

Answer on Question 51099, Physics, Other

Question:

About how many kilograms of boiled potatoes would you have to eat to supply energy for half-hour of swimming? Assume that your body utilizes only 20% of the total energy stored.

Solution:

The energy used in swimming in 1 minute is about 12 cal or $12 \cdot 4.184 \text{ J} = 50.21 \text{ J}$ (we assume that the mass of the swimmer is 70 kg , intensity of swimming is $50 \frac{\text{m}}{\text{min}}$, see for example <http://www.brianmac.co.uk/energyexp.htm>). Thus, for half-hour of swimming we need to use $30 \cdot 50.21 \text{ J} = 1506.3 \text{ J}$. The energy given by 1 kg of boiled potatoes is about $3.7 \cdot 10^3 \text{ J}$. Taking into account, that our body utilizes only 20% of the total energy stored we get:

$$20\% \cdot 3.7 \cdot 10^3 \text{ J} = \frac{20}{100} \cdot 3.7 \cdot 10^3 \text{ J} = 0.74 \cdot 10^3 \text{ J}.$$

So, the energy obtained by 1506.3 J is:

$$\frac{1 \text{ kg} \cdot 1506.3 \text{ J}}{740 \text{ J}} = 2.03 \text{ kg}$$

Answer:

2.03 kg of boiled potatoes.