

NUCLEAR REACTIONS AND THEIR APPLICATIONS

Chapter 23 Outline

Text Problems: # 6, 8, 9, 12, 13, 34
+ Supplementary Questions (attached)

Text Sample Problems: The text has a number of excellent sample problems (solved in detail) in each section. I would recommend that you study these problems + the "follow up" problems, which have brief solutions at the end of the chapter.

Sect.	Title and Comments	Required?
1.	Radioactive Decay and Nuclear Stability	YES
2.	The Kinetics of Radioactive Decay We already covered the kinetics of nuclear decay and radioisotope dating in CHEM 1413.	NO
3.	Nuclear Transmutation: Induced Changes in Nuclei	YES
4.	Effects of Nuclear Radiation on Matter	NO
5.	Applications	NO
6.	Interconversions of Mass and Energy	YES
7.	Applications of Fission and Fusion	A LITTLE

Chapter 23
Supplementary Homework Questions

S1. Use the nuclear mass table (at bottom) to calculate (a) the Binding Energy, and (b) the Binding Energy per nucleon for each of the following nuclei (in kJ/mol).

- a. ^{31}P
- b. ^{190}Os
- c. ^{239}Pu

S2. Use the nuclear mass table (at bottom) to calculate ΔE for the following nuclear reactions, in kJ/mol

- a. $^{235}_{92}\text{U} + ^1_0n \rightarrow ^{138}_{56}\text{Ba} + ^{86}_{36}\text{Kr} + 12^1_0n$
- b. $^2_1\text{H} + ^3_1\text{H} \rightarrow ^4_2\text{He} + ^1_0n$
- c. $^7_3\text{Li} + ^1_1\text{H} \rightarrow ^1_0n + ^7_4\text{Be}$

Nucleus	Atomic Mass	
^1_1H	1.008	g/mol
^1_0n	1.009	
^2_1H	2.014	
^3_1H	3.016	
^4_2He	4.003	
^7Li	7.016	
^7Be	7.017	
^{31}P	30.974	
^{86}Kr	85.910	
^{138}Ba	137.911	
^{190}Os	189.958	
^{235}U	235.044	
^{239}Pu	239.052	

Answers to the Supplementary Homework Questions are posted on the course web site. Questions about these Problems will be answered in Recitation