PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Liquid drop Model - CSIR NET Physics PYQs

Nuclear and Particle Physics . All PYQs (2015-2025) with answer key

5 questions . Answer key included

www.physicsbyaaryan.com . www.csirnetphysics.com
Contact: 9501976811

Q1. [Dec 2015] . 5.0 marks

Nuclear and Particle Physics > Liquid drop Model

CSIR NET	2015 Dec	5 M

Of the nuclei of mass number $A = 125$, the binding energy calculated from the liquid drop model (given that the coefficients for the Coulomb and the asymmetry energy are $a_c = 0.7\text{MeV}$ and $a_{sym} = 22.5\text{MeV}$ respectively) is a maximum for

1. $^{125}_{54}\text{Xe}$
2. $^{124}_{53}\text{I}$
3. $^{125}_{52}\text{Te}$
4. $^{125}_{51}\text{Sb}$

Q2. [June 2016] . 5.0 marks

Nuclear and Particle Physics > Liquid drop Model

CSIR NET	2016 June	5M

Let E_S denote the contribution of the surface energy per nucleon in the liquid drop model. The ratio $E_S\left(^{27}_{13}\text{Al}\right) : E_S\left(^{64}_{30}\text{Zn}\right)$ is

1. 2: 3
2. 4: 3
3. 5: 3
4. 3: 2

Q3. [Dec 2019] . 5.0 marks

Nuclear and Particle Physics > Liquid drop Model

CSIR NET	2019 Dec	5M

The Bethe-Weizsacker formula for the binding energy (in MeV) of a nucleus of atomic number Z and mass number A is

$$15.8A - 18.3A^{2/3} - 0.714\frac{Z(Z-1)}{A^{1/3}} - 23.2\frac{(A-2Z)^2}{A}$$

The ratio Z/A for the most stable isobar of a $A = 64$ nucleus, is nearest to

1. 0.30
2. 0.35
3. 0.45
4. 0.50

Q4. [June 2020] . 5.0 marks

Nuclear and Particle Physics > Liquid drop Model

CSIR NET	2020 June	5M

The binding energy B of a nucleus is approximated by the formula $B = a_1A - a_2A^{2/3} - a_3Z^2A^{-1/3} - a_4(A-2Z)^2A^{-1}$, where Z is the atomic number and A is the mass number of the nucleus. If $\frac{a_4}{a_2} \simeq 30$. The atomic number Z for naturally stable isobars (constant value of A) is

1. $\frac{30A}{60+A^{2/3}}$
2. $\frac{30A}{30+A^{2/3}}$
3. $\frac{60A}{120+A^{2/3}}$
4. $\frac{120A}{60+A^{2/3}}$

Q5. [Dec 2025] . 5.0 marks

Nuclear and Particle Physics > Liquid drop Model

CSIR NET	2025 Dec	5M	NPP

Suppose that the volume and the surface terms are the most dominant ones in the semi-empirical formula for the binding energy of a nucleus. Let C_s and C_v be the coefficients of the surface and volume terms. Which of the following is a criterion for stability of the nucleus?

1. $A > \left(\frac{C_s}{C_v}\right)^3$
2. $A < \left(\frac{C_s}{C_v}\right)^3$
3. $A > \left(\frac{2C_s}{3C_v}\right)^3$
4. $A < \left(\frac{2C_s}{3C_v}\right)^3$

Answer Key

5 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Nuclear and Particle Physics	Liquid drop Model	**3**
Q2	Nuclear and Particle Physics	Liquid drop Model	**2**
Q3	Nuclear and Particle Physics	Liquid drop Model	**3**
Q4	Nuclear and Particle Physics	Liquid drop Model	**3**
Q5	Nuclear and Particle Physics	Liquid drop Model	**1**

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Contact
9501976811