

CHEM/TOX 3360 W05
Take-home assignment

1. In chapter 1, we considered the effect of injection of 100 ppmv of CO₂ into the atmosphere on CO₂ levels in the surface and deep ocean as well as the atmosphere. Create a spreadsheet and graph solving chapter 1, question 23.
2. One of the possibilities we looked at for reducing atmospheric CO₂ levels was direct injection of CO₂ into the deep ocean. Create a second spreadsheet and graph in the same manner as question 1 above but start with injection of the equivalent of 100 ppmv CO₂ into the deep ocean.
3. We have now looked at carbonate chemistry in seawater in more detail and realize that dissolution of CO₂ is not a simple process. One of the issues we discussed was the dissociation of carbonic acid to form bicarbonate and carbonate species, which in turn can form a variety of complexes. These processes effectively remove some of the CO₂ from the models calculated in questions 1 and 2. Create a third spreadsheet and graph, with the same conditions as question 1, but account for 40% loss of CO₂ (aq) (H₂CO₃ (aq)) to other carbonate species (assuming equilibrium with these other species is instantaneous).

Note, for each question:

- determine the change in CO₂ levels in ppmv rather than the absolute concentration
- model the changes over a 50 yr period using a spreadsheet program
- hand in a printout of each spreadsheet and each graph
- hand-in the formulae used to calculate each column of CO₂ levels - you can printoff the formulae used in your spreadsheet or write out by hand the formulae used
- each question should be on a separate page, but table and/or graph, and/or formulae for one question can be on the same page
- all tables and charts must be clearly and properly labeled with titles, units etc
- each student must hand in a unique set of tables and graphs
- marks will be deducted for poor organization and presentation of data