Questions & Answers

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Will counteragents used in decontamination damage Tychem® TK films?

There are many different kinds of counteragents. The most common type of counteragents used in the U.S. for decontamination is liquid detergent. The main brand used is Liquid Tide. Liquid detergents are basically used for two reasons:

1. They have good cold water solubility.
2. They won't damage films in the suit materials.

It is possible that other counteragents could damage suit materials; although we do not know which other specific counteragents would damage the material. Consider not using "chemical" counteragents in
decontamination, but to use detergents instead. A soft bristle brush should be used as hard bristles may scratch or damage the film.

AVOD EXOTHERMIC REACTIONS: Certain chemicals produce a large amount of heat when they react with water. If suits are heavily contaminated with a water-reactive chemical, there is a possibility that the suit may be damaged during field decontamination from the high reactive heat. The excess chemical may have to be removed with dry sand or non-reactive absorbent before water decontamination. Go to top

1. How should Tychem® TK Level A Garments be stored?
Users store the Tychem® TK Level A Suit in the original packing bag. Make certain the suit is completely dry before storing the garment. Go to top

2. Do ultraviolet rays damage the material quality?
Yes, ultraviolet rays can damage most chemical suit materials. We recommend drying suits out of direct sunlight, or inside using fans. Some decontamination units are equipped with a drying “room”. The suits are hung to dry with tubes inserted inside the arm and leg extensions to gently blow air into the suits for drying. Do not dry clean these suits. Do not use hot air or a tumbling air dryer to dry this suit. Go to top

3. When changing tanks on my SCBA (Self-Contained Breathing Apparatus) is it necessary for the user to change to a new chemical suit?
No, this is usually not necessary. Normally, the person wearing the suit will come out of the spill area (‘hot zone’), and then will be “decontaminated” while still in the suit (by washing off the suit) in order to remove the suit safely. Then the person will sit down, and the suit is removed just to the waist, enabling the SCBA tank to be changed. After the person is rested and received medical clearance; the tank is changed. The person will put his arms back into the suit, and the suit will be zipped completely. He is now ready to return to the spill area (‘hot zone’).

NOTE: It is important to “decontaminate” (wash) the suit before removing the suit even halfway for changing the SCBA tanks. Go to top

4. It is not advisable to train in the actual emergency suits; does DuPont offer a training suit?
Yes, DuPont offers a variety of training suits:
  - Responder® Training Suit: 41555 - Front Entry, Expanded Back (41556 - rear entry). This training suit is low cost, and is made to simulate situations wearing actual Responder® suits. It is made of Responder® material, but has a cloth zipper, PVC gloves, and has inexpensive component parts; also, it is NOT gas tight, is NOT pressure tested, and DOES NOT have a serial number.
  - PVC Training Suit: 30550 - Front Entry, expanded back (30551 - rear entry) This training suit is made of durable PVC to simulate wearing actual, heavy-weight, reusable chemical suits such as CPE, Viton®, Butyl, etc. It is designed for multiple training uses, and can handle daily use at hazmat training facilities.
  - Commander® EX Training Suit - Expanded Back - Front Entry TKX113; Rear entry, TKX112 ⁠ This training suit offers an economical and effective option for Level A training. Commander® EX style training suits are made of our popular Tychem® TK materials and features extra wide visor made of 20-mil PVC, providing a panoramic view. All seams are stitched with nylon thread. Butyl gloves are sewn directly on the suit sleeve. Sock boots and boot flaps are made from the base material. The 48” cloth zipper enables storm flap assembly. An internal waist belt provides easier donning of the garment. Each garment is prominently labeled "TRAINING SUIT, DO NOT USE IN HAZARDOUS ENVIRONMENTS". Sizes S/M-4XL.
  - Cordura® Fully Encapsulated Training Suit - Expanded Back ⁠ Front Entry 80110, Rear Entry 80111, Commander® style training suits are made of a durable fabric woven from 1000 denier DuPont Cordura® Nylon. Face shield is removable for laundering. Sizes S-4XL. Color may vary.
  - System CPF® 1 Training Suit - Lightweight, economical suits for short-term training situations. Go to top

5.
What is the heat resistance of Tychem® TK fabric?
Protective clothing is used under a variety of conditions. Garments can be exposed to a range of ambient temperatures as well as variations in the temperatures of the challenge chemical. No comprehensive method or standard currently exists to establish a temperature service range for a chemical suit or material. An estimated temperature service range for Tychem® material and seams: -94° F (-70° C) to 194° F (90° C). The auto ignition temperature is in excess of (350° C).

NOTE: The Tychem® TK fabric offers little thermal protection to the user. The temperature range for the material and seams is much higher than the temperatures that the human skin can withstand without injury. Skin temperatures of 28º F (-2° C) can result in frostbite. Temperatures in excess of 115º F (46° C) will result in first-degree burns.

The flammability characteristics of Tychem® TK chemical barrier fabric and seam tape are similar to synthetic fibers. When exposed to flame, these products shrink rapidly away from the flame. If the flame is made to follow the shrinking sheet, these products will melt, and will eventually ignite.

