

1 September 2009

I have categorized materials in the Triboelectric Series to help estimate the triboelectric charging properties of unlisted materials. Note that there are exceptions, so experimental measurements are needed to verify the positions of unlisted materials. Please feel free to use this information provided that you acknowledge your source of information. Following is an updated version that first appeared in:

K. Robinson, "Static Beat: Stop Tribocharging Your Products," *Paper, Film & Foil Converter*, Vol. 83, No. 5 (ISSN 0031-1138), May 2009, pg. 12.

I gratefully acknowledge that the ordering of the synthetic polymers benefits from:

A. F. Diaz and R. M. Felix-Navarro, "A semi-quantitative tribo-electric series for polymeric materials: the influence of chemical structure and properties," *Journal of Electrostatics*, vol. 62, No. 4, pg. 277-290, 2004.

Triboelectric Series by Electrostatic Answers®

Less human processing ↑ ↓ More human processing	Positive	inorganics & biological materials	human skin asbestos glass human hair mica
		exception	nylon
		inorganics & biological materials	wool cat fur silk alumina
		natural fibers	paper cotton wood
	Nearly Neutral	exceptions	steel poly(methyl methacrylate) (Elvacite®)
		natural resins	wax amber latex
		metals	copper brass gold platinum
	Negative	exceptions	synthetic rubber (neoprene) sulfur
		biopolymers	acetate (Rayon®) acrylic (Orlon®) cellophane
		synthetic polymers	polyurethane polycarbonate polyvinylidene chloride (Saran®) polystyrene polyethylene polypropylene polyimide polyethylene terephthalate (PET, Mylar®, Estar®)
		chloropolymers	polyvinyl chloride (PVC)
		fluoropolymers	polychloro trifluoro ethylene (PCTFE) Kel-F® polyvinylidene fluoride (Kynar®) polytetrafluoroethylene (PTFE) (Teflon®)
exception		silicone rubber	