

臺北醫學大學 92 學年度第 一 學期 期中 考試 (試) 命題紙

系 級	科 目	授 課 教 師	考 試 日 期	學 號	姓 名
牙 一	普 物	張 永 明	93 年 1 月 12 日 第 1 節		

*①請注意本試題共 張。如發現頁數不足及空白頁或缺印，應當場請求補齊，否則缺少部份概以零分計。
 ②每張試題卷務必填寫(學號)、(姓名)。

- A 2.0 mCi source of R_n (Randon, $T_h=3.83$ days) is permanently implanted into a patient.
 - Determine the total emitted radiation in unit of mCi-hr
 - If this source were left in place in patient for five days, find the emitted radiation in unit of mCi-day. (12%)
- Calculate the activity (in unit of C_i) of a sample containing 10^{10} atoms of ^{131}I , What is the mass of this sample? ($T_h=8.1$ days) (12%)
- An x-ray beam with initial intensity (I_0) of 10^6 photons/cm²-s each having an energy of 65000ev, is incident upon 4-cm-thick bone. If the linear attenuation coefficient is 0.16cm^{-1} , (a) Determine the final intensity. (b) find the fraction transmitted and absorbed %. (12%)
- Assume that the x-ray tube has a current of 200mA. Using Kramers' analysis calculate (a) the efficiency of this x-ray production; (b) the output power of the x-rays produced in unit of watt; and (c) the rate of heat deposited at the anode in unit of watt. (12%)
- Find the maximum kinetic energy of the α -particle emitted in the following



Given: $^{226}_{88}\text{Ra}$ (鐳)=226.025406amu, $^{222}_{86}\text{Rn}$ (氡)=222.017574amu

$^4_2\text{He} = 4.002603\text{amu}$ $1\text{amu} = 931.5\text{MeV}$ (16%)

- A $^{32}_{15}\text{P}$ nucleus decays into $^{32}_{16}\text{S}$ with an emission of a β^- particle and an antineutrino $\bar{\nu}$. The mass of p-32 atom is 31.973909 amu and the mass of S-32 atom is 31.972073 amu. The mass of one amu is about 931.5Mev.

(a) Calculate the maximum energy E_{max} of the emitted β^- particle in unit of MeV ?

(b) What is the average energy \bar{E} of all the emitted β^- -particle in unit of MeV? (16%)

- (a) Explain the phenomenon of k-capture. (b) Write down the nuclear reaction for k capture. (c) What will happen as an electron capture occurs? (8%)

- The figure as show is the β^- and β^+ spectra for C_{u-64} .

(a) Explain why the β^+ particles will have more mean kinetic energy than the β^- particles.

(b) As a C_{u-64} nucleus decay into Ni-64 by β^+ decay. What is the energy difference between the C_{u-64} nucleus and the Ni-64 nucleus ? (12%)

