The Inverse Galois Problem is concerned with finding an extension of a given field $K$ having a given Galois group. Here we consider the particular case where the base field is $K = \mathbb{F}_p(t)$. We give a conjectural formula for the minimal number of primes, both finite and infinite, ramified in $G$-extensions of $K$, and give theoretical and computational proofs for many cases of this conjecture. (Received September 17, 2011)