Supplemental Information for Transport of the Pathogenic Prion Protein through Soils

On the Average Isoelectric Point of PrP^{TSE}. Our use of the term *average isoelectric point* warrants clarification. PrP possesses two sites for asparagine-linked glycosylation (residues 181 and 197 in hamster PrP) that are variably occupied. Variability in glycosylation site occupancy results in three distinct bands on immunoblots of PrP corresponding to the di-, mono- and unglycosylated protein. To date, attempts to isolate individual PrP^{TSE} molecules have proven unsuccessful. Isolated PrP^{TSE} is present in aggregates spanning a range of sizes that include molecules with varying degrees of glycosylation. That is, a single PrP^{TSE} aggregate may contain molecules in that are diglycosylated, monoglycosylated at either position, and unglycosylated. The situation is actually more complicated than this because the oligosaccharides attached to each glycosylation site can vary in composition leading to approximately 60 glycoforms in brain tissue of a single rodent strain (Endo et al., 1989; Rudd et al., 1999; Stimson et al., 1999). Because of PrP^{TSE} aggregate size and glycoform heterogeneity, determining the isoelectric point of non-denatured PrP^{TSE} necessarily entails measuring the electrophoretic mobility of an ensemble of PrP^{TSE} particles. We therefore qualify the isoelectric point as reported by Ma et al. (2007) as an ensemble or average property. Despite this limitation, the data reported by Ma et al. (2007) are clear in that the average pH_{IEP} lies between 4 and 5.

REFERENCES

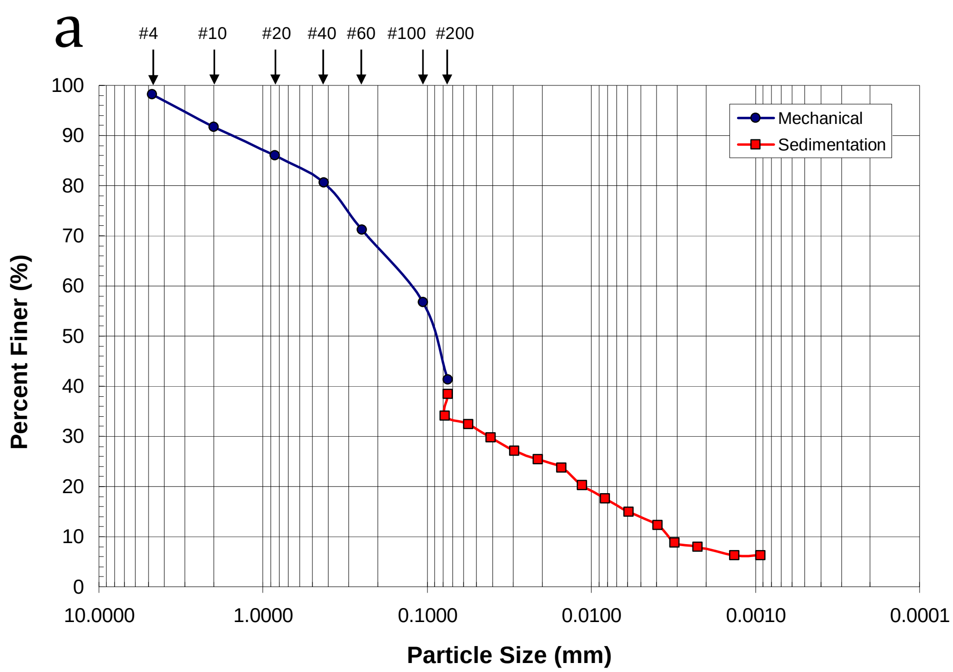
ASTM D422 - 63(2007) Standard Test Method for Particle-Size Analysis of Soils.

Endo, T., D. Groth, S.B. Prusiner, A. Kobata. 1989. Diversity of oligosaccharide structures linked to asparagines of the scrapie prion protein. Biochemistry 28:8380–8388.

Ma, X., C.H. Benson, D. McKenzie, J.M. Aiken, J.A. Pedersen. 2007. Adsorption of pathogenic prion protein to quartz sand. Environ. Sci. Technol. 41:2324–2330.

Rudd, P.M., T. Endo, C. Colominas, D. Groth, S.F. Wheeler, D.J. Harvey, M.R. Wormald, H. Serban, S.B. Prusiner, A. Kobata, R.A. Dwek. 1999. Glycosylation differences between the normal and pathogenic prion protein isoforms. Proc. Nat. Acad. Sci. USA 96:13044–13049.

