The relationships of loveringite to other phases in the system Ti-Mn-Ca-O, quenched from 1100°C and various f(O2) have been studied. Structural variation as a function of composition has been determined by Rietveld refinement of powder X-ray data. The calculated Ti3+ content, based on 38 oxygen atoms, varies from 2.5 atoms per formula unit (apfu) when grown at an f(O2) of 10–15 to 5.5 apfu at 10–18. As an example, a loveringite grown at f(O2)=10−16.7 has the composition Ca0.52Mg0.18 Ti3+0.25Ti4+0.13O3. The Ti4+/Ti3+ ratio of a synthetic loveringite is also dependent on the other phases present which varies with the bulk composition of the charge. Other phases which coexist with loveringite at various compositions and f(O2) are TiO2, Ti3O7, pyrophosphate, perovskite and rutile. Rutile coexists with loveringite at more oxidizing conditions while perovskite and or Ti3O7 occur at more reducing conditions. Pyrophosphate coexists with loveringite at more manganiferous bulk compositions over a wide range of f(O2).

The unit cell of this closest-packed oxide structure discriminate most significantly with the calcium content. The substitution of Mn2+Ti4+ for 2 Ti3+ maintains charge balance for different Ti4+/Ti3 ratios within loveringite. Ca in excess of 1 apfu and Mn are ordered into the largest octahedral site.

Mechanical explosion on solids causes their structure to be changed essentially. The changes are characterized by arising new inner interfaces as well as dislocations and various modes of point defects. The small concentrations of surfactants implanted in the layers near surface are favourable for enhancement of structure changes when disordering under mechanical explosion.

In the present work the introduction of the inorganic salts in the layers near surface of chromite as one of the most stable minerals to mechanical and chemical explosions was carried out.

The estimation of deformability degree of covalent bonds in inorganic salt addition - chromite system when forming the defects was defined by method of infrared spectroscopy. The appearance of additional vibrational frequencies indicating the formation of new complexes surface - addition was observed in the infrared spectra. The bands of the stretching internal modes of carbonate ions at 1375 and 1530 cm−1 in the spectrum of the mechanically treated chromite with Na2CO3 additions were recorded. This values differ from the free CO2-ion mode value and 1460 cm−1 band of Na2CO3 inorganic salt.

The change of structure perfection of chromite was investigated by method of X-ray diffraction with using Fourier - analysis. When dissolving the mineral particles layer by layer the relationship between the sizes of coherent dispersion blocks as well as microdistortions and depth of layer near surface has been established. Size of coherent dispersion blocks depend on type of inorganic salt addition. When Na2CO3 was added to chromite the last was destroyed till 500 Å blocks. Distraction was enchanced five-fold by using NH4Cl as addition.

In order to investigate the influence of Ti ions in the molecular structure of hydroxynpite (HAp) dissolution studies were carried out using 0.9% sodium chloride solution to which different concentrations of Ti ions were added, running from 1 to 2000 ppm. The crystallinity of solids was studied by XRD techniques. For Ti concentrations in solution smaller than 350 ppm, hydroxynpite undergoes an isomorphous substitution (Ca → Ti) and the X-ray pattern revealed HAp single phase. By EDS it was possible to establish that this HAp is Ca-deficient (Ca/P lower than 1.67) and it is transformed into an amorphous or a poorly crystallized phase for solutions containing Ti ions in concentrations of about 400 ppm. The "amorphous" phase can be a precursor of the formation of a titanium hydrogen phosphate compound, to which reference is made below. The lifetime of this precursor phase is sensitive to experimental conditions: with increasing time and temperature its crystallinity increases. When the concentration of Ti ions is higher than 400 ppm a crystalline phase is detected in early stages and its X-ray diffraction data seem to correspond to a mixture of the α-titanium hydrogen phosphate hydrate [α-Ti(HPO4)2·H2O] and γ-titanium hydrogen phosphate hydrate [γ-Ti(HPO4)2·2H2O]. The X-ray diffraction data of the crystalline phase obtained were compared with data from the literature for α and γ form. However, some reflections in positions non predicted, δ=0.05, 6.4, 4.8 Å, may correspond to a new phase or a mixed layered compound of the α and γ-form. Usually, the layers are stacked along the c-axis and the stacking matrix is formed by epitactic overgrowth. In this case a and b axis are exchangeable. The preliminary results of the mixed layered compound formed from both polytypes (α and γ) point towards a stacking matrix (II), with a layer spacing of approximately 19.2 Å, which can be responsible for the reflections observed. On the other hand, the diffuse nature of the scattering pattern suggests that this material possesses a low level of crystallinity and/or a very small crystallite size.

A series of phosphorus (III) compounds, RPHX (X= H, F, Cl, Br, I) and some low co-ordinate phosphorus (III) compounds have been reacted with a platinum complex (i) to form cis-platin analogues (ii). These compounds have been shown to exhibit anti-cancer activity. The rate at which compounds hydrolyse in an aqueous media is very important when considering them to be practical in vivo anti-tumour agents. The relationship between the rate of hydrolysis of the Pt-Cl bond and its bond length will be described.

Crystallographic studies of these compounds have revealed that the Pt-Cl bond trans (to Pt) is significantly shorter than the cis Pt-Cl (i) bond. We believe that this variation can be correlated with the strength of the P-Cl bond, which is in turn governed by the electro negativity of the substituents X, attached to Pt. Therefore by synthesizing analogues with varying X substituents we hope to engineer a compound with Pt-Cl bond lengths with the optimum strength for in vivo pharmaceutical action.