1/ Give the atomic number, mass number, and number of neutrons for the following nuclei:

^{238}U, ^{60}Co, ^{131}I, ^{151}Eu, ^{194}Ir, ^{137}Cs.

2/ Which one of the following is a mirror nuclear pair?

^{110}Cd – ^{110}Pd ^{144}Nd – ^{144}Sm ^{74}Se – ^{74}Ge ^{124}Te – ^{124}Sn ^{90}Ru – ^{90}Pd

3/ Calculate the radius of a ^{97}Tc nucleus.

[5.74fm]

4/ A beam of 250MeV electrons strikes a target of ^{116}Sn nuclei.

- Calculate the wavelength of these electrons
- If the resultant diffraction pattern has a minimum at 31.12^0, calculate the diameter of the ^{116}Sn nuclei.

[4.96fm, 11.71fm]

5/ An exchange particle, the **ω** meson has a range of interaction of 0.126fm. Use the uncertainty principle to calculate the mass of the **ω** meson.

[782MeV]

6/ A hypothetical particle has a mass of 8.51 amu (= 1.41×10^{-26} kg). Calculate the equivalent mass in MeV.

[7930MeV]

7/ The mass of a nucleus of ^{208}Pb is 207.9316746amu. If the mass of a free proton is 1.00728 amu and a free neutron is 1.008665 amu

- calculate, using $E = mc^2$, the binding energy for the ^{208}Pb nucleus in Joules (note, one amu = 1.6605×10^{-27}kg, c=3×10^8m/s).
- express this energy in MeV
- calculate the binding energy per nucleon.

[2.63×10^{-10} J, 1641MeV, 7.89MeV]

8/ Given the nuclear mass for ^{165}Re is 164.96709amu and that of ^{161}Ta is 160.95837amu, calculate the maximum energy of alpha particles emitted when ^{165}Re decays to ^{161}Ta. Take the mass of an alpha particle to be 4.00260 amu, the speed of light to be 3×10^8 m/s, the mass of an amu to be 1.661×10^{-27} kg and the charge on an electron to be 1.602×10^{-19} C.

[5.70MeV]