

No-Hit Wonder! D3O®

1. What are "smart materials"?
2. What was the inspiration for the invention of D3O®?
3. Give a definition for viscosity, and list two substances with higher viscosity.
4. What is a Newtonian fluid?
5. Name two places that synovial fluid is found in the body. Why does synovial fluid protect you from injury?
6. List a) three synthetic polymers; b) three natural polymers.
7. Why is D3O® effective material in protective knee and elbow pads?
8. How might D3O® provide better protection from concussions than impact protection helmets currently in use?
9. What is perhaps the most important use of D3O®, according to the article?

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Directions: *Before reading*, in the first column, write “A” or “D,” indicating your agreement or disagreement with each statement. As you read, compare your opinions with information from the article. In the space under each statement, cite information from the article that supports or refutes your original ideas.

Me	Text	Statement
		1. D3O [®] is n more than 100 products.
		2. D3O [®] is available in several neon colors.
		3. Fluids with a high viscosity (resistance to flow) also have a high density.
		4. Isaac Newton described the effect of heating on the viscosity of fluids.
		5. Non-Newtonian fluids change viscosity due to agitation or pressure.
		6. Fluids that thicken when shear stress is applied quickly are not found in nature.
		7. Both shear-thinning fluids and shear-thickening fluids are polymers.
		8. D3O [®] is a colloid, a polymer suspended in an oily liquid without separating.
		9. D3O [®] flows easily until a sudden shear stress is applied.
		10. D3O [®] can be used in bulletproof vests and helmets.

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Directions: As you read the article, complete the graphic organizer below to describe fluids, including D3O.[®]

Fluid	Examples with Properties	Uses
Newtonian fluid		
Shear-thinning fluid		
Shear-thickening fluid		
D3O[®]	Shear-thinning or Shear-thickening?	

Explain this misconception:

“Thick liquids (more viscous) have a high density.”