Decomposition: Tychem® TK decomposes with heat. Thermal decomposition will produce carbon dioxide, carbon monoxide, aldehydes, ketones and hydrocarbons.

CAUTION: Do not use for fire protection. Avoid open flame or intense heat. Contact DuPont for further information regarding "Temperature Service Range".

Extinguishing data: Water is the best extinguishing medium, but dry chemical, carbon dioxide and foam can also be used. Go to top

Will the Tychem® TK fabric melt from contact with a hot chemical?
This depends on the temperature of the chemical. Tychem® TK begins to soften at 95º F. Refer to question number 7. Go to top

What is the material of Tychem® TK? What is the material made of?
Tychem® TK is a chemical barrier material consisting of a high strength, high tear resistant 100% nonwoven polyester staple fabric sandwiched between proprietary non-halogenated barrier films. Go to top

How many times may the Tychem® TK suits be used?
Garments made of Tychem® TK are designed for single use exposure. If the fabric or seam tape becomes torn, abraded, or punctured, the end user must discontinue use of the garment to avoid potential chemical exposure. Go to top

Can suits made of Tychem® TK be incinerated?
The recommended method of disposal is burial in a landfill in accordance with local, state and federal regulations. If suit is known to be contaminated, additional regulations could apply. Tychem® TK suits may be incinerated. Tychem® TK material is made of polymers which do not contain halogens in their structural formula. Depending on the chemical nature and the amount of contamination on the garments, garments made from Tychem® TK could be either incinerated after use, without any harm to the environments, or buried in a responsible way. On incineration of the garment itself, traces of halogens in combustion gases and ash are at the level of ordinary halogen contamination in any non-halogen containing industrial products. Results of the Tychem® TK combustion by-products may be obtained from DuPont. Restrictions to the disposal of used suits manufactured from Tychem® TK depend on the contaminant. Go to top

Can suits made of Tychem® TK be recycled?
No, these products are made from several different thermoplastic resins. They should never be put in
with paper waste, which will be re-pulped. These products are not readily biodegradable.  

11. **How will Tychem® TK hold up against abrasion or rough usage?**  
As with all film laminate fabrics, excessive abrasions could damage or limit the useful life. Film laminate fabrics are not as strong as elastomeric or thermoplastic fabrics such as PVC or butyl; however, film laminate fabrics offer much greater chemical protection and are much less expensive.  

12. **Can suits made of Tychem® TK suits be repaired?**  
DuPont limited-use suits are not designed to be repaired. The suits are inexpensive, and being made from film laminates, are not designed for long-term, repeated wear.  

DuPont recognizes that in some instances minor repairs may be necessary on a new suit or a suit worn, but not contaminated. In these cases, contact DuPont Protective Apparel Customer Service for information and costs of associated with such repairs. DuPont will accept no suit returns without prior arrangement and documentation.  

13. **What chemicals should Tychem® TK not be used to protect against?**  
Caution should be used when encountering the following chemicals while wearing a Tychem® TK garment:  

- Bromine Liquid: 15 minutes  
- Thionyl Chloride: 90 minutes  

Even in these situations Tychem® TK may still be used, keeping in mind the amount of time until breakthrough, after chemical splash.  

14. **Do suits made of Tychem® TK have attached boots? If not, why?**  
No, Tychem® TK or Fully Encapsulated suits do not have attached boots. Instead, integral 'sock boots' are attached to the legs of the suit. These 'sock boots' serve a number of purposes:  

1. Protects the wearer's foot in case of chemical permeation through the boots - the Tychem® TK fabric offers much higher chemical protection than boot materials.  
2. Allows each individual wearer to use the size of boot that best fits, and the type of boot that is best for the particular situation.  
3. Is more economical. There are additional costs added for attaching boots.  
4. If the boots are damaged and/or contaminated, and the suit is not, then the suit may be easily reused, without cutting off and re-attaching boots.  

15. **Who uses suits made of Tychem® TK?**  
Tychem® TK suits are ideal for end-users who:  

1. Have an occasional need for chemical protection.  
2. Have a need for a wide range of chemical protection.  
3. Do not have proper decontamination equipment.  
4. Have a limited budget.  
5. Need a lightweight, easy-to-maintain suit.  
6. Are exposed to extremely toxic chemicals and cannot conduct adequate decontamination procedures.  

Tychem® TK suits offer the highest level of chemical protection available, and, because of this, they are ideal for applications such as chemical emergencies, cleanup and handling of highly toxic chemicals, maintenance situations involving highly toxic chemicals, to keep on site in case of a chemical emergency response, etc.  

16.  
17. **Will Tychem® TK suits protect against radiation?**
Responders® suits will not protect against ionizing radiation. A heavy shielding material, such as lead, is required to provide protection from ionizing radiation. Protective clothing is typically worn in nuclear applications for protection against radioactive contaminated particles and liquids. Responders® suits will serve as a barrier to radioactive particles, liquids and gases. NuFab®, Tyvek®, NexGen® or Pro/Shield® 2 garments will also provide adequate barrier against radioactive particle contamination; garments made of CPF® 1, CPF® 2 or Tyvek® QC will provide barrier protection against radioactive liquid contamination.

