such as contact, heat, or flame.
- The tubing end should be placed as far as possible into the duct, canopy, or hood.
- The open end of the tubing should not face into oncoming air movement through the duct or canopy.

Connecting the Exhaust line

Connect the exhaust line from the instrument to the waste bottle so that it drops vertically. This prevents liquid and waste from accumulating and blocking the flow.

Make sure that the line leads to the fume hood or duct in a straight and upward direction. The line must not create low points by dipping in a downward direction becauuse condensation may collect and prevent proper flow through the instrument.

Pressurized Gas and Accessories Needed but Not Supplied

Gas Cylinder

Each laboratory must supply the required gas cylinder and accessories for installation. This instrument requires one size 1-A argon gas cylinder that holds approximately (7.2 m^3) 257 $ft.^3$ of gas when full.

Use only prepurified argon of 99.998% or greater purity. An additional argon cylinder should be ordered in advance for the ongoing operation of the instrument.

CAUTION **Damage to the instrument and its products can result from using impure argon, gasses other than argon, or an inadequate amount of argon.**

Pressure Regulator

A two-stage pressure regulator with dual gauges (output range: 0–80 psi, high pressure range: 0–3000 psi), and a Compressed Gas Association (CGA) 580 cylinder adapter with a needle-type shutoff valve on the exit side is required. The needle valves should have Swagelok- type end-fittings ready for connection to .25-in. (6.35 mm) o.d. tubing.

CAUTION **Do not allow the cylinder pressure to drop below 300 psi. Chemical vapors and/or liquids can backflow into the pressure regulator resulting in serious damage to the instrument.**

The second stage output of the regulator should be set at approximately 15 psi (448 kPa).

Attaching the Cylinder

Attach the pressurized gas cylinder firmly to a wall or gas cylinder cart by means of approved straps or clamps.

! WARNING ! **Pressurized gas cylinders are explosive. Attach the pressurized gas cylinder firmly to a wall or bench by means of approved straps or clamps. Always cap the gas cylinder when not in use.**

Chemical Safety 3

Introduction

Please read… This chapter contains detailed information for this instrument about:

- hazardous chemicals used (if any)
- hazardous waste produced and how to handle

Where appropriate, detailed Waste Profiles and Material Safety Data Sheets (MSDSs) are provided to ensure correct and safe operation of the instrument.

Applied Biosystems assumes that all operations in your laboratory will be conducted in accordance with safety practices detailed in Waste Profiles and MSDSs and with any applicable laws and regulations that apply.

Hazardous Chemicals

Overview

This instrument uses chemicals that are hazardous, chlorinated, organic liquids.

! WARNING ! Hazardous chemicals can cause injury, illness, or death. Handle all chemicals as potentially hazardous.

Chemicals are classified as hazardous when they are physically hazardous or if they may cause health hazards upon acute or chronic exposure.

- Physically hazardous chemicals are materials that are flammable, combustible, compressed gasses, explosives, oxidizers, organic peroxides, pyrophoric, reactive or unstable, or water reactive.
- Chemicals that may cause health hazards are materials that are carcinogens, toxic or highly toxic, reproductive toxins, irritants, corrosives, sensitizers, heptagons, nephrotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin eyes, or mucous membranes.

Handling Hazardous Chemicals

Important requirements for handling hazardous chemicals include:

- Read all applicable MSDSs before handling hazardous chemicals.
- When replacing reagents, always install the new bottle on the instrument. Do not top off old bottles. Some chemicals reduce the integrity of glass bottles and repeated use beyond six weeks may result in the bottle fracturing when it is pressurized during operation.
- Provide secondary containment for all reagent bottles.
- Do not store chemicals in direct sunlight or heat (on or off the instrument).

Hazardous Waste

Overview

The 390Z DNA/RNA Synthesizer generates hazardous, chlorinated, organic liquid and gaseous waste.

! WARNING ! CHEMICAL WASTE HAZARD. Waste produced by this instrument is potentially hazardous and can cause physical injury, illness, or death. Dispose of the contents of the waste tray and waste bottle in accordance with all applicable health and environmental laws and regulations.

