Ge 131 2016
Homework # 1

Due, Friday April 8 (to Joe O’Rourke)

Guidelines: Collaboration is OK but you must write up your own solutions. TA Joe can give you guidance. Do not use any information (e.g., solution sets) from previous years. In all homework problems, we are looking for an understanding of the problem and the tools used to solve it. We don’t care much about precise numerical answers, though you should try to get that approximately right (and have the good sense to realize when you get an answer that is ridiculous!) Note that the questions are typically uneven in length.

1. Problem 1.4. in the book(See the Wikipedia page on the poisoning of Alexander Litvinenko.)

2. Problem 1.5.

3. Problem 1.6.

4. Problem 2.3

5. Consider a planetary system that happens to form from the collapse of an interstellar cloud in which C/O is 1.1 by number. As a consequence nearly all of the oxygen is tied up in carbon monoxide (unavailable for building planets because it will not condense except at very low temperatures) and there will be carbon “left over” to condense in elemental form. The planets that form in the “terrestrial” zone will then be made in part of elemental carbon, which becomes diamond at high pressure. (Pressure required is already reached at a few hundred kilometers depth in Earth, which is only a small distance down relative to the radius of Earth, so you can effectively assume all of the excess C is available to make diamond; the part that is graphite will be small). Estimate the total planetary mass of diamond (in Earth masses), assuming the total mass of planets is similar to our solar system. What radius and mass planet might you get at “earth” orbit, if
it were made just of diamond alone? Only very approximate answers are expected because I’m not expecting you to take into account the compression of diamond with pressure. Density of diamond is 3.5 g/cc.