Labware Notes
Delivering the Tools for Science
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SIGMA-ALDRICH Labware

Not all Gloves are created equal

Choose the right glove based on material performance and workplace conditions

Glove choice depends on job function, exposure to hazardous materials and skin sensitivities. Disposable gloves can be made from natural latex or a synthetic elastomerinc material. Overall performance is directly effected by formulations and manufacturing processes resulting in different barrier integrity and in-use performance.

Natural rubber latex has superior fit and comfort making it the preferred choice of glove users. However, reports of latex allergies have spread and as a result people are increasingly concerned with the effect latex products may have. More facilities are looking for synthetic alternatives that offer the fit and comfort of latex without the allergy risks.

A Sensitive Topic - How real is the risk?

When surgical gloves were first introduced, the gloves were sterilised by boiling and then put on wet over wet hands[1]. With the introduction of dry sterilisation, a dusting powder was necessary to facilitate donning of the glove. Originally, talc was used, but by 1940 it was recognised that talc caused granulomas. Corn starch treated with epichlorhydrin was found to be a good alternative. This is still in use today.

The powder was expected to be harmless but in the 1970's experiments showed that delayed hypersensitivity to starch could be induced. Human patients were also shown to have developed hypersensitivity to starch[2].

Many users believe the reactions they experience from a latex glove are due to the powder, but this is rarely the case.

Non-allergic contact dermatitis – Most common form

Cause	Direct contact with chemical or irritant (not always latex).
Symptoms	Skin irritation within minutes to hours on areas of direct contact.

Type IV allergy – Delayed allergic contact dermatitis

Cause	Specifically from gloves, usually accelerators in glove formulation.
Symptoms	Red rash, small blisters or crusting sores within 6 to 48 hours after contact. Not limited to areas in direct contact.

Type I allergy – Immediate-type

Cause	Latex proteins or accelerators[3].
Symptoms	Generalized urticaria, rhinitis, conjunctivitis, asthma or anaphylaxis within minutes to 1 hour after contact. Not limited to areas in direct contact.

Although glove powder has been reported to be the cause of several cases of immediate-type reactions it was believed that incidences have been due to the presence of proteins in the powder[3]. Starch is known to bind the allergenic latex proteins. Thus corn starch powder does not generally cause an allergic reaction on its own, but by binding with glove powder can also provoke irritant reactions by mechanical means. The starch particle can abrade the users skin, transferring the bound protein directly into the abrasion.

There is also growing evidence that glove powder can act as a vector for pathogens[4]. Podell notes that where glove powder is used, "it can be found throughout the operating theatre, acting as a magic carpet for microorganisms to contaminate the surgical field; it is attracted electrostatically to instruments, needles, sutures and implants, and is not removed by routine washing and wiping"[5].

Not an Easy Problem to Solve

Many workers wear gloves during the majority of the workday, a better fit with a secure grip means less hand fatigue and greater instrument control. Latex gloves fit snugly and are generally comfortable. But now that facilities are beginning to understand latex sensitivity, they are looking for alternatives. No products have offered a totally acceptable solution. Nitrile and polychloroprene gloves are resistant to many biological and chemical hazards but are less elastic than natural rubber latex. Vinyl is a synthetic plastic material that is very economical but also much less elastic than latex, and studies have shown that vinyl gloves do not have the same barrier integrity as nitrile, polychloroprene or latex.

Cost is also a consideration. Synthetic gloves cost more and haven't performed as well as latex so most facilities are still buying latex and turning to synthetics only when a verified allergy among the staff calls for change.

Putting the pieces together – Making sense of manufacturers claims is not a trivial matter. M. Fay states that selection criteria should be used to identify known risk factors, and glove features selected that minimise those risk factors[6].

Fay proposes that potential purchasers ask the following questions:

Is the product safe, does it meet regulatory criteria?

Does it fulfil its intended purpose?

Is the product better than a currently stocked item?

Are product claims supported by independent testing laboratories?

Can proven savings from risk reduction offset increased cost?

By understanding the process of glove manufacture and the key safety parameters it should be possible to determine whether the gloves are acceptable or not.

