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Modification of Bethe-Weizsacker Mass Formula Considering Nuclear Radius

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Abstract
Bethe-Weizsacker mass formula is modified to include deviation of nuclear radius from behaviour. In the modified formula, mass number dependence of volume, surface and coulomb energy terms are replaced with nuclear radius dependence. Effect of this modification on description and prediction of binding energy for stable and unstable nuclei is investigated using different improved nuclear radius formulae. Modified mass formula and Bethe-Weizsacker mass formula were fitted to binding energy data for stable nuclei. Fitted parameters thus obtained, were used to predict binding energies for unstable nuclei with half-lives greater than one year. For mass range N, Z > 8, we have found very minor difference between Modified mass formula and Bethe-Weizsacker mass formula. However, for broader mass range (A>1), the modified formula consistently fits and predicts binding energy data with greater accuracy.

Keywords: *Binding energy, Nuclear mass, Nuclear radius.*