The discriminant d_K of a number field K of degree n depends upon several elements of K such that :

- r the number of real places and s the number of complex places
- Its sign is $(-1)^s$
- It verifies the Stickelberger's congruence :

$$d_K \equiv 0 \text{ or } 1 \bmod 4$$

- To equal degree, the discriminants have tendencies to grow with the number of real places
- For every prime number p, the valuation of p in d_K can only take a finite number of values
- We have lower bounds for $|d_K|$ according to the signature of the field K
- Finally, it is well known that the set of isomorphism classes of number fields of given discriminant is finite (Hermite). It is therefore natural to try to sort the number fields by their discriminants.

The enumeration of all number fields of degree n, of signature (r, s) and of absolute discriminant smaller than a real constant $\mathcal{B}$ in absolute value, containing a given subfield, is the subject of this thesis in the following precise cases :

► $n = 8$, $(r, s) = (2, 3), (4, 2), (6, 1)$ with quadratic subfields and quartic subfields

► $n = 10$, $(r, s) = (10, 0), (8, 1), (6, 2), (4, 3), (2, 4), (0, 5)$ with quintic fields.

The thesis is composed of two parts.

- The first part is organized as follows

In chapter 1, we provide notations and mathematical basis on the expression of number fields.

The chapter 2 presents works of Stark, Odlyzko, Poitou and Serre, using the analytic methods, which led lower bounds for discriminants of number fields over the rational numbers $\mathbb{Q}$ much better than those obtained by Minkowski with the number geometric methods. Such lower bounds bring important simplifications in the research of small discriminants, and were used in the search of non-primitive number fields of degree eight. Results of this chapter made subject of a publication to appear in the Maghreb Mathematical Review [*D41*].

Chapter 3 is devoted to the description of explicit construction methods, by the number geometric methods, of all number fields of degree n, of signature (r, s) and of absolute discriminant smaller than a given bound. Techniques and simplifications used for the computations have been described. We evidently presented this in such a way to take out again what was necessary for non-primitive number fields.

Some used algorithms in the computation are the subject of the last chapter.

- The second part is composed of two sections

The first section is a summary of known results till now in the minimal discriminants search and in the enumeration of number fields of degree smaller than 10.