Chemical Oceanography 2012 Problem Set 4
Professor Ryan David_Ryan@uml.edu

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 10 % of your overall grade. You have two weeks to complete this assignment (due 5/1/12) 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 – PS4.doc.

1) Please read the review paper (Hedges and Oades, Organic Geochemistry 27 (1997) 319–361) posted on the website for the 4/12/12 lecture. The basic premise of the paper is that comparing natural organic matter (NOM) found in soil to NOM in marine sediments reveals some similarities and some differences. With a focus on the chemistry (and not so much on the biology) what are the major similarities and major differences between materials from these sources? To answer this question make two (2) lists, one for the similarities and one for the differences and give a brief description of each. Your discussion can incorporate class material and other assigned readings (i.e. Libes), however it should primarily emphasize material from the paper. Please try to be brief and to the point.

2) Five classes of geochemical species for metal ions where discussed in class:

1) Inorganic complex or Ion Pair
2) Organic Complex
3) Organometallic species
4) Redox species (i.e. an element that undergoes oxidation or reduction)
5) Colloid bound or particle adsorbed species

For each of these classes give the following:

a) a specific metal that belongs in that category (i.e. is an example of that class)
b) a brief, 1 or 2 sentence description of its relevant chemical behavior
c) what or how the metal reacts (this might be covered in b above)
d) approximate total concentration of metal (order of magnitude 10^{-6} or 10^{-9} M)
e) approximate percentage that might take part in the behavior being described.

All the information needed to answer this question is from class material or the posted chapter from Millero (2006), chapter 3.

Question #1 is worth 50 %
Question #2 is worth 50 %