HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

LABORATORY SAFETY GUIDELINE

Qiagen Kits

Many labs use DNA/RNA extraction kits to isolate total RNA or DNA from a wide variety of samples, including animal and plant cells and tissue, bacteria and yeast. While the kits are low hazard on their own, it's important to remember that mixing incompatible chemicals can produce high hazard by-products and gases. Recent incidents have been reported concerning researchers mixing bleach with RNA extraction kits waste. These kits contain guanidine salts (e.g., guanidine thiocyanate and guanidine hydrochloride) that may produce hazardous gases when combined with bleach (sodium hypochlorite) and/or strong acids. Please reference the Bleach Incompatibility Information in Appendix 1. See also the Qiagen Reagent Guidance in Appendix 2.

HAZARDS

Qiagen Kits can have multiple hazards depending on the chemical composition of the kit reagents. Please review the manufacture's Safety Data Sheet and additional chemical information at http://www.ehs.harvard.edu/safety-data-sheets-sds

PRECAUTIONS

Before starting work:

- Ensure that a written experimental protocol including safety information is available.
- Always read the Safety Data Sheet (SDS) for a chemical and the user guide for a kit. Review Sections 7 (Handling & Storage) and 10 (Stability & Reactivity) of the SDS for incompatible chemicals.
- Make sure you are familiar with general University emergency procedures in the EHS Lab Emergency Response Guide.
- Identify the location of the nearest eyewash and shower and verify that they are accessible.

During work:

- As biological materials are already inactivated by Trizol and other cell-lysis related reagents (i.e., DNAzol, RNAzol or Tri-reagent, etc.), there is NO NEED to also decontaminate them with bleach. This kind of chemical – containing biological waste should be disposed of as a chemical waste (please see the guidance sheet with hazardous waste disposal guidelines).
- NEVER mix bleach with Trizol or other incompatible chemicals (see Appendix 1).
- When working with Trizol and/or similar chemical reagents while purifying nucleic acids, always work with an exposure control device such as a chemical fume hood or snorkel and wear a lab coat, disposable gloves (double nitrile if it contains phenol as in the case of Trizol), and eye protection.

EMERGENCY PROCEDURES

Spill Response

- If liquid containing Qiagen buffers is spilled, clean with suitable laboratory detergent and water. If the spilled liquid contains potentially infectious agents, clean the affected area first with laboratory detergent and water, and then with 1:10 bleach dilution.
- For more information, please consult the appropriate SDS as well as the Qiagen kit handbook

- If a kit has reacted or a spill cannot be contained, please contact the University Operations Center at (617) 495**5560** [HMS/HSDM (617) 432-1901]

Appendix 1. Bleach Incompatibility Information

Incompatible Chemicals and Agents	Possible Results of Mixing with Bleach
Hydrogen Peroxide	Violent reaction producing **oxygen**
Acids and Acidic Compounds such as: ➢ Hydrochloric Acid ➢ Sulfuric Acid ➢ Hydrofluoric Acid ➢ Fluorosilicic Acid ➢ Phosphoric Acid ➢ Aluminum Sulfate ➢ Aluminum Chloride ➢ Ferrous or Ferric Chloride ➢ Ferrous or Ferric Sulfate (including chlorinated solutions)	Release of **Toxic Chlorine Gas** (reaction/release may occur violently)
Ammonia-containing Compounds such as: ➢ Ammonium Hydroxide ➢ Ammonium Chloride ➢ Ammonium Silicofluoride ➢ Ammonium Sulfate ➢ Quaternary Ammonium Salts	Formation of **Chloramine compounds** (toxic and potentially explosive)
Organic Chemicals such as: ➢ Organic solvents ➢ Organic polymers ➢ Amines ➢ Ethylene Glycol ➢ Formic Acid ➢ Insecticides ➢ Fuels and fuel oils ➢ Propane ➢ Methanol	Formation of **explosive compounds** Release of **toxic chlorine gas** Formation of **chlorinated organics** which may be toxic or carcinogenic
Metals such as: ➢ Cobalt ➢ Copper ➢ Nickel ➢ Iron ➢ Avoid piping and equipment containing aluminum, carbon steel, stainless steel, and other metals	Release of **oxygen** which could cause overpressurization and rupture of a closed container or system
Reducing Agents such as: ➢ Sodium Bisulfite ➢ Sodium Hydrosulfate ➢ Sodium Sulfate ➢ Sodium Thiosulfate	Production of **heat** from reaction may cause boiling/splashing
Guanidine Salts (found in many lysis buffers) such as: ➢ Guanidine Hydrochloride ➢ Guanidine Thiocyanate	Release of **toxic gases** which can include chloramines, chlorine and hydrogen cyanide

Appendix 2. Qiagen Kit Guidance

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
Buffer AE		See Note**	
Buffer AL	Guanidinium chloride @ 25-50%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer ALO	Sodium Dodecyl Sulphate @ 0.1-1.0%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
Buffer AP1	Sodium Dodecyl Sulphate @ 0.1-1.0%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
Buffer AP2	Acetic Acid @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer AP3/E	Guanidinium chloride @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer APP	Zinc Chloride @ 1.0-2.5%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Bugger ATL	Sodium Dodecyl Sulphate @ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
Buffer AW		See Note**	
Buffer AW1	Guanidinium chloride @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer AW2	Sodium Azide @ 0.1%, Non-Hazardous Salt Buffer @ 99.9%	**Manage as hazardous waste**	
Buffer BB	Cetrimonium Bromide @ 0.1-1.0%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	

