11. Suppose a single electron orbits about a nucleus containing two protons (+2*e*), as would be the case for a helium atom from which one of the two naturally occurring electrons is removed. The radius of the orbit is 2.65 x 10^{-11} m. Determine the magnitude of the electron's centripetal acceleration.

$$\sum F_c = F_E = k\frac{q_1 q_2}{r_{12}^2} = k\frac{(+2e)(-e)}{r^2} = m_e a_c$$

Note the – sign means attractive. Solve for centripetal acceleration.

$$a_c = k\frac{2e^2}{m_e r^2} = \left(8.99\ x\ 10^9\ {Nm^2}/{C^2}\right)\frac{2(1.6\ x\ 10^{-19}C)^2}{(9.11x\ 10^{-31}kg)(2.65\ x\ 10^{-11}m)^2}$$

$$a_c = \left(8.99\ x\ 10^9\ {Nm^2}/{C^2}\right)\frac{5.12\ x\ 10^{-38}C^2}{6.397\ x\ 10^{-52}kgm^2} = 7.195\ x\ 10^{23}\ {m}/{s^2}$$

$$\boxed{a_c = 7.20\ x\ 10^{23}\ {m}/{s^2}}$$

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