Diamicton

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November 1, 2024

Abstract

The definition of diamicton is based of the physical characteristics of a rock unit. Not an interpretive one. Origin and environment of deposition are not included in its recognition. The abbreviated definition is "a gap graded, poorly sorted, deposit, regardless of rock unit induration." The rock unit (and all grain sizes within) as a whole is considered in the classification. Induration and composition are not defining factors.

Definition

Diamicton is a gap graded, poorly sorted, deposit with at least two well defined curves (bimodal or more distribution) on a non cumulative grain sized chart with any skewness or kurtoses shape, regardless of rock unit induration. Grain size analysis includes all clast sizes from boulder to clay gathered either in outcrop, a coring, or a large field sample. The grain size analysis can be done by mass or volume of the rock. (figure 1a and 1b). The Wentworth Scale is the defining guide for grain size. When it comes to grain size, determining whether or not a rock unit is a diamicton, is the defining concept. Lithic composition of the diamicton should be described in detail, but is not a defining factor. For more expansive definitions you can use Folk, 1954 or Baumann, 2025.

Unimodal curves and well sorted deposits are not diamicton (Figure 2).

This definition replaces the original definition of "Diamicton is a general term used to describe a non-sorted or poorly sorted, sometimes non-calcareous, terrigenous or marine sediment containing a wide range of particle sizes derived from a broad provenance " (Harland et al., 1966)

Clarification

Since boulders cobbles and pebbles are included this nullifies the use of the United States Department of Agriculture's (USDA) soil textural chart. Since the Wentworth scale (Figure 3) is used, this nullifies the United States Soil Classification System (USCS). Neither the USDA or USCS for mass determination, can be used for well indurated deposits anyway.

Volume analysis may be more practical than a mechanical grain size analysis. You may also get a diamicton or not from the same sample depending on the number of sieves you may be using. More sieves means more precise measurements but it may not be as accurate. You may need to use professional judgment from time to time.

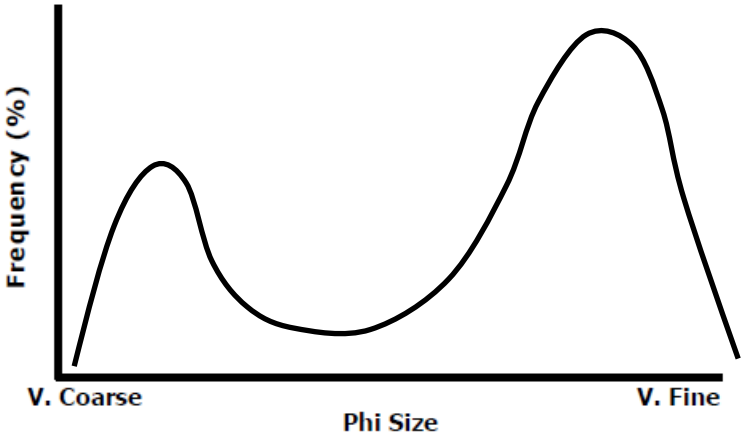
Exceptions to the definition

None

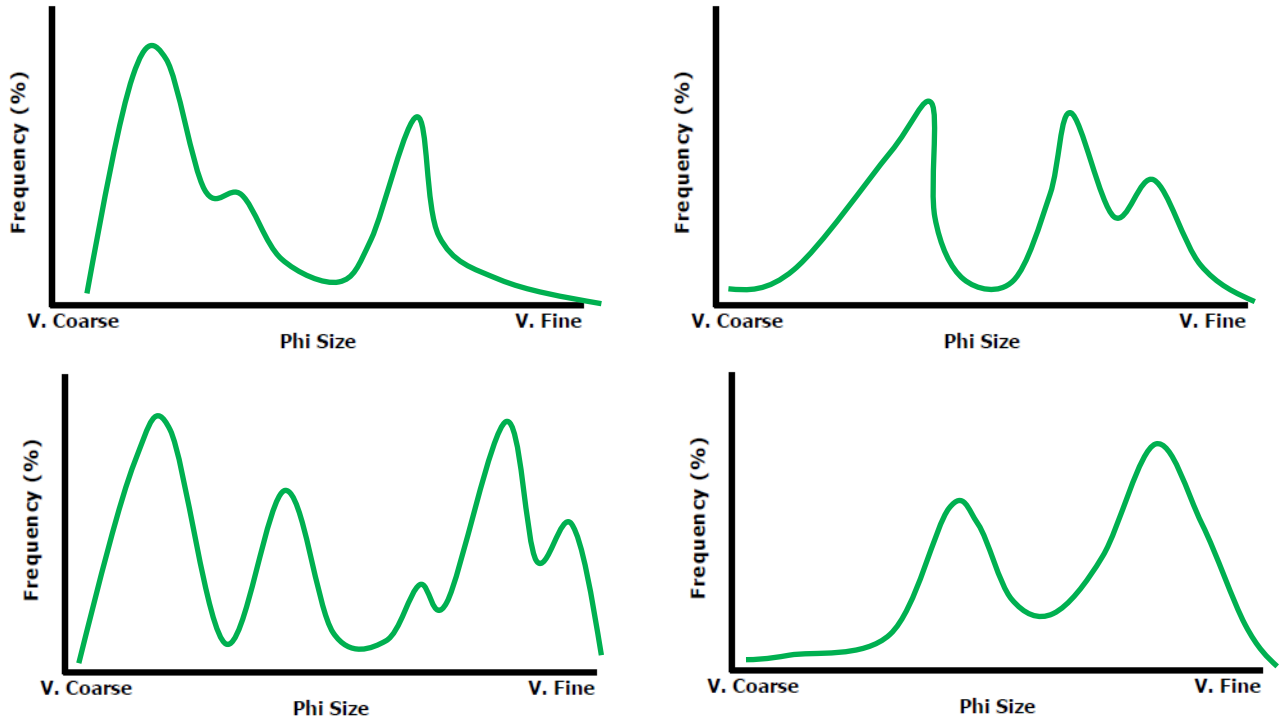
Typical deposits associated with diamicton

