



TIME OF FLIGHT MASS SPECTROMETRY 3

Avogadro constant $L = 6.022 \times 10^{23} \text{ mol}^{-1}$

$$\text{Kinetic energy} = \frac{mv^2}{2}$$

- 1 It takes the $^{12}_6\text{C}^+$ ion $1.23 \times 10^{-5} \text{ s}$ to travel along the flight tube in a time of flight mass spectrometer having been given $5.94 \times 10^{-17} \text{ J}$ of kinetic energy. Calculate the length of the flight tube.

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- 2 Find the time it takes the $^7_3\text{Li}^+$ ion to travel down a 78 cm time of flight tube given $1.52 \times 10^{-18} \text{ J}$ of kinetic energy.

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- 3 It takes the $^{81}_{35}\text{Br}^+$ ion $2.83 \times 10^{-5} \text{ s}$ to travel along the flight tube in a time of flight mass spectrometer. How long would it take the $^{79}_{35}\text{Br}^+$ ion to travel down the same flight tube under the same conditions?

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- 4 An ion takes 3.81×10^{-5} s to travel along the 85 cm flight tube in a time of flight mass spectrometer having been given 1.6×10^{-17} J of kinetic energy. Calculate the mass number of this ion.

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- 5 The relative atomic mass of lithium is 6.924. It consists of two isotopes, ${}^6_3\text{Li}$ and ${}^7_3\text{Li}$. Find the percentage composition by mass of ${}^6_3\text{Li}$ in lithium.

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- 6 The relative atomic mass of silicon is 28.109. It consists of three isotopes, ${}^{28}_{14}\text{Si}$, ${}^{29}_{14}\text{Si}$ and ${}^{30}_{14}\text{Si}$. It contains 92.2% ${}^{28}_{14}\text{Si}$. Find the percentage composition by mass of ${}^{29}_{14}\text{Si}$ in silicon.

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