

Physics of Materials and Nuclei - MidSem

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Nuclear and Particle Physics

(a) What will be the energy to remove a neutron from Li-7. (b) What will be the energy to remove proton from Li-7. Atomic masses are given as follows: $m(\text{Li-7}) = 7.0160\text{u}$, $m(\text{Li-6}) = 6.0151\text{u}$, $m(\text{n}) = 1.008665\text{u}$, $m(\text{He-6}) = 6.0188\text{u}$, $m(\text{p}) = 1.00727647\text{u}$. 1 point

- ☒ (a) 7.23, (b) 9.38
- ☐ (a) 6.52, (b) 7.23
- ☐ (a) 9.20, (b) 2.25
- ☐ (a) 0.32, (b) 12.55
- ☐ None of the above

[Clear selection](#)



The ratio of the sizes (radii) of U-238 and Al-27 nuclei is approximately equal to

1 point

The ratio of the sizes (radii) of $^{238}_{92}\text{U}$ and $^{27}_{13}\text{Al}$ nuclei is approximately equal to:

- ☒ 2
- ☐ 4
- ☐ 8
- ☐ 5
- ☐ None of the above

Clear selection

Which of the following was the first particle discovered which is still today believed to be elementary, i.e. not made up of further constituents?

1 point

- ☒ electron
- ☐ neutron
- ☐ gluon
- ☐ photon
- ☐ None of the above

Clear selection



Which of the following particles carry the strong force

1 point

- ☐ photons
- ☒ gluons
- ☐ Z- or W-bosons
- ☐ electron
- ☐ None of the above

Clear selection

The asymmetry term in semi-empirical mass formula is due to

1 point

- ☐ non-spherical shape of the nucleus
- ☐ non-zero spin of the nucleus
- ☒ unequal number of protons and neutrons on the nucleus
- ☐ odd number of protons inside the nucleus
- ☐ None of the above

Clear selection

The N –values of four nuclei are given below. Which one has the lowest neutron absorption cross-section?

1 point

- ☒ 50
- ☐ 143
- ☐ 146
- ☐ 12
- ☐ None of the above

Clear selection



Two radioactive materials X and Y have decay constants 10λ and λ , respectively. If initially, they have the same number of nuclei, then the ratio of the number of nuclei of X to that of Y will be $3/e$ after a time

1 point

- ☒ $1/3\lambda$
- ☐ $1/9\lambda$
- ☐ $3/\lambda$
- ☐ $9/\lambda$
- ☐ None of the above

Clear selection

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