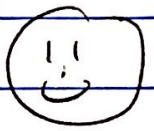
AMG 480/580 MIDTERM
SPRING-2018 DUE 3/2/18 (IN CLASS)

YOUR MIDTERM WILL TEST YOU ON KNOWLEDGE & APPLICATION OF THAT KNOWLEDGE.

GOOD LUCK! 

(I) EXPLAIN/ DEFINE THE FOLLOWING: (100 pts)

1) Leptons 2) Hadrons 3) Atomic # 4) Atomic mass #
5) Nucleons 6) Atomic weight 7) Gram atomic weight
8) Q-value 9) Binding energy 10) Multiplication factor
11) Fissile ~~fissible~~ 12) Fertile 13) Decay heat 14) Half life
15) Saturation activity 16) Microscopic xs 17) Macroscopic xs
18) Mean free path 19) Number density 20) Atomic enrichment
21) Weight enrichment 22) Elastic scatter 23) Compound nucleus
24) Resonance xs 25) Doppler broadening 26) Inelastic scatter
27) Slowing down decrement 28) Neutron moderator 29) η economy
30) Slowing down power 31) Slowing down ratio 32) fast η
33) Intermediate η 34) Slow η 35) Conservation of ~~a~~ charge
36) Conservation of mass # 37) Conservation of energy 38) Non leakage probability (39) thermal utilization 40) k_∞

(10)

(II) Au^{198} ($t_{1/2}$ = 64.8 hrs) CAN BE PRODUCED BY BOMBARDING Au^{197} (stable) WITH n IN A NUCLEAR REACTOR. SUPPOSE THAT A Au^{197} FOIL WEIGHING 0.1 g IS PLACED IN A REACTOR FOR 12 HRS & ACTIVITY IS 0.9 C WHEN REMOVED.

(a) WHAT IS THEORETICAL MAX. ACTIVITY DUE TO Au^{198} IN FOIL

(b) HOW LONG DOES IT TAKE FOR ACTIVITY TO REACH 80% OF MAX

(III) 1.20 from textbook. (10)

(IV) Calculate Binding energy per nucleon of $^{107}_{47}Ag$ (5)

(V) ~~Calculate Q value of rxn~~. Complete the rxn & find its Q-value. (5)

$$^{14}N + n \rightarrow ? + {}^{1}H.$$

(VI) 2.13 from textbook. (5)

(VII) 2.11 from textbook (5)

USE TABLE B-3

(5)

VII In a certain reactor, the volume of the system increases by a factor of 2. What is the chage in

(a) Microscopic xs of system

(b) Macroscopic xs of system.

~~(c) Repeat it reactor is made from natural U.~~

(5)

VIII ~~In a reactor made of natural U~~, write the microscopic absorption xs of U, averaged over thermal spectrum at 400°C.

natural U (5)

IX A square, fuel pellet size 1cm by 1cm develops a crack which is now filled by Xe gas. The volume fraction the crack is 0.25. find the absorption xs of the cracked fuel pellet.

X Explain the 4 & 6 factor formulas using a flow chart. (5)