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MOSELEY'S LAW

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Henry Moseley was an English physicist, a student of Ernest Rutherford, and one of the forefathers of the X-ray spectroscopy. The law that states the relationship between the frequency of the characteristic X-ray emission line and the atomic number of the emitting chemical element was named after him. The article is dedicated to this law.

Moseley empirically derived his formula in 1913–1914. According to his law the square root of the frequency of the characteristic X-ray emission line is proportional to the atomic number of the chemical element in Mendeleev's periodic table: $\nu = A(Z - b)^2$ or $\sqrt{\nu} \sim Z$, where A and b are constants that depend on the type of the line (K, L, etc.), ν is the frequency of the observed X-ray emission line and Z is the charge of nucleus (the number of the chemical element). Bremsstrahlung, or deceleration radiation is produced when an element is bombarded with high velocity charged particles. A charged particle is deflected by an atomic nucleus and loses kinetic energy, which is converted into radiation according to the law of conservation of energy. Kinetic energy increases with the accelerating voltage being applied to the electrons. The kinetic energy of the electrons is proportional to the accelerating voltage. Characteristic X-rays are produced when an element is bombarded with high-energy charged particles. If the incident electron has enough energy, then it strikes a bound electron in an atom, which causes the bound electron to be ejected from the inner shell of the atom. A characteristic X-ray is emitted when an electron fills an innershell vacancy. Each element has a unique set of energy levels, which makes X-ray frequencies unique to each element, thus it's called characteristic X-ray. Moseley's law confirmed that the placement of the chemical elements described in D. I. Mendeleev's periodic table was correct. It also contributed to clearing up the physical meaning of quantity Z. Moseley's law resulted in discovering a number of previously unknown chemical elements and allowed to broaden D. I. Mendeleev's periodic table.