Handling Hazardous Waste

The following are important requirements for handling hazardous waste:

- Ensure that the waste container is correctly installed.
- Always handle hazardous materials beneath a fume hood that is connected in accordance with all installation requirements.
- During transporting, ensure that waste containers are tightly sealed with the cap provided.
- Read the Instrument Waste Profiles in this chapter before handling or disposing of hazardous waste.
- Read all applicable Material Safety Data Sheets before handling or disposing of hazardous waste.
- Dispose of hazardous waste in accordance with all applicable laws and regulations.

Storing Hazardous Waste

! WARNING ! Never collect or store waste in a glass container because of the risk of breaking or shattering.

The following are guidelines for storing hazardous waste:

- Do not store waste for long periods of time.
- Do not store large amounts of waste in the lab.
- Do not store waste in direct sunlight or heat (on or off instrument).

Instrument Waste Profile Overview

General Information

The Instrument Waste Profile provides essential information about hazardous waste. Read the Instrument Waste Profile and all applicable MSDSs before handling or disposing of waste. The Instrument Waste Profile is NOT a substitute for MSDS information. See specific MSDS sheets in this chapter for chemical constituent, health, toxicological, and hazard information. For a complete list of acronyms and abbreviations used in Waste Profiles, see Appendix A.

Waste Profile Sections

Information in the Instrument Waste Profiles is divided into ten sections. The names of the ten sections are listed below.

Topic	Section
Identification	1
Approximate Composition	2
Physical Data	3
Fire and Explosion Hazard Data	4
Health Hazard Data	5
Reactivity Data	6
Spill or Leak Procedures	7
Special Protective Equipment	8
Special Precautions	9
Additional Information	10

ABI MODEL 390Z CHEMISTRY with CPG Support WASTE PROFILE

EMERGENCY PHONE NUMBERS: (USA) 415-570-6667 Ext. 999 (UK) 0925-825650

SECTION 1 — IDENTIFICATION

This Waste Profile assumes a synthesis using a derivatized controlled pore glass (CPG) support. All liquid waste from the Model 390Z is collected in a 20-L bottles located below the instrument. The Model 390Z generates about 520 mL of hazardous waste per cycle at the 200 μm scale. This waste is a complex mixture of reagents which may have properties of greater hazard than the individual waste components by themselves.

HANDLE THIS MATERIAL WITH EXTREME CAUTION! DO NOT DISPOSE OF THIS WASTE IN SINKS OR DRAINS! THIS MATERIAL SHOULD BE DISPOSED OF AS A REGULATED HAZARDOUS WASTE!

SECTION 2 — APPROXIMATE COMPOSITION

Material	%	TLV	PEL*	CAS#
1-methylimidazole	<1	N/A	N/A	616-47-7
Acetonitrile	77	40 ppm	40 ppm	75-05-8
Dichloromethane	16	50 ppm	500 ppm	75-09-2
Tetrahydrofuran	3	200 ppm	200 ppm	109-99-9
Phosphoramidites	<1	N/A	N/A	N/A
Acetic anhydride	<1	N/A	N/A	N/A
Iodine	<1	0.1 ppm	0.1 ppm	7553-56-2
2,6-lutidine	<1	N/A	N/A	108-48-5
Dichloroacetic acid	2.6	N/A	N/A	79-43-6
Pyridine	<1	5 ppm	5 ppm	110-86-1
Tetraethylthiuram disulfide	<1	2 mg/m^3	2 mg/m^3	97-77-8

N/A = Not Available
* OSHA's PEL limits are subject to the decision of the 11th Circuit Court of Appeals or higher Federal Court decision.

SECTION 3 — PHYSICAL DATA

BOILING POINT	760 mm: N/A
SPECIFIC GRAVITY	(H_2O = 1): 0.94
VOLATILITY	(vol%): 96-98%
APPEARANCE AND ODOR:	Yellow to reddish-brown liquid with an acrid, unpleasant odor
FREEZING POINT	N/A
pH RANGE	4-6
SOLUBILITY IN H_2O	Soluble

SECTION 4 — fire and explosion hazard data (Acetonitrile data only!)

