## Answer on Question #65020, Physics / Other

Heavy ion radiotherapy is a relatively new cancer treatment that uses high energy beams of ions to destroy cancer cells. Carbon nuclei having a mass of $1.99 \times 10^{-26}$ kg and a charge of +6e (corresponding to the most common isotope of carbon, with six protons and six neutrons) are accelerated at $2.60 \times 10^2$ m/s$^2$. Determine the magnitude of the electric field required to produce this acceleration, assuming that this field is constant over the region where the ions are being accelerated.

**Solution:**

If the electric field at a particular point is known, the force a charge q experiences when it is placed at that point is given by :

$$F = qE$$

The Newton's second law

$$ma = F$$

Thus,

$$ma = qE$$

$$E = \frac{ma}{q}$$

Substituting,

$$E = \frac{(1.99 \times 10^{-26} kg) \times (2.60 \times 10^2\ m/s^2)}{6 \times 1.6 \times 10^{-19}\ C} = 5.4 \times 10^{-6}\ \text{N/C}$$

**Answer:** $5.4 \times 10^{-6}\ \text{N/C}$