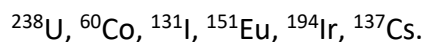
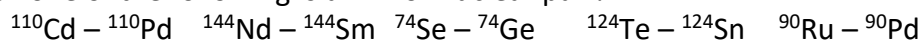


- 1/ Give the atomic number, mass number, and number of neutrons for the following nuclei:



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



- 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° , 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 ($= 1.41 \times 10^{-26}$ 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, $c = 3 \times 10^8$ m/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]