

Unit 5 - Week 3 : Nuclear Fission

Course outline

How does an NPTEL online course work?

Week 0 : Prerequisite

Week 1: Fundamentals of Nuclear Power

Week 2 : Radioactivity and nuclear Reactions

Week 3 : Nuclear Fission

● Lec 1 : Fission & role of neutron energy

● Lec 2 : Theory of elastic scattering

○ Quiz : Assessment 3

● Feedback form

Week 4:Chain Reaction in Reactors

Week 5 : Reactor Thermalhydraulics

Week 6:Reactor Control

Week 7:Thermal Reactors

Week 8:Breeder Reactors

Week 9:Nuclear Fusion

Week 10:Biological Effects of Radiation

Week 11:Reactor Safety & Security

Week 12:Waste Management

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Assessment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-19, 23:59 IST.

1) Only naturally available isotope offering significant fission cross-section to thermal neutrons is 1 point

- ${}^{226}_{88}\text{Ra}$
 ${}^{233}_{90}\text{Th}$
 ${}^{235}_{92}\text{U}$
 ${}^{239}_{94}\text{Pu}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 ${}^{235}_{92}\text{U}$

2) The gap between the mass numbers of the two most likely fission fragments keeps on reducing with 1 point

- increase in mass number of parent nucleus
 decrease in mass number of parent nucleus
 increase in atomic number of parent nucleus
 decrease in atomic number of parent nucleus

No, the answer is incorrect.
Score: 0

Accepted Answers:
increase in mass number of parent nucleus

3) In the $1/V$ region, absorption cross-section is inversely proportional to 1 point

- velocity
 kinetic energy
 temperature
 physical cross-sectional area of target nucleus

No, the answer is incorrect.
Score: 0

Accepted Answers:
velocity

4) The term MSDP is synonymous to 1 point

- macroscopic cross-section
 logarithmic energy decrement
 moderating power
 moderating ratio

No, the answer is incorrect.
Score: 0

Accepted Answers:
moderating power

5) A good moderator is expected to have 1 point

- high logarithmic energy decrement
 high moderating power
 high moderating ratio
 all of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
all of the above

6) Heavy water is a superior moderator compared to ordinary water because 1 point

- it requires less number of collisions to thermalize a fast neutron.
 it has very small absorption cross-section.
 it exhibits high MSDP.
 it is cheap.

No, the answer is incorrect.
Score: 0

Accepted Answers:
it has very small absorption cross-section.

7) The difference between energy in LAB system and CM system is equal to the 1 point

- kinetic energy of the neutron.
 kinetic energy of the centre-of-mass.
 kinetic energy of the nucleus.
 binding energy of the nucleus.

No, the answer is incorrect.
Score: 0

Accepted Answers:
kinetic energy of the centre-of-mass.

8) Total momentum of the neutron-nucleus pair during elastic scattering, as per the CM system, is equal to 1 point

- the momentum of the neutron alone in CM system.
 the momentum of the nucleus alone in CM system.
 the combined momentum of the neutron & nucleus in LAB system.
 zero

No, the answer is incorrect.
Score: 0

Accepted Answers:
zero

9) A neutron carrying 1.2 MeV of initial energy collides with a stationary deuterium nucleus and gets deflected by an angle of 90° as per the CM system. Its actual angle of deflection approximately is 1 point

- 90°
 63°
 29°
 0°

No, the answer is incorrect.
Score: 0

Accepted Answers:
 63°

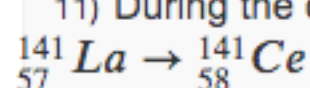
10) If the non-fission capture and fission cross-sections of ${}^{233}_{92}\text{U}$ subjected to thermal neutrons are 531 and 45 barns respectively, then the probability of fission occurrence is 1 point

- 89%
 92%
 95%
 98%

No, the answer is incorrect.
Score: 0

Accepted Answers:
 92%

11) During the decay of a fission fragments, following reaction has been observed. Identify the nature of the emitted particle. 1 point



- electron
 proton
 neutron
 antineutrino

No, the answer is incorrect.
Score: 0

Accepted Answers:
electron

12) ${}^{238}_{92}\text{U}$ is 1 point

- fissile isotope
 fissionable & fissile isotope
 fissionable & fertile isotope
 fertile, but non-fissionable isotope

No, the answer is incorrect.
Score: 0

Accepted Answers:
fissionable & fertile isotope

13) If the scattering cross-sections of hydrogen and oxygen nuclei subjected to neutrons of 1 MeV of energy are 3 and 8 barns respectively, net scattering cross-section of water molecule is _____ barns.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 14

14) Minimum number of collisions required to convert a 2-MeV-electron to a 1-MeV-electron using deuterium as moderator is _____.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 1

1 point