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Recently, Coykendall and Maney introduced the concept of an irreducible divisor graph of a nonzero nonunit in an atomic domain. Given an atomic domain D and some nonzero nonunit $x \in D$, the irreducible divisor graph of x in D , denoted $G(x)$, has as vertices one representative from each associate class of irreducible divisors of x . Two vertices y and z have an edge between them if and only if yz divides x in D . Following Coykendall and Maney, we study the algebraic consequences of various graph-theoretic properties of the set of irreducible divisor graphs over an atomic domain D . In particular we give necessary and sufficient conditions for D to be a finite factorization domain and provide examples which illustrate why this concept may not be useful for non finite factorization domains. (Received September 15, 2009)