TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P545 (B1845)

Delayed neutrons are fission neutrons that...

A. are released at the instant of fission.

B. are responsible for the majority of U-235 fissions.

C. have reached thermal equilibrium with the surrounding medium.

D. are expelled at a lower average kinetic energy than most other fission neutrons.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P845 (B1945)

Delayed neutrons are neutrons that...

A. are responsible for the majority of U-235 fissions.

B. are expelled within 1.0×10^{-14} seconds of the fission event.

C. have reached thermal equilibrium with the surrounding medium.

D. are produced from the radioactive decay of certain fission fragments.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1145 (B1545)

Which one of the following is a characteristic of a prompt neutron?

A. Expelled with an average kinetic energy of 0.5 MeV.

B. Usually emitted by the excited nucleus of a fission product.

C. Accounts for more than 99 percent of fission neutrons.

D. Released an average of 13 seconds after the fission event.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1445 (B1345)

A neutron that is expelled 1.0×10^{-2} seconds after the associated fission event is a _____ neutron.

A. thermal

B. delayed

C. prompt

D. capture

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1545

A neutron that is expelled 1.0×10^{-6} seconds after the associated fission event is a _____ neutron.

A. thermal

B. prompt

C. delayed

D. capture

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1945 (B1146)

Which one of the following types of neutrons has an average neutron generation lifetime of 12.5 seconds?

A. Prompt

B. Delayed

C. Fast

D. Thermal

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2045 (B2046)

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the prompt neutron is more likely to... (Assume that both neutrons remain in the core.)

A. require a greater number of collisions to become a thermal neutron.

B. be captured by U-238 at a resonance energy peak between 1 eV and 1000 eV.

C. be expelled with a lower kinetic energy.

D. cause thermal fission of a U-235 nucleus.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2145 (B2145)

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the prompt neutron is more likely to... (Assume that both neutrons remain in the core.)

A. cause fast fission of a U-238 nucleus.

B. be captured by a U-238 nucleus at a resonance energy between 1 eV and 1000 eV.

C. be captured by a Xe-135 nucleus.

D. cause thermal fission of a U-235 nucleus.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2345 (B2345)

A neutron that is released 1.0×10^{-10} seconds after the associated fission event is classified as a _____ fission neutron.

A. delayed

B. prompt

C. thermal

D. spontaneous

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2445 (B3345)

In a comparison between a prompt neutron and a delayed neutron produced from the same fission event, the delayed neutron requires _____ collisions in the moderator to become thermal; and is _____ likely to cause fission of a U-238 nucleus. (Assume that both neutrons remain in the core.)

A. more; more

B. more; less

C. fewer; more

D. fewer; less

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2545 (B2545)

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the prompt neutron is more likely to...

A. be captured by a Xe-135 nucleus.

B. cause thermal fission of a U-235 nucleus.

C. leak out of the core while slowing down.

D. be captured by a U-238 nucleus at a resonance energy.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2645 (B2645)

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the delayed neutron is more likely to...

A. leak out of the core.

B. cause fission of a U-238 nucleus.

C. become a thermal neutron.

D. cause fission of a Pu-240 nucleus.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2845 (B3145)

During a brief time interval in a typical reactor operating steady-state near the beginning of a fuel cycle, 1.0×10^3 delayed neutrons were emitted.

Approximately how many prompt neutrons were emitted during this same time interval?

A. 1.5×10^5

B. 6.5×10^6

C. 1.5×10^7

D. 6.5×10^8

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2945 (B2945)

Which one of the following types of neutrons in a reactor is more likely to cause fission of a U-238 nucleus in the reactor fuel? (Assume that each type of neutron remains in the reactor until it interacts with a U-238 nucleus.)

A. A thermal neutron.

B. A prompt fission neutron beginning to slow down.

C. A delayed fission neutron beginning to slow down.

D. A fission neutron at a U-238 resonance energy.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P3545 (B3545)

During a brief time interval in a typical reactor operating steady-state at the beginning of a fuel cycle, 1.0×10^5 delayed neutrons were emitted.