Glacial till, slump deposits, marine debris flows, fault proximal deposits

Figure 1: Diamicton Curves

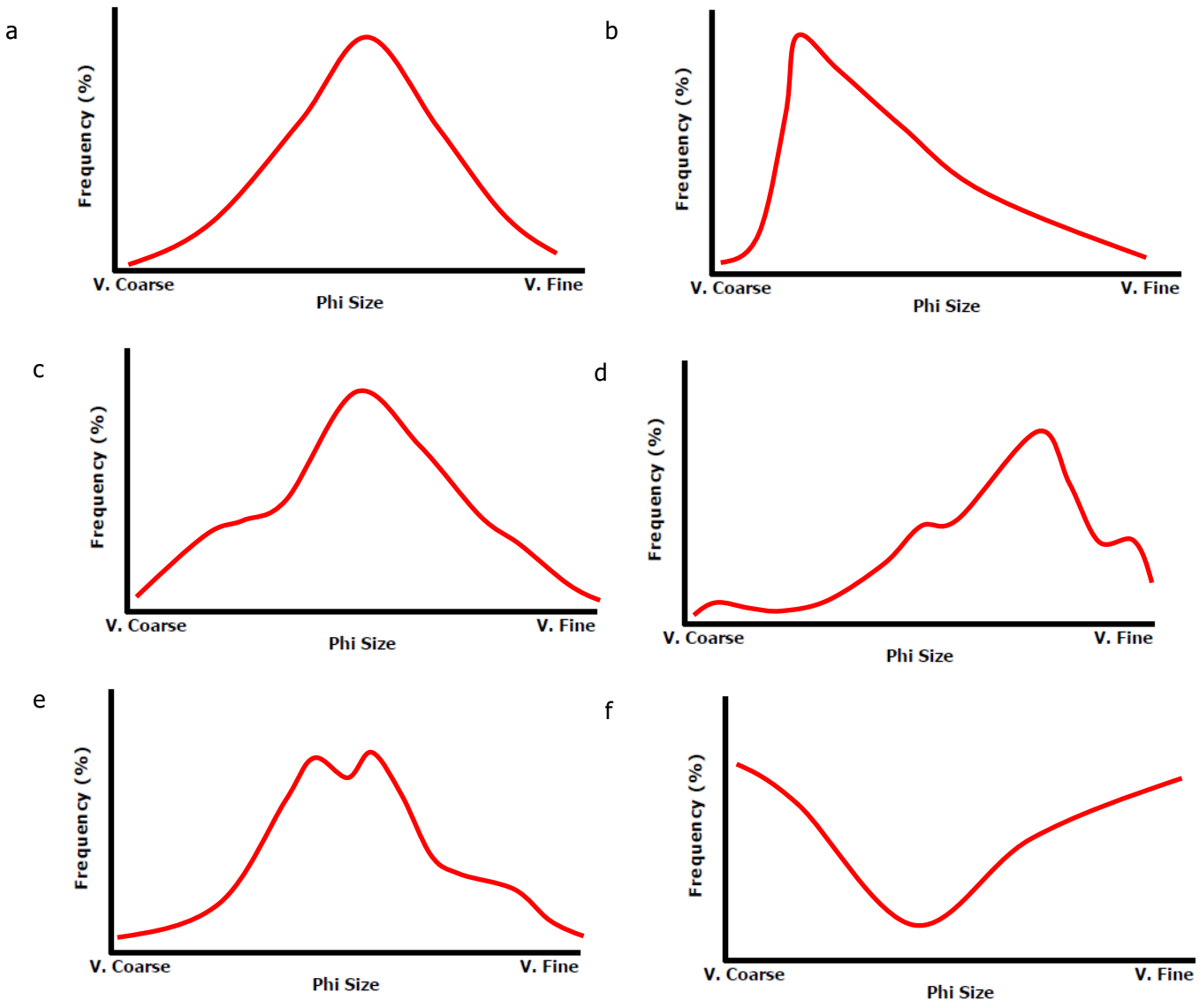


1a. Typical grain size distribution of a diamicton.



