

# Assignment #7 Physics 346

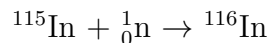
Due 4:30 pm **Friday** March 23, 2012

Use Phys 346 drop box located at entrance to Physics Dept. off main floor of AQ.

1. Ch 10 Exercises: 1, 2, 4, 7  
Ch 10 Problems: 8, 12, 16, 19, 22, 23
2. Table 12-8 in your text shows the principal radioactive isotopes in nuclear fuel, one 1 after removal from a reactor. Calculate the total activity after two years from all isotopes.(Note some isotopes can be ignored in the calculation. Why?)
3. This problem demonstrates the use of In to measure the neutron flux in a reactor. 10 g of In is placed in a reactor with a neutron flux  $N$ . It is left there for 10 s. If the activity of the product  $^{116}\text{In}$  is  $10^8$  Bq, what was the flux  $N$  in neutrons/m<sup>2</sup>/s? The cross section of  $^{115}\text{In}$  is 198 barns and the half-life of  $^{116}\text{In}$  is 54 min.

Notes:

- (a) This reaction proceeds by neutron capture:



- (b) The flux and the time the sample is left in the beam determine how many nuclei become radioactive. This can be monitored by measuring the activity, or the number of decays per second, of the sample after it has been left in the beam for a set amount of time.