Let $A$ be a non-trivial, finitely-generated abelian group and $A^* = A - \{0\}$. A graph is $A$-magic if there exists an edge labeling using elements of $A^*$ which induces a constant vertex labeling of the graph. For bicyclic graphs $G$ (without pendant), we determine the set of numbers $k \geq 1$, where $G$ has a $\mathbb{Z}_k$-magic labeling.

Key words: group-magic graphs, integer-magic graphs, integer-magic spectra, bicyclic graphs.