Solution of mid-term questions

1. mass defect = $\Delta m = Z m_p + (A-Z) m_n$ − Rest mass of nucleus

Rest mass of Al nucleus = Atomic mass − Rest mass of electrons

$= 26.9815 - 13 * 5.486 \times 10^{-4} = 26.973\ u$

$\Delta m = 13 * 1.007 + 14 * 1.008 - 26.973 = 0.23\ u$

$BE = \Delta m\, c^2 = 0.23 * 1.66 \times 10^{-27} * (3 \times 10^8)^2$

$= 3.43 \times 10^{-11}$ Joules

we can convert BE to eV

$BE = \frac{3.43 \times 10^{-11}}{1.6 * 10^{-19}} = 2.14 \times 10^8\ eV = 214\ MeV$ } Bonus

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2- Factors affecting binding energy

1. Volume effects
2. surface effects
3. Coulumb effects
4. Asymmetry effects (paulie exclusion principle)
5. pairing effects

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3. SI units for radioactivity is Becquerel (Bq)

1 Bq = 1 disintegration (decay) / sec

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4. Definition of nuclear cross-section should highlight The following

* It is a measure of probability (liklihood) of a nuclear reaction between a neutron and nucleus to take place
* It has the units of area $(Length)^2$
* Each reaction (e.g. scattering, or absorption) has its own cross-section (e.g. σ_s, σ_a)

Nuclear cross-section depends on

1. energy of neutron
2. the target nucleus