

Theme Seminar

"Chemical Research and Innovations for Economic Prosperity"

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Journey towards economic sustainability- Role of Chemists

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The role of chemists is particularly important in the mineral sector, where value addition to minerals is the forte of chemists. For example, Eppawala rock phosphate can not only be used to produce fertilizers but also for the production of phosphate, which is an essential component of lithium batteries. It can also be used for manufacture of poultry feed. Similarly, Sri Lanka imports around 100,000 tons of precipitated calcium carbonate, when we have pure calcium carbonate deposits at Balangoda. The production of precipitated calcium carbonate is a simple, low technology chemical process.

Ilmenite is used in the production of titanium dioxide and is widely used as a pigment. The process involves digestion with sulphuric acid followed by the hydrolysis of the resulting titanyl sulphate. One disadvantage of this process is the relatively high temperature required and there is now research involving digestion in an autoclave for the production of high quality titanium dioxide. Another mineral which is found in very high purity is crystalline quartz. It is currently mined and powdered and exported to Japan and other countries. Although silicon production for the semiconductor industry is not possible owing to the high electric power required still, we can make things like water glass which is sodium silicate, quartz glassware, quartz crystals for watches and quartz lenses.

Value addition to graphite to make greases, crucibles for foundry works and electrodes for batteries are examples of processes which can be commenced.

Electrodes in batteries can also be made using activated charcoal. One interesting mineral deposit is the iron pyrites ore at Panirandawa in the Seruvila area. This is the only sulphur containing mineral found in Sri Lanka and the only one with containing copper. This is a neglected resource, and these pyrite ores usually also have gold in its composition. Historically gold plating of pinnacles of stupas represent where gold has been used from Sri Lanka. There is also an often-neglected mineral at Ussangoda area at Hambantota. Here the red soil is rich in nickel. A simple process to extract nickel using sulphuric acid can produce nickel sulphate which can be directly used in nickel plating.

We have extensive resources of monazite and is widely sought after mineral because of its rare earth content. It was earlier collected from the beaches at Beruwela and the factory at Katukurunda processed it to produce monazite which was exported. Also, it is worthwhile to carry out research on the separation of rare earths and here too use of high temperature for the digestion is a drawback. Here again, the autoclaving method may be useful. Monazite has thorium in addition to rare earths and this is the raw material for producing fissionable uranium nuclear fuel. In this process, monazite is treated with concentrated sulphuric acid at about 230 °C and the rare earth sulphates so formed are separated by a complex process of precipitation, solvent extraction and chromatography.