## Abstract

Manganese is an essential element for all creatures including plants and human beings. Since it is paramagnetic in nature, it is also helpful in the field of medical research in magnetic resonance imaging. It has only one stable and many radioisotopes which can be used for medical applications among which $^{52}$Mn seems to have suitable properties to meet the requirements necessary for imaging via positron emission tomography (PET). It has such a moderate half-life of 5.6days which allows the examination of affected area with great ease as well as its emitted radiations are favorable to use it in nuclear medicine for diagnostic purpose. It is a positron emitter radioisotope and it emits positrons of relatively low energy and of suitable amount which makes it excellent candidate for PET imaging. Data for nuclear reaction cross sections of $^{52}$Mn was collected to find out the most appropriate reaction channel for the production of positron emitting $^{52}$Mn. For the purpose, charged particle induced reactions on $^{59}$Co, $^{54}$Fe, $^{52}$Cr, $^{50}$Cr, $^{nat}$Cr, $^{nat}$Ni, $^{nat}$Fe and $^{nat}$Cu were investigated up to 100 MeV. Cross section data points were plotted against respective energy values. To check the efficacy of particular reaction route, experimental data was compared with theoretical data points obtained from nuclear model codes TALYS 1.95, EMPIRE 3.2 and ALICE-IPPE. It was observed that the reactions $^{50}$Cr(α,pn)$^{52}$Mn, $^{52}$Cr(d,2n)$^{52}$Mn, $^{52}$Cr(p,n)$^{52}$Mn, $^{nat}$Cr($^{3}$He,x)$^{52}$Mn provide appropriately high cross sections, so these may be considered as suitable production routs for $^{52}$Mn.