Approximately how many prompt neutrons were emitted in the reactor during this same time interval?

A. 1.5×10^5

B. 6.5×10^6

C. 1.5×10^7

D. 6.5×10^8

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P4123 (B4123)

A neutron that appears 1.0×10^{-16} seconds after the associated fission event is classified as a _____ fission neutron.

A. delayed

B. prompt

C. thermal

D. spontaneous

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P4923 (B4923)

During a brief time interval in a typical reactor operating steady-state near the beginning of a fuel cycle, 4.25×10^5 delayed neutrons were produced.

Approximately how many prompt neutrons were produced in the reactor during this same time interval?

A. 1.5×10^6

B. 6.5×10^6

C. 1.5×10^7

D. 6.5×10^7

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P5023 (B2245)

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the delayed neutron is more likely to... (Assume that each neutron remains in the core unless otherwise stated.)

A. cause fission of a U-238 nucleus.

B. travel to an adjacent fuel assembly.

C. be absorbed in a B-10 nucleus.

D. leak out of the core.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P7123 (B7123)

Which one of the following is the process that produces the majority of delayed neutrons in an operating nuclear power plant reactor?

A. A thermal neutron is absorbed by a fuel nucleus. After a period of time, the nucleus fissions and releases a delayed neutron.

B. A thermal neutron is absorbed by a fuel nucleus. The fuel nucleus fissions. During the decay process of the fission products, a delayed neutron is emitted.

C. A fast neutron is absorbed by a fuel nucleus. After a period of time, the nucleus fissions and releases a delayed neutron.

D. A fast neutron is absorbed by a fuel nucleus. The fuel nucleus fissions. During the decay process of the fission products, a delayed neutron is emitted.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P7523 (B7523)

During a brief time interval in a typical reactor operating steady-state near the beginning of a fuel cycle, 4.25×10^{10} prompt neutrons were produced.

Approximately how many delayed neutrons were produced in the reactor during this same time interval?

A. 2.8×10^{8}

B. 6.5×10^{8}

C. 2.8×10^{9}

D. 6.5×10^{9}

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P7677 (B7677)

Which one of the following is the process that produces the majority of prompt neutrons in an operating nuclear power plant reactor?

A. A thermal neutron is absorbed by a fuel nucleus. Almost immediately, the nucleus fissions and emits one or more prompt neutrons.

B. A thermal neutron is absorbed by a fuel nucleus. Almost immediately, the fuel nucleus fissions and produces fission products. During the decay of the fission products, one or more prompt neutrons are emitted.

C. A fast neutron is absorbed by a fuel nucleus. Almost immediately, the nucleus fissions and emits one or more prompt neutrons.

D. A fast neutron is absorbed by a fuel nucleus. Almost immediately, the fuel nucleus fissions and produces fission products. During the decay of the fission products, one or more prompt neutrons are emitted.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P7787

Delayed neutrons are fission neutrons that...

A. have an average lifetime of about 80 seconds.

B. have an average kinetic energy of about 2 MeV.

C. are responsible for less than one percent of all fissions.

D. are in thermal equilibrium with the surrounding medium.

[redacted]

TOPIC: 192001
KNOWLEDGE: K1.04 [2.4/2.4]
QID: P7767 (B7767)

Which one of the following nuclei will cause the greater loss of kinetic energy from a 2.1 MeV fission neutron during a head-on collision? (Assume that each nucleus is stationary just prior to the collision and the neutron is elastically scattered in all cases.)

A. A helium-4 nucleus in the fuel rod fill gas.

B. An oxygen-16 nucleus in the reactor coolant.

C. A zirconium-90 nucleus in the fuel cladding.

D. A uranium-235 nucleus in a fuel pellet.

[redacted]