

This Problem Set is designed to be open book and open notes, but you are expected to work individually to obtain your answers. This will constitute approximately 10 % of your overall grade. You have 1.5 weeks to complete this assignment (due 11/21/19) and submit it to me by email. Please email me concerning any specific questions so as not to use valuable class time on this. Since there are no calculations, please submit your answers as a MS Word document and the PowerPoint file with a file name consistent with the protocol Lastname, Firstname – PS#3.doc.

- 1) Please read the paper (Verdugo et al., Marine Chemistry 92 (2004) 67–85) posted as a handout for class 11/12/19 and discuss the following questions as they relate to class material and other assigned readings (i.e. Libes). Please be brief and to the point.
  - a) What is marine snow?
  - b) What holds it together?
  - c) What is the link between dissolved and particulate organic matter as described in the paper?
  - d) How does the “gel phase” influence what we refer to as the “Organic Carbon Continuum”?
  - e) What influence might gels have on the amount of particulate organic material that reaches the sediment?

2) In Emerson & Hedges chapter 8 and Libes chapters 22 and 23 (provided on the class website) as well as in the lecture slides many classes of organic compounds and organic functional groups are identified as being components of marine organic material. In theory any or all of these can be incorporated into humic material becoming part of their structure or functionality.

In the attached PowerPoint diagrams circle one example of each of the following structural entities:

Figure 1 - aromatic ring, aliphatic carboxylic acid group, methyl group, alcoholic group (aliphatic), saturated hydrocarbon chain, unsaturated hydrocarbon chain, fatty acid, carbonyl group, peroxide group, glycerine backbone.

Figure 2 - aromatic carboxylic acid group, aliphatic carboxylic acid group, phenolic group, amine group, amino acid, metal complex, hydrogen bond, quinone, polysaccharide, alumino-silicate clay, ether, ester, aldehyde, ketone, amide.

The functional groups can be circled using the circles provided on the right side of each of the PowerPoint slides. Just open the file in PowerPoint and position your cursor over the border of a circle. Click and hold the left mouse button and the circle will go into edit mode. With the mouse button still depressed you can move the circle to the desired location on the PowerPoint slide to highlight a structural feature. While in the edit mode the circles can be stretched to make ovals and resized to accurately encircle the structural feature of interest. Identify the features with a key for the circle color (provided).

Question #1 is worth 50 % and therefore, Question #2 is worth 50 %