Assume $R$ is a commutative ring with identity. A monic polynomial with coefficients in $R$ is said to be separable if it is relatively prime to its formal derivative. We form a graph of separable polynomials and we consider the simplicial complex formed by the cliques of this graph. In the case where $R$ has exactly one maximal ideal, we show that the set of separable polynomials forms a matroid. (Received February 28, 2017)