FLASH POINT (Closed Cup):	5.6 °C (42 °F)
FLAMMABLE LIMITS:	4.4% LEL 16% UEL
FIRE EXTINGUISHING MEDIA:	Dry chemical, alcohol foam, carbon dioxide or Halon
SPECIAL FIRE FIGHTING PROCEDURES:	Use self-contained breathing apparatus and protective clothing to prevent skin and eye contact.

Section 5 — HEALTH HAZARD DATA

EXPOSURE LIMITS:	See Section III
	For acetonitrile, the STEL is 60 ppm and the IDLH level is 4,000. For Dichloromethane, the STEL is 1000 ppm and the IDLH level is 5,000 ppm.
EFFECTS OF ACUTE OVEREXPOSURE:	
SWALLOWING	Harmful if swallowed! Causes severe irritation of eyes, nose, and throat, Higher concentrations may cause liver and kidney damage, unconsciousness, and death.
SKIN	May cause severe irritation or burns. Allergic skin sensitization may also occur.
INHALATION	May cause irritation of eyes, nose, throat, and lungs. Higher concentrations may cause pulmonary edema, unconsciousness, and death.
EYES	May cause severe irritation or burns.
EMERGENCY AND FIRST-AID PROCEDURES	
SWALLOWING	If conscious, give large quantities of water immediately and induce vomiting. Get medical attention immediately. Do not induce vomiting if unconscious.
SKIN:	Remove contaminated clothing. Flush the contaminated area with water and wash with mild soap or detergent. Get medical attention.
INHALATION:	Provide fresh air and rest. If breathing is difficult, provide oxygen and get medical attention immediately.
EYES:	Flush eyes immediately with large amounts of water for at least 15 minutes. Get medical attention.

SECTION 6 — REACTIVITY DATA

STABILITY:	Stable
INCOMPATIBILITY:	Contact with strong oxidizing agents or concentrated acids or bases may cause fire or explosion.
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS:	Burning may release toxic vapors and gases including phosgene, hydrogen chloride, hydrogen fluoride, carbon monoxide, and oxides of nitrogen.
HAZARDOUS POLYMERIZATION:	Will not occur.

SECTION 7 — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN:	Avoid inhalation and skin contact. Wear protective clothing. Ventilate area of spill or leak. Remove all ignition sources. Small quantities may be collected with absorbent towels or pads and removed to a well-ventilated area away from ignition sources. Larger amounts (1 liter or more) may be collected with an inert absorbent (kitty litter or similar material) or commercially available spill pillows designed for solvent collection. This waste material must not be allowed to enter confined spaces (such as a sewer) because of the possibility of an explosion.
WASTE DISPOSAL:	This instrument waste solution should be disposed of as a regulated hazardous waste by a properly-permitted hazardous waste management facility in accordance with federal, state and local regulations. Recommend disposal methods include high temperature incineration and solidification for secure chemical landfill disposal.

SECTION 8 — SPECIAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION:	An MSHA- or NIOSH-approved respirator for organic vapors is recommended. A supplied-air or SCBA respirator is recommended for high vapor concentration and emergency situations.
VENTILATION:	Handle within a well-ventilated area.Minimize open exposure to air.
PROTECTIVE GLOVES:.	Neoprene or latex rubber gloves are recommended
EYE PROTECTION:	Safety glasses with side shields, monogoggles, or face shield.
OTHER PROTECTIVE EQUIPMENT:	As necessary to prevent skin contact.

SECTION 9 — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN:	Handle as a flammable, poisonous liquid. Maintain adequate ventilation at all times. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Accidental contact should be washed immediately. Keep away from heat, sparks, and flame. Spill collection materials, eye wash, and safety shower should be in area of use.
OTHER:	This waste solution has strong solvent properties and will attack many forms of rubber, plastics, coating, and finishes.

SECTION 10 — ADDITIONAL INFORMATION

When not directly attached to the instrument, this waste material should be stored in a secure, well-ventilated location suitable for flammable materials. Store away from light, heat, or potential ignition sources. Contact the appropriate state hazardous waste regulatory agency for proper disposal procedures and lists of registered service companies.

