

5.4 Chloride Process Pigment Production

Rutile, high grade leucosene, synthetic rutile and high grade titania slag are suitable feeds for chloride process pigment plants. In the output of waste material, the chloride process is much more environmentally acceptable to the alternative sulphate process.

In the Cooljarloo example, synthetic rutile is reacted at high temperature with petroleum coke and chlorine gas in a fluid bed chlorinator. The reaction produces metal chlorides and other gas. Titanium tetrachloride ($TiCl_4$) is separated from the gas stream and condensed to a liquid which is distilled to remove impurities.

Pure titanium tetrachloride can be used to produce titanium dioxide pigment or titanium metal products.

The oxidation process burns oxygen and pure $TiCl_4$, activated by an aluminium chloride catalyst, to produce TiO_2 particles and chlorine gas. The solids and gases are separated before the plant is further treated to enhance its opacifying qualities and the gas is recycled.

Titanium metal can be produced using the Hunter, Kroll or Electrolytic Ginatta processes. The Hunter and Kroll processes react $TiCl_4$ with sodium and magnesium respectively to produce titanium metal and chlorides. The Electrolytic Ginatta process involves electrolysis of $TiCl_4$ to produce metal and chlorine gas.

CONCLUSION

Many titaniferous metal deposits have been located around the world, however, there are two major constraints for further development:

1. The grade of the deposits are dropping from 9% to 12% mined 10 years ago to as low as 3% to 5%.

The lower grade mines need to be extracted using highly mechanised dredging methods which are capital intensive and will require an abundance of water for ponds and processing.

2. Environmental constraints are the biggest factor against new developments because most deposits are near coastlines with more delicate ecological balances and near centres of population.

The mines with lower grades need to strip vegetation over larger areas. However, with proper rehabilitation techniques the land can be readily returned for agricultural use in better condition than the usual mineral and nutrient deficient soil found prior to mining.