

Chem 155 Homework #5 Due at the start of class on Mon. Feb 13.

Reading: Chapter 14, Nuclear Chemistry

Chapter 13 Problems

13.38

13.46

13.48

13.71

Additional Problems

1) (re)download the article by M. Levy and A. D. Ellington in PNAS Vol. 100, p 6416-6421 (2003). If you are on campus you will automatically be able to use the university subscription to the Proceedings of the National Academy of Sciences to download this article. From off-campus you can use the UW library proxy server (instructions are available at <http://www.lib.washington.edu/help/connect.html>).

Read the data from Figure 2 for the reaction of L_B with C_A and enter them into Excel to determine the Michaelis-Menten parameters

i) In applying the Michaelis-Menten equation to this data set, does $[C_A]$ or $[L_B]$ correspond to $[S]$ (substrate concentration).

ii) Replot these data as described in Oxtoby and lecture. Fit your data in Excel determine K_m and k_2 Include the printout of your fit in the homework.

Chapter 14 Problems

14.26

14.31

14.36

14.63

14.66

Additional Questions:

1) Why don't all the positively charged protons in the nucleus cause it to fly apart? (Give a 2-3 sentence explanation).

2) Use Einstein's formula to calculate the momentum (in units of MeV/c) of a proton with a total energy of 1400 MeV. What is this in m/s? How fast is this proton moving (in m/s)? Comment.

3) List the conservation laws for nuclear reactions given in lecture. What are baryons and leptons?

4) Download and read the series of news focus articles from Science Magazine from August 2005 Science v 309 p 1168-1179, and vol 315 p174. As well as Chapter 24 from David J. C. Mackay's excellent book "Sustainable Energy: Without the Hot Air" (the chapters are available for free online) before answering the following:

3A) What fraction of U.S. electricity is currently generated by nuclear power?

3B) What will replace the electricity produced by our aging nuclear reactors once they are decommissioned?

3C) In 1/4-1/2 of a page, explain your opinion as to whether you think nuclear power should be considered as a viable energy source at present. There is *NO right answer* but you should justify your opinion with facts and *data* from the articles provided (or fact checked sources of your choosing). The key to getting your points here is to make statements based on numbers.