THIS WASTE MATERIAL IS HAZARDOUS AND SHOULD ONLY BE HANDLED BY PERSONS THOROUGHLY TRAINED IN HAZARDOUS MATERIALS HANDLING PROCEDURES!

ABI MODEL 390Z CHEMISTRY WITH HLP SUPPORT WASTE PROFILE

EMERGENCY PHONE NUMBERS: (USA) 415-570-6667 Ext. 999 (UK) 0925-825650

SECTION 1 — IDENTIFICATION

This Waste Profile assumes a synthesis using a derivatized high-loaded polystyrene (HLP) support. All liquid waste from the Model 390Z is collected in a 20-L bottles located below the instrument. The Model 390Z generates about 520 mL of hazardous waste per cycle at the 200-μmol scale. This waste is a complex mixture of reagents which may have properties of greater hazard than the individual waste components by themselves.

HANDLE THIS MATERIAL WITH EXTREME CAUTION! DO NOT DISPOSE OF THIS WASTE IN SINKS OR DRAINS! THIS MATERIAL SHOULD BE DISPOSED OF AS A REGULATED HAZARDOUS WASTE

SECTION 2 — APPROXIMATE COMPOSITION

Material	%	TLV	PEL*	CAS#
1-methylimidazole	<1	N/A	N/A	616-47-7
Acetonitrile	70	40 ppm	40 ppm	75-05-8
Dichloromethane	14.5	100 ppm	500 ppm	75-09-2
Tetrahydrofuran	2.7	200 ppm	200 ppm	109-99-9
Phosphoramidites	<1	N/A	N/A	N/A
Acetic anhydride	<1	N/A	N/A	N/A
Iodine	<1	0.1 ppm	0.1 ppm	7553-56-2
2,6-lutidine	<1	N/A	N/A	108-48-5
Dichloroacetic acid	2.6	N/A	N/A	79-43-6
Pyridine	<1	5 ppm	5 ppm	110-86-1
Tetraethylthiuram disulfide	<1	2 mg/m^3	2 mg/m^3	97-77-8
N,N-Dimethylformamide	9.6	10 ppm	10 ppm	68-12-2

N/A = Not Available
* OSHA's PEL limits are subject to the decision of the 11th Circuit Court of Appeals or higher Federal Court decision.

SECTION 3 — PHYSICAL DATA

BOILING POINT	760 mm: N/A
SPECIFIC GRAVITY	(H_2O = 1): 0.94
VOLATILITY	(vol%): 96-98%
APPEARANCE AND ODOR:	Yellow to reddish-brown liquid with an acrid, unpleasant odor
FREEZING POINT	N/A
pH RANGE	4-6
SOLUBILITY IN H_2O	Soluble

SECTION 4 — fire and explosion hazard data (Acetonitrile data only!)

FLASH POINT (Closed Cup):	5.6 °C (42 °F)
FLAMMABLE LIMITS:	4.4% LEL 16% UEL
FIRE EXTINGUISHING MEDIA:	Dry chemical, alcohol foam, carbon dioxide or Halon
SPECIAL FIRE FIGHTING PROCEDURES:	Use self-contained breathing apparatus and protective clothing to prevent skin and eye contact.

Section 5 — HEALTH HAZARD DATA

EXPOSURE LIMITS:	See Section III
	For acetonitrile, the STEL is 60 ppm and the IDLH level is 4,000. For Dichloromethane, the STEL is 1000 ppm and the IDLH level is 5,000 ppm.
EFFECTS OF ACUTE OVEREXPOSURE:	
SWALLOWING	Harmful if swallowed! Causes severe irritation of eyes, nose, and throat, Higher concentrations may cause liver and kidney damage, unconsciousness, and death.
SKIN	May cause severe irritation or burns. Allergic skin sensitization may also occur.
INHALATION	May cause irritation of eyes, nose, throat, and lungs. Higher concentrations may cause pulmonary edema, unconsciousness, and death.
EYES	May cause severe irritation or burns.
EMERGENCY AND FIRST-AID PROCEDURES	
SWALLOWING	If conscious, give large quantities of water immediately and induce vomiting. Get medical attention immediately.Do not induce vomiting if unconscious.
SKIN:	Remove contaminated clothing. Flush the contaminated area with water and wash with mild soap or detergent. Get medical attention.
INHALATION:	Provide fresh air and rest.If breathing is difficult, provide oxygen and get medical attention immediately.
EYES:	Flush eyes immediately with large amounts of water for at least 15 minutes.Get medical attention.