17. Sometimes the pass through can damage the material when folded into the suits for storage. What steps can be taken to eliminate this? The best solution is to wrap the pass through in bubble wrap, or other protective wrap, or inserting into a piece of foam, when storing. All suits ordered with a pass through are shipped with the pass through wrapped in bubble wrap and tape for protection during shipment.

18. What is a flash fire? A chemical ‘flash fire’ is the combustion or burning of flammable vapors or gases; typically occurring in enclosed or confined spaces. A flash fire is the ignition of a gas in the air generating radiant heat energy. Flash fires generate extreme temperatures 1200 - 1500 °F (649 - 816 °C) for a short period of time (5-10 seconds).

19. Sometimes the gas-protective zipper on Level A suits made of Tychem® TK is difficult to zip. What can be used to lubricate the zipper? If the zipper is difficult to operate, it can be lubricated lightly on the outer and inner components with paraffin (wax). Only use paraffin wax. After lubrication, the zipper should be closed and opened a number of times to assure that all excess lubricant has been removed.

20. Is it possible to use one single standard pass-through for both breathing air (connected to the respirator inside) and cooling air (connected to the air circulation system inside)? This is possible, although DuPont recommends that two pass throughs be used. The use of one single pass through for both applications it is not recommended for several reasons:
   1. If there is a problem with the airline, then there is no backup. (i.e.: if two airlines were used, and one became blocked or contaminated, then the other would be available in an emergency).
   2. Breathing air is usually of a higher quality, and thus more expensive to use. It is often not practical to use breathing air to also cool the suit.

21. What is the shelf life of Tychem® TK? DuPont™ Tychem® garments contain materials, including gloves, for which there is no specific shelf life data available. It is suggested that garments be labeled and retired to “Training Use Only” after five years. Garments may be used as long as they pass the ASTM F1052-97 pressure test and pass a full visual inspection. Uncontaminated garments that do not pass a pressure test or fail a visual inspection should be retired and labeled “For Training Use Only” or be discarded.

22. How is permeation performance affected by temperature? In general, permeation is expected to increase with increasing temperatures. However, there are a few exceptions to this generality. The temperature response of permeation rates depends on the barrier material and the chemical. For example, at room temperature, a 6 °C increase in temperature will increase the permeation rate of simple gases through an oriented polyester film from 1.3 to 2.1 fold, depending on the gases. (“Diffusion in Polymers”, J. Crank and G.S. Park, Ed., Academic Press, 1968, PP 46-50). This illustrates the behavior of one film and a few chemicals within a narrow temperature range.

23. CAUTION! Permeation rate may increase by a factor of 1.2 to 3.5 (depending on the material and the...
chemical) for each 5.6 °C (10°F) increase in the surrounding temperature. Go to top

23. **How is Tychem® TK different from Responder®?**
Tychem® TK is softer, more flexible, stronger and is a high visibility lime-yellow color. Go to top

24. **Are garments made of Tychem® TK manufactured in the same way as Responder®?**
No, Tychem® TK is offered in the Commander® and Commander® EX Models.

All Commander® models offer:
- PVC/Teflon® / PVC face shield – 3-layer face shield system, 20 mil PVC inner / 5 mil Teflon® middle / 40 mil PVC outer.
- Dual-glove system Butyl or Viton® outer and Barrier® inner gloves.
- Auer air relief valves.
- Double taped seams.
- Large face shield or extra large face shield that offers a complete viewing range.
- Knee Pad with Inner Sock Boot and outer boot flap with elastic cuff.
- Available in SM – 4X.

Responder® and Responder Plus® Suits offer:
- 40 mil PVC Face shield (note: 2 Layer face shield system; 40 PVC inner / 5 mil Teflon® overlay; is offered in the Hazmat Responder® and Hazmat Responder Plus® models).
- Butyl Gloves Standard. Hazmat Responder® and Hazmat Responder Plus® models offer Butyl gloves with 4-H glove liners.
- Pirelli air relief valves.
- Single outer tape seam. Hazmat Responder® and Hazmat Responder Plus® models offer double taped seams.
- Sock Boot with boot flap. Hazmat Responder® and Hazmat Responder Plus® models offer knee pads.
- Available in SM – 3X.

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25. **What is DuPont’s future plans for Commander® and Commander® EX? May customers continue to purchase regular Commander suits?**
DuPont will continue to offer Commander®. There are no current plans to discontinue regular Commander®. Go to top

26. **Will new chemicals be tested against Tychem® TK?**
Yes. We will order additional testing as interested customers request chemicals be tested for specific needs.

DuPont will test a chemical against Tychem® TK at no charge, on a confirmed order of at least four Level A suits or four cases of Level B coveralls. Go to top

27.

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