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Answers to NCERT/CBSE PHYSICS Class 12(Class XII)textbook Exercise and Additional exercise

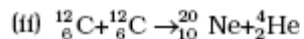
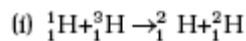
Chapter 13.

NUCLEI

13.15 The Q value of a nuclear reaction $A + b \rightarrow C + d$ is defined by

$$Q = [m_A + m_b - m_C - m_d]c^2$$

where the masses refer to the respective nuclei. Determine from the given data the Q -value of the following reactions and state whether the reactions are exothermic or endothermic.



Atomic masses are given to be

$$m({}_1^2\text{H}) = 2.014102 \text{ u}$$

$$m({}_1^3\text{H}) = 3.016049 \text{ u}$$

$$m({}_6^{12}\text{C}) = 12.000000 \text{ u}$$

$$m({}_{10}^{20}\text{Ne}) = 19.992439 \text{ u}$$

13.15 (i)

$$Q = [m({}_1^1\text{H}) + m({}_1^3\text{H}) - m({}_1^2\text{H}) - m({}_1^2\text{H})]c^2 = [(1.007825) + 3.016049] - (2.014102 + 2.014102) \times 931 \text{ MeV} = -4.03 \text{ MeV}$$

The negative sign indicates the reaction is endothermic.