The polycrystalline samples of $\text{Ba}_2\text{Co}_{2-x}\text{Zn}_x\text{Fe}_{12}\text{O}_{22}$ ($x = 0.5, 1.0, 1.5$) were synthesized by using a solid-state-reaction method. From the XRD patterns analyzed by Rietveld refinement, we confirmed to be single-phased with rhombohedral structure ($R-3m$). The unit cell volume ($V_u$) of samples increased with increasing Zn ion concentration, because Fe$^{3+}$ ions are transferred from tetrahedral sites to octahedral sites. The magnetic properties of samples were investigated with vibrating sample magnetometer (VSM), and Mössbauer spectroscopy. Base on the applied-field dependent hysteresis curves up to 10 kOe at various temperatures, saturation magnetization ($M_s$) of samples increased with increasing Zn ion concentration because the non-magnetic Zn ions preferentially occupy the tetrahedral sublattices with down-spin site. Also, from the 295 K, the coercivity ($H_c$) of $\text{Ba}_2\text{Co}_{2-x}\text{Zn}_x\text{Fe}_{12}\text{O}_{22}$ ($x = 0.5, 1.0, 1.5$) samples were found to be $H_c = 153.0, 103.8, 61.1$ Oe, respectively. The decrease in $H_c$ is due to decreasing Co ion concentration of high magnetic anisotropy. Base on the zero-field-cooled (ZFC) and field-cooled (FC) magnetization curves under 100 Oe between 4.2 and 740 K, all samples were found to have spin transition ($T_s$) from helicalmagnetic order to ferrimagnetic order. With increasing Zn ion concentration, the $T_s$ and Curie temperature ($T_C$) of samples decrease linearly. We have obtained Zero-field Mössbauer spectra of all samples at various temperatures ranging from 4.2 to 650 K, and analyzed the spectra below $T_C$ as six-sextets for Fe sites. Isomer shift values of all samples indicate that the charge states are Fe$^{3+}$. From the temperature dependence of hyperfine field ($H_{hf}$), we have observed an abrupt change in $H_{hf}$ at $T_s$. In addition, Mössbauer spectra of all samples at 4.2 K were taken with applied field ranging from 0 to 50 kOe. As a result, the canting angle between applied field and $H_{hf}$ of samples decreased with increasing Zn concentration.