

Time of flight Mass Spec Calculations

- ① Calculate the velocity of an ion of mass $2.1 \times 10^{-25} \text{ kg}$ which has a kinetic energy of $12.1 \times 10^{-18} \text{ J}$.
- ② Calculate the velocity of an ion of mass $2.1 \times 10^{-20} \text{ g}$ which has a kinetic energy of $2.16 \times 10^{-19} \text{ J}$.
- ③ Calculate the velocity of an Mg^{2+} ion which has a kinetic energy of $12.1 \times 10^{-18} \text{ J}$ where avogadro's constant is 6.022×10^{23} .

④ Calculate the distance travelled by an Na^{23} ion which has a kinetic energy of $1.1 \times 10^{-19} \text{ J}$ and a time of flight of 0.001 seconds.

⑤ Calculate the time of flight of a K^{39} ion that has a kinetic energy of $12.1 \times 10^{-18} \text{ J}$ when the distance of the flight tube is 80 cm long.

⑥ A sample of copper was found to contain two isotopes, Cu^{63} and Cu^{65} . All of the ions were accelerated to have a kinetic energy of $1 \times 10^{-16} \text{ J}$, and travelled through a flight tube that was 0.80 m long. The Cu^{63} ions took $1.829 \times 10^{-5} \text{ s}$ to travel through the tube, how long did the Cu^{65} take?

⑦ A Ba^{137} ion travels through a time of flight tube with a kinetic energy of $3.23 \times 10^{-16} \text{ J}$. This ion takes 2.62×10^{-5} seconds to reach the detector. Calculate the length of the flight tube.

⑧ A sample of copper was analysed and found to have two isotopes Cu^{63} and Cu^{66} . All isotopes were accelerated and Cu^{63} took $1.4242 \times 10^{-5} \text{ s}$. How long would the Cu^{66} ion take?