Chromium ore, or chromite, occurs exclusively in rocks formed by the intrusion and solidification of molten lava or magma which is very rich in the heavy, iron containing minerals such as pyroxenes and olivines. Within these rocks, often referred to as ultramafic igneous rocks, chromium occurs as a chromium spinel, a highly complex mineral made up, in its basic form, of magnesium as MgO and aluminium as Al2O3. However, the magnesium can be substituted in varying proportions by divalent iron, and the aluminium can be substituted, also in varying proportions, by trivalent chromium and trivalent iron. Thus the chromium spinel may be represented as:

(Fe,Mg)O.(Cr,Fe,Al)2O3

Large variations in the total and relative amounts of Cr and Fe in the lattice occur in different deposits. These affect the ore grade not only in terms of the Cr2O3 content but also in the Cr:Fe ratio which determines the chromium content of the ferrochromium produced. The variations also affect the reducibility (relative ease of reduction) of the ore. For example, increasing amounts of magnesium compared with iron in the divalent site will make the spinel more difficult to reduce. Conversely, increasing amounts of iron in the trivalent site, replacing aluminium, will increase the reducibility of the spinel. Overall, the chromite ore can be given a refractory index (relative resistance to reduction) as follows:

Refractory index = \frac{wt.\% Cr2O3+MgO+Al2O3}{(total \text{ Fe as FeO}) + SiO2}

The greater the index, the more refractory, or less reducible, the ore.

Chromium is the most abundant of the Group V1A family of elements and at an average concentration of nearly 400ppm in the earth's crust it is the 13th most common element. However, as with all minerals or elements, economic deposits occur only where it has been concentrated in nature. The chromium spinel is a heavy mineral and it concentrates through gravity separation from most of the other molten material in the magma during crystallisation from the cooling magma. Commercial chromite deposits are found mainly in two forms: stratiform seams in basin-like intrusions, often multiple seams through repeated igneous injections, and the more irregular podiform or lenticular deposits.

The best known example of a stratiform deposit is the Bushveld Igneous Complex of South Africa. This complex contains most of the world's chromite reserves. The Great Dyke of Zimbabwe, traversing nearly the length of the country, is very similar and has been linked to the Bushveld in geological history. These two features are well-known also for their important and very large commercial deposits of the platinum-group metals.

Other stratiform deposits occur in Madagascar and in the Orissa district of India.

Stratiform deposits are generally very large complexes. They can be more
than 5,000 metres thick and cover thousands of square kilometres. For example, the largest, the Bushveld, covers an area of 12,000 square kilometres.

The podiform deposits are relatively small in comparison and may be shaped as pods, lenses, slabs or other irregular shapes. Many have been extensively altered to serpentine and they are often faulted. They are generally richer in chromium than the stratiform deposits and have higher Cr:Fe ratios. Ore reserves in Kazakhstan are of the podiform type. Podiform ores were originally highly sought after, especially those from the deposits in Zimbabwe, as the best source of metallurgical grade chromite for high-carbon ferrochromium. These ores also tend to be massive (hard lumpy) ores, as opposed to the softer, more friable ores from the stratiform deposits, and this makes for better electric smelting operation.

There is a third type of chromite deposit but of very limited commercial significance. These are the eluvial deposits that have been formed by weathering of chromite-bearing rock and release of the chromite spinels with subsequent gravity concentration by flowing water.

Chromium may also be concentrated in high-iron lateritic deposits containing nickel and there have been attempts to smelt these to produce a chromium-nickel pig iron for subsequent use in the stainless steel industry.