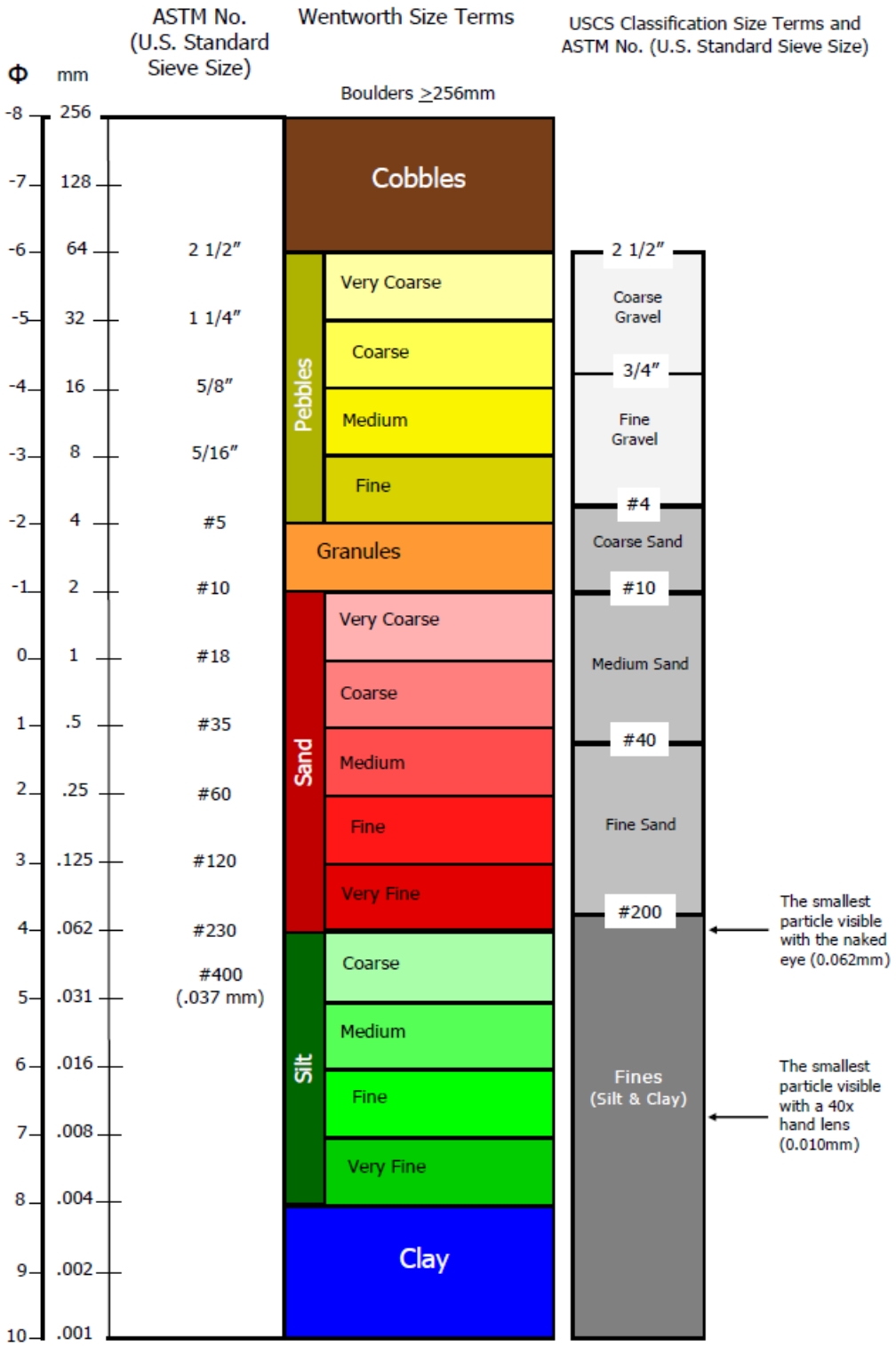
1a. A small illustrative sample of grain size distribution possible in a diamicton.

Figure 2: Non Diamicton Curves



1c. Examples of non diamicton curves because they are unimodal (a, b), or do not have well defined multimodal distribution (c, d, e), or the gain size distribution is incomplete / has no peaks (f).

Figure 3: Wentworth Scale



Taken from: Baumann, 2025

References

Baumann, S.D.J., 2025. Lab Reference Book; classifying igneous, metamorphic, and sedimentary rocks. 3rd edition, Amazon publishing, ISBN-13: 979-8343595390

Folk, R.L., 1954. The distinction between grain size and mineral composition in sedimentary rock nomenclature. J. Geol., 62, 344–359.

Harland, W.B., Herod, K.N., and Krinsley, D., 1966. The definition and identification of tills and tillites. Earth Sci. Rev., 2, 225–256.

Wentworth, C.K., 1922. A Scale of Grade and Class Terms for Clastic Sediments. Journal of Geology, 30, 377-392. https://doi.org/10.1086/622910