SECTION 6 — REACTIVITY DATA

STABILITY:	Stable
INCOMPATIBILITY:	Contact with strong oxidizing agents or concentrated acids or bases may cause fire or explosion.
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS:	Burning may release toxic vapors and gases including phosgene, hydrogen chloride, hydrogen fluoride, carbon monoxide, and oxides of nitrogen.
HAZARDOUS POLYMERIZATION:	Will not occur.

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VENTILATION:	Handle within a well-ventilated area.Minimize open exposure to air.
PROTECTIVE GLOVES:.	Neoprene or latex rubber gloves are recommended
EYE PROTECTION:	Safety glasses with side shields, monogoggles, or face shield.
OTHER PROTECTIVE EQUIPMENT:	As necessary to prevent skin contact.

SECTION 9 — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN:	Handle as a flammable, poisonous liquid. Maintain adequate ventilation at all times. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Accidental contact should be washed immediately. Keep away from heat, sparks, and flame. Spill collection materials, eye wash, and safety shower should be in area of use.
OTHER:	This waste solution has strong solvent properties and will attack many forms of rubber, plastics, coating, and finishes.

SECTION 10 — ADDITIONAL INFORMATION

When not directly attached to the instrument, this waste material should be stored in a secure, well-ventilated location suitable for flammable materials. Store away from light, heat, or potential ignition sources. Contact the appropriate state hazardous waste regulatory agency for proper disposal procedures and lists of registered service companies.

THIS WASTE MATERIAL IS HAZARDOUS AND SHOULD ONLY BE HANDLED BY PERSONS THOROUGHLY TRAINED IN HAZARDOUS MATERIALS HANDLING PROCEDURES!

Acronyms and Abbreviations

A

Acronyms and Abbreviations Used in Waste Profiles and MSDSs

Introduction

Waste Profiles and MSDSs use acronyms and abbreviations for certain organizations, government regulations, common scientific terminology, units of measurement, and chemicals.

The following tables contain lists of acronyms and abbreviations commonly used in Waste Profiles and MSDSs.

Organizations, Regulations, and Scientific Terminology

Acronyms and abbreviations for organizations, government regulations, and scientific terminology.

Table A-1 Acronyms and abbreviations

Term	Explanation
ACGIH	American Conference of Governmental Industrial Hygienists
CAS#	Chemical Abstract Service Reference Number for Specific Pure Chemical
cc	Closed cup testing of flash point
CFR	Code of Federal Regulations. Regulations published by the United States Government
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund) is a federal las administered by EPA
DFG MAK	Federal Republic of Germany's Maximum Contamination Value in the workplace (similar to PEL in the USA)
DOT	United States Department of Transportation, regulates transportation of hazardous material (USA)
EPA	United States Environmental Protection Agency, regulates use, disposal, or emission of hazardous material (USA)
IDLH	Immediate Danger to Life and Health
LC_{LO}	Lowest published lethal concentration
LC_{50}	Lethal concentration in air that kills 50% of a specified population
LD_{50}	Lethal dose that kills 50% of a specified population
LEL	Lower Explosion Limit
MSHA	Mine Safety and Health Administration, recommends respirators
NFPA	National Fire Protection Association, publishes recommended regulations for local or state governments in the United States (Hazardous rating system developed by this Association)

