

Subtopic: Nuclear fission and fusion

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Q1.(2020)

a)

uranium / plutonium

b)

neutron absorbed by a uranium nucleus

nucleus splits into two parts

and (2 / 3) neutrons (are released)

and gamma rays (are emitted)

c)

lighter nuclei join to form heavier nuclei

some of the mass (of the nuclei) is converted to energy (of radiation)

d)

activity decreases quickly

risk of harm decreases quickly

Q2.(2020)

nuclei

decreases

Q3.(2020)

a)

$$m = 0.004 \text{ (kg)}$$

$$E = 0.004 \times 5200 \times 50\,000\,000$$

$$E = 1.04 \times 10^9 \text{ (J)}$$

or

$$E = 1\,040\,000\,000 \text{ (J)}$$

b)

any **two** from:

- to make sure the fusion process is possible
- to develop an understanding of the process
- to make adaptations to the process
- to assess the efficiency of the process
- to make predictions
- assess safety risks
- to assess environmental impact
- set-up cost is lower (for small scale experiments)

c)

releases carbon dioxide
which causes global warming

OR

releases particulates
which causes global dimming

or

which causes breathing
problems

OR

releases sulfur dioxide
which causes acid rain

OR

releases nitrogen oxides
which causes breathing
problems

or

which causes acid rain

Q4.(2024)

a)

nuclei

neutrons

gamma (rays)

b)

energy = power $\times$ time

or

$$E = P \times t$$

c)

$$P = 500\,000\,000\text{ (W)}$$

$$E = 500\,000\,000 \times 3600$$

$$E = 1\,800\,000\,000\,000\text{ (J)}$$

or

$$E = 1.8 \times 10^{12}\text{ (J)}$$

d)

any **one** from:

- bury the radioactive waste
- put the radioactive waste in cooling ponds
- transport the radioactive waste in secure vessels
- store the radioactive waste in metal containers
- cover the radioactive waste in concrete

e)

$$\text{number of days} = \frac{92}{100} \times 365$$

$$\text{number of days} = 335.8$$