Buffer EB		See Note**	
Buffer EC		See Note**	

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
Buffer ETR		See Note**	
Buffer EX Reaction Buffer		See Note**	
Buffer N3	Guanidinium Chloride @ 25-50%, Acetic Acid @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	**REACTS WITH BLEACH***
Buffer P1		See Note**	
Buffer P3	Acetic Acid @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer PE		See Note**	
Buffer PB	Guanidinium Chloride @ 25-50%, Propan-2-ol @ 25-50%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	**REACTS WITH BLEACH***
Buffer PNI	Guanidinium Chloride @ 25-50%, Propan-2-ol @ 25-50%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	**REACTS WITH BLEACH***
Buffer PM	Guanidinium Hydrochloride @ 25-50%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer QBT	Propan-2-ol @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer QC	Propan-2-ol @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer QG	Guanidinium chloride @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer QLE		See Note**	

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
Buffer QLL	Dimethyl-N-Lauryl-N-(3Sulfopropyl)-Ammonium-Betain @ 2.5-10%, Guanidinium Chloride @ 1.0-2.5%, Gudanidine Thiocyanate @ 1.0-2.5%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer QLW		See Note**	
Buffer QN	Propan-2-ol @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer QS	Propan-2-ol @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer QXI	Sodium Perchlorate @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Buffer RDD		See Note**	
Buffer RNA later		See Note**	
Buffer RLC	Guanidinium chloride @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer RLT	Guanidinium chloride @ 25-50%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer RPE (concentrate)		See Note**	
Buffer RT	Trometamol@ 2.5-10%, Hydrogen Chloride @ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
Buffer RW1	Guanidine Thiocyanate @ 2.5-10%, Ethanol @ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
Buffer S3	Acetic Acid @ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
dNTP Mix	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Effectene Transfection Buffer	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Enhancer	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Exonuclease Solvent (Buffer)		See Note**	
gDNA Wipeout Buffer	Trometamol@ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
GelPilot Loading Dye	Trometamol@ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
LyseBlue	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Lysozyme	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Multiplex PCR Master Mix 2x	Non-Hazardous Proprietary Ingredients @ 100%	Sink disposal	
Omniscript Reverse Transcriptase		See Note**	
OneStep Enzyme Mix		See Note**	
OneStep RT-PCR Buffer	Trometamol@ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
pH Indicator I	Cresol Red @ <1%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
Proteinase K	Proteinase @ <1%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	
Quagen Resin		See Note**	
QIAEX II Suspension	Sodium Perchlorate @ 50-100%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	**REACTS WITH BLEACH***

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
QIAzol Lysis Reagent	Phenol @ 25-50%, Guanidine Thiocyanate @ 10-25%, Non-Hazardous Proprietary Ingredients @ Balance	**Manage as hazardous waste**	**REACTS WITH BLEACH***
Q-Solution 5x	Non-Hazardous Proprietary Ingredients @ Balance	Sink disposal	
Quantifast SYBR Green PCR Master Mix	1,2,4-Triazole @ 1.0-2.5%, 2amino/2/(hydroxymethyl)propane-1,3-diolhydrochloride @ 1.0-2.5%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	**REACTS WITH BLEACH***
QuantiScript Reverse Transcriptase		See Note**	
QuantiScript RT Buffer 5x		See Note**	
QuantiTect RT Mix		See Note**	
RNase A Solution	Ribonuclease @ 2.5-10%, Non-Hazardous Proprietary Ingredients @ Balance	Not hazardous waste; sink disposal	
RT Primer Mix	Non-Hazardous Proprietary Ingredients @ Balance	Sink disposal	
SuperFect Transfection Reagent	Non-Hazardous Proprietary Ingredients @ Balance	Sink disposal	
SYBR Green RT-PCR Master Mix	Sodium Azide @ 0.27%, Tris Buffer @ Balance	**Manage as hazardous waste**	
Common Kits			
QIAprep Miniprep			**REACTS WITH BLEACH***
BioSprint PCR Purification			**REACTS WITH BLEACH***
QIAquick Multiwell PCR Purification (8 & 96)			**REACTS WITH BLEACH***
QIAamp Virus BioRobot 9604 Kit			**REACTS WITH BLEACH***

Reagent Name	Chemical Components	Management/Disposal Requirements	Known Bleach Reactions
QIAquick Kits			**REACTS WITH BLEACH***
NOTES:	*If any spilled Qiagen kit liquid contains potentially infectious agents, clean the affected area first with laboratory detergent and water, and then with a dilute 1% (v/v) sodium hypochlorite		

**Can be disposed of down the drain but the maximum combined total volume that can be discharged is 100 grams of solute per laboratory per day. After drain disposal, please flush with at least 10-20-fold excess of water to thoroughly rinse out the sink and sink trap.

The information in the table above only applies to the reagents when they are not mixed with any other chemicals. Please contact your Lab Safety Advisor for proper management/disposal of any Qiagen reagents not listed above.