Stimson, E., J. Hope, J., A. Chong, A.L. Burlingame. 1999. Site-specific characterization of the N-linked glycans of murine prion protein by high-performance liquid chromatography electrospray mass spectrometry and exoglycosidase digestions. Biochemistry 38:4885–4895.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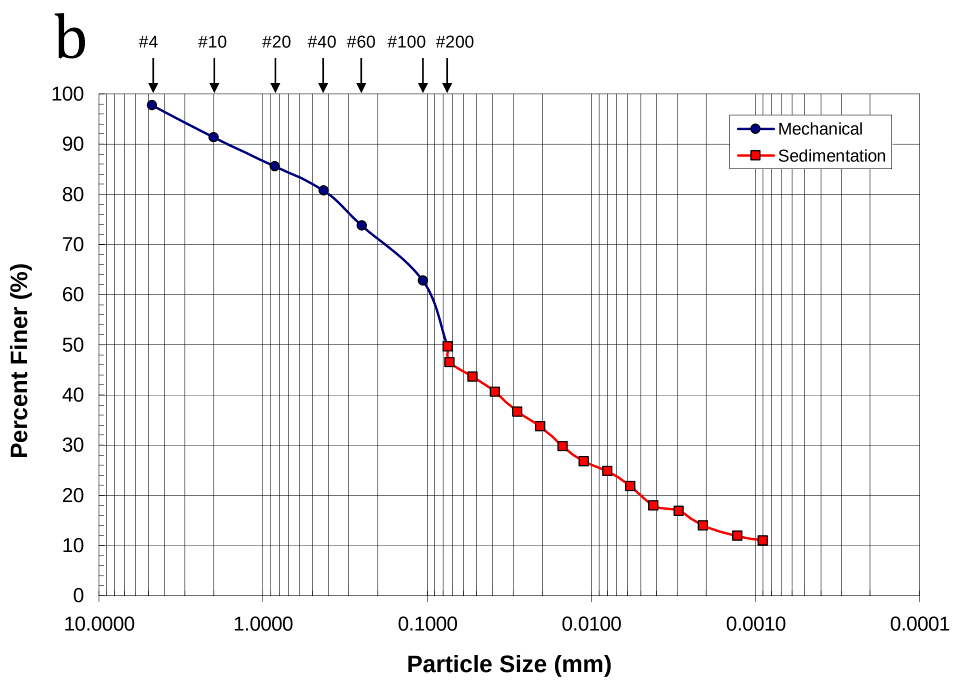
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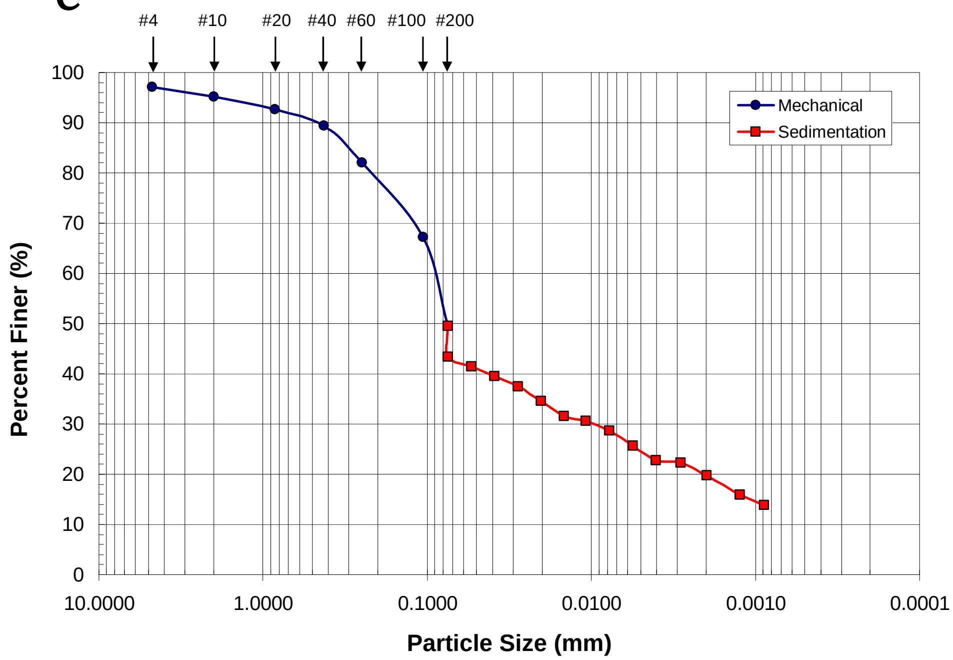
c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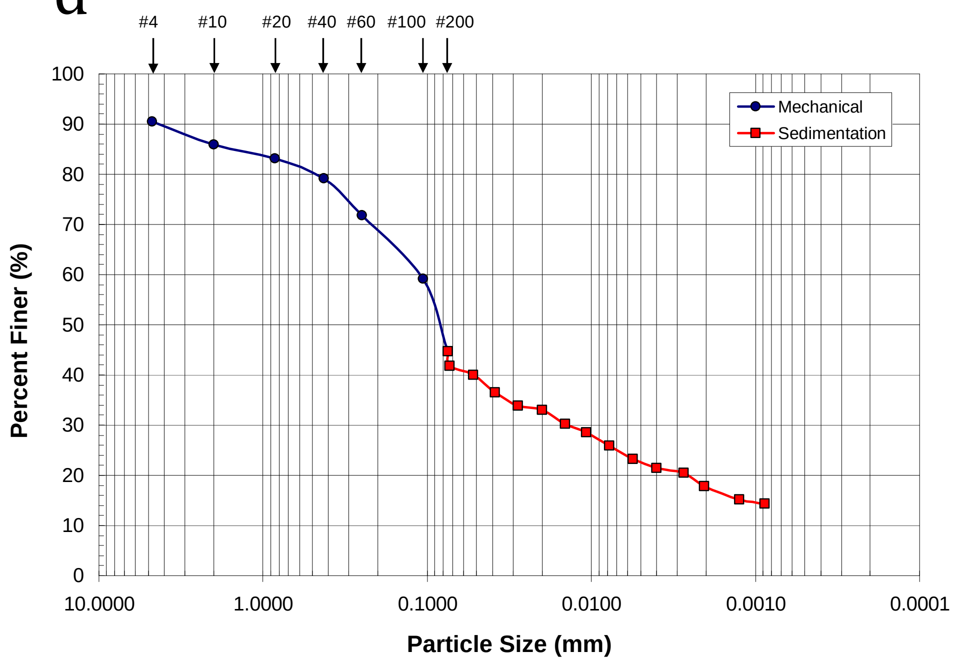
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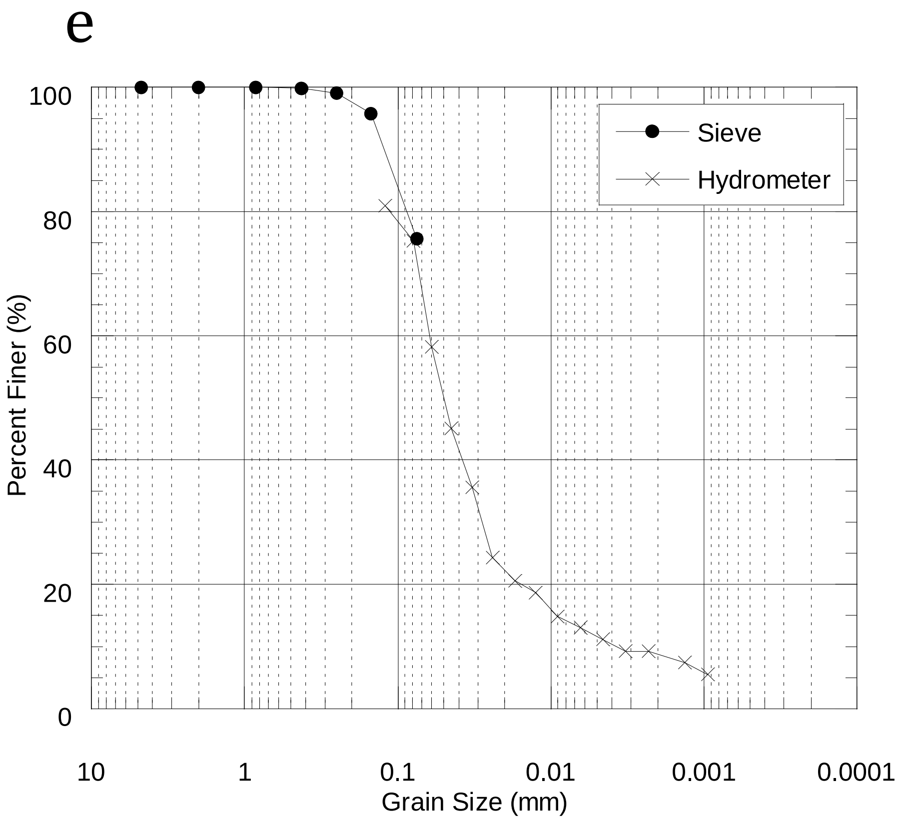

FIGURE S1 – Particle distribution curves of (a) Site S topsoil, (b) Site S subsoil, (c) Site C topsoil, (d) Site C subsoil and (e) Boardman soil. Particle size analysis was conducted using the methods described in ASTM D422. Each soil was initially washed by hand over the No. 200 (75 μm) sieve to separate the coarse and fine fractions. Both fractions were then air-dried. Mechanical analysis was conducted on the coarse fraction using the sieve set described in D422. Sedimentation analysis was conducted on the fines fraction using a 1-L sedimentation tube and a hydrometer.

TABLE S1. Relative abundance of phyllosilicates

R0 M-L C/S 50S†	0.0	0.0	14.5	7.9
R1 M-L I/S 20S‡	8.9	7.5	0.0	0.0
Illite & Mica	31.2	20.6	49.8	46.0
Kaolinite	46.0	60.1	21.4	28.6
Chlorite	13.9	11.8	14.5	17.5
TOTAL	100.0	100.0	100.2	100.0

† Randomly Ordered Mixed-Layer Chlorite/Smectite with 50% Smectite Layers, ‡ Ordered Mixed-Layer Illite/Smectite with 20% Smectite Layers