Table A-1 Acronyms and abbreviations *(continued)*

Term	Explanation
NIOSH	National Institute of Occupational Safety and Health (USA) recommends exposure levels and respirators
oc	Open cup testing for flash point
OSHA	Occupational Safety and Health Administration (USA), sets chemical exposure levels.
PEL	Permissible Exposure limit. The federal OSHA limit, usually expressed as TWA for an 8-hour work shift.
PPM	Parts Per Million
Prop 65	A California Law requiring warnings for chemicals that are known to the state to be carcinogenic or cause reproductive harm.
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act, a federal act administered by EPA.
SCBA	Self-Contained Breathing Apparatus
STCC	Standard Transportation Commodity Code
STEL	Short Term Exposure Level, published by ACGIH
TC_{LO}	Lowest published toxic concentration
TLV	Threshold Limit Value. The ACGIH-recommended TWA, usually for an 8-hour work shift
TWA	Time Weighted Average
UEL	Upper Explosive Limit
u or U	Unknown
UN	United Nations. This designation identifies hazardous chemicals in the process of world-wide transportation.

Units of Measurement

The following are abbreviations for units of measurement.

Table A-2 Abbreviations for units of measurement

Abbrev.	Unit of Measurement
#	number
°C	degrees Celsius
°F	degrees Fahrenheit
µL	microliter
µm	micron
µmol	micromole
AUFS	absorbency units full-scale
ft.	foot
i.d.	inside diameter
in.	inch
L	liter
m	meter

Table A-2 Abbreviations for units of measurement

Abbrev.	Unit of Measurement
mg	milligram
mL	milliliter
mm	millimeter
o.d.	outside diameter
P/N	Applied Biosystems part number
psi	pounds per square inch
sec	second
V	volt

Chemicals

The following are abbreviations for chemicals.

Table A-3 Abbreviations for chemicals

Abbrev.	Definition
A	adenine
AA	amino acid
1Ac	acetyl
Acl	acetylimidazole
Acm	acetamidomethyl
Ac_2O	acetic anhydride
ACN	acetonitrile
ACT	activator vessel
BHA resin	benzhydrylamine resin
t-Boc	tert-butyloxycarbonyl
Bzl	benzyl
Br-Z	2-bromobenzyloxcarbonyl
t-Bu	tert-butyl
C	cytosine
CHO	formyl
CH_3Bzl	4-methylbenzyl
$CH_3$0Bzl	4-methoxybenzyl
Cl-Z	2-chlorobenzyloxycarbonyl
CPG	Controlled Pore Glass
DCA	dichloroacetic acid
DCC	dicyclohexylcarbodiimide
DCM	dichloromethane
DCU	dicyclohexylurea
DIEA	diisopropylethylamine
DMAP	4-dimethylaminopyridine
DMF	dimethylformamide
DMSO	dimethylsulfoxide
DNA	deoxyribonucleic acid

Table A-3 Abbreviations for chemicals *(continued)*

Abbrev.	Definition
Dnp	2,4-dinitrophenyl
Et	ethyl
EtOH	ethanol
Fmoc	9-fluorenylmethyloxycarbonyl
G	guanine
HBTU	2-(1 H-benzotriazol-1-yl)-1,1,3,3-tetramethyl-uronium hexafluorophosphate
HLP	high loaded polystyrene
HMP resin	p-hydroxymethylphenoxymethyl-polystyrene resin
HOAc	acetic acid
mBHA resin	4-methylbenzhydrylamine resin
MeOH	methanol
Mob	4-methoxybenzyl
Mtr	4-methoxy-2,3,6-trimethyl-benzene sulfonyl
Mts	mesitylene-2-sulfonyl
NMI	1-Methylimidazole
NMP	N-Methylpyrrolidone, N-methyl-2-pyrrolidone
OBt	ethyl ester
OMe	methyl ester
PAM resin	phenylacetamidomethyl resin
PEG	polyethylene glycol
RV	reaction vessel
SSPS	solid-phase peptide synthesis
T	thymine
TETD	tetraethylthiuram disulfide
TFA	trifluoroacetic acid
TFMSA	trifluoromethane sulfonic acid
THF	tetrahydrofuran
Tos	4-toluenesulfonyl (tosyl)
Tri	trityl
U	uracil
Z	benzyloxcarbonyl

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