Continuing advances in latex and synthetic glove manufacture can be expected which will produce gloves with negligible allergen content and improved physical and mechanical properties.

Natural Rubber Latex – for example ComfortGrip gloves

Positive	Excellent elasticity Excellent tear strength Good chemical resistance	**Negative**	Linked to sensitivity/allergy problems

Polychloroprene – for example NeoPro® gloves

Positive	Excellent grip in wet conditions Good tear strength Good chemical resistance Good elasticity	**Negative**	Expensive Incineration releases hydrogen chloride[7]

Nitrile rubber – for example UltraSense™ gloves

Positive	Excellent chemical resistance Excellent puncture resistance	**Negative**	Generally less elastic than polychloroprene or latex Incineration releases hazardous cyanide[7]

Vinyl

Positive	Inexpensive	**Negative**	Poor elasticity Poor tear strength Links to allergies to additives used in manufatcure[8] Incineration releases the carcinogen vinyl chloride

Citations
1. Ellis 1990 hazards of surgical glove dusting powders
2. Grant Davies Espiner 1982
3. Heese Hintzenstern Peters Koch Hornstein 1991
4. Newsom Shaw Airborne particles Heathrow
5. Risks Complications Podell Regent
6. Fay Amsterdam Conference 1996
7. Morris, Health considerations of synthetic alternatives to natural rubber latex, 1994

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Paula's Pointers

Kimwipes dispenser

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If you have ever thought that easy, waste free dispensing of tissues was impossible when wearing gloves then this product could be your answer. The new Kimwipes push up dispenser has a spring-mounted plunger that gently ensures the top tissue is always easy to reach and ready when you need it, down to the very last one. The single piece construction is durable high-impact polystyrene that also acts as protection from spills in your work area.

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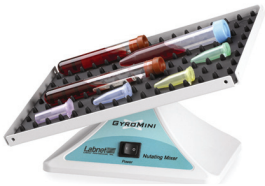
Labware Listens

Gyro-mini



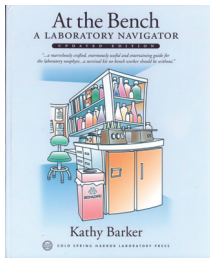
Mini-LabRoller

Lab Dancer

In response to a huge increase in customers asking for small footprint mixing equipment Labware has increased the range of mini-units offered. Joining the Lab Dancer vortexer from IKA we have the new mini-LabRoller and Gyro-mini units from Labnet. These models enable you to make the best use of your bench space by combining full operational specifications with a highly compact footprint.

For full details visit *sigma-aldrich.com/labwarenotes.*

Furture Reading



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At the Bench: A Laboratory Navigator, Updated Edition

At the Bench is the unique and hugely successful handbook for living and working in the laboratory, an essential aid to understanding basic lab techniques and how research groups work at a human level. In this newly revised edition, chapters have been rewritten to accommodate the impact of computer technology and the Internet, not only on the acquisition and analysis of data, but also on its organization and presentation. Alternatives to the use of radiation have been expanded, and figures and illustrations have been redrawn to reflect changes in laboratory equipment and procedures.

Down Time

	8	9						
			5		3		9	
3					2	8	1	5
		8				1		9
	1	2			4		3	
6								
1		3					2	
				7		4		
		5	6					7

Sudoku is a logic-based number placement puzzle. The objective is to fill a 9×9 grid so that each column, each row, and each of the nine 3×3 boxes contains the digits from 1 to 9 only one time each. Completed Sudoku puzzles are usually a type of Latin square with an additional constraint on the contents of individual regions. Sudoku means "single number" in Japanese.

Labware Links

For more detailed information on the products featured in this newsletter along with back issues and many useful Labware web links and protocols visit ***sigma-aldrich.com/labwarenotes***

Latest News

One click away from Personal Protection

Save time searching for the correct protection equipment to use with the chemical you have just ordered. All of our chemical product detail pages now contain direct links to the Personal Protection Equipment relevant to the hazards associated with that chemical. One click takes you directly to the applicable page of our on-line catalogue.
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