The [$Re(CO)_3(N(SO_2)$(1-nap)dien)] compound crystalizes in monoclinic system with space group *P21/n* [*a* = 8.0675(4), *b* = 22.9977(12), *c* = 9.9692(5) Å, *V* = 1793.27(16) Å3, *Z* = 4]. The complex has a distorted octahedral structure where the Re(I) metal is coordinated by three nitrogen atoms of the dien backbone and three CO ligands. The two chelate rings of the [$Re(CO)_3(N(SO_2)$(1-nap)dien)] complex have the same pucker chirality. Crystal structure of the complex and NMR analysis confirm that, upon complexation, the sulfonamide nitrogen deprotonates and binds with metal in a tridentate fashion giving a net neutral coordination sphere. The metal complex exhibits an upfield (*exo*-NH) and a relatively downfield NMR signal (*endo*-NH) in DMSO-d_6, In an FTIR spectrum of the ligand, the peak at 870 cm^{-1} due to S-N stretching vibrations, has shifted to 860 cm^{-1} in the spectrum of the metal complex. The high energy bands between 200-300 nm in the absorption spectrum of the free ligand have shifted to shorter wavelength in the spectrum of the complex. Emission spectra were recorded in methanol and enhanced fluorescence intensity was observed at 440 nm for the $N(SO_2)$(1-nap)dienH ligand while its Re complex showed quenched fluorescence intensity. The i*n vitro* cytotoxic activity of the synthesized compounds was examined using NCI-H292 (non-small cell lung cancer cells) and MRC-5 (human normal lung fibroblast cell line). Both the ligand and the complex show acute cytotoxicity for MRC-5 cells at 24 hours. Highest cytotoxic activity was observed for [$Re(CO)_3(N(SO_2$(1-nap)dien)] complex for NCI-H292 cells with an IC_{50} value of 9.91µM at 48 hours.

The promising cytotoxic activity of the novel synthesized ligand and its metal complex indicate that these compounds may be good candidates to be utilized as anticancer drug agents.

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Technical Sessions : A - 25

Development of natural rubber based materials having enhanced mechanical properties

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Advances in polymer science have led to the development of several novel mechanical strengthen high performance polymers from natural rubber (NR). The properties of natural rubber itself restrict it to be used for many applications. Modifications of NR acquire a vast range of desired properties to use in so called areas. Those shortcomings were overcome by chemical and physical alteration of natural rubber. The mechanical strength of a polymer mainly depends on its physical parameters and cross-links density.

Double network (DN) systems were synthesized using NR (network I) and isodecyl acrylate (IDA) (network II) to acquire a higher mechanically strengthen material following a general synthesis procedure reported elsewhere. The long chains of isodecyl acrylate can favor chain entanglements which could increase the strength of the material.

Different concentrations of natural rubber (NR), different percentages of cross-linker of NR; dicumyl peroxide (DCP), monomer -isodecyl acrylate (IDA), initiator-benzoyl peroxide (BPO) and the cross-linker for the second network-divinyl benzene (DVB) were used to synthesize a series of DN systems. As a reference set, a series of single network (SN) samples were prepared by using the conventional method. Swelling test, hardness test and compression test were carried out for property analysis.

Swelling data of the DN samples in toluene have shown higher swelling ratio than the conventionally prepared SN samples confirming that DNs contain higher free volume than the SN. Hardness test was carried out using an IRHD hardness tester and it showed that DNs have better hardness over the SN. The sample NR-2.5M-30-5/IDA-2.5M-1-2.5 which contains 2.5M NR concentration and 5% (w/w) of DCP along with 2.5M of IDA with 1% (w/w) and 2.5% (w/w) has shown the highest IRHD (International rubber hardness degrees) value of 68.33 out of the DNs. This sample contains the highest initiator to cross-linker ratio in network II among the rest of the samples.
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Compression test was carried out to analyze the compressive force or crush resistance of a material. The ability of the material to recover after applying a specified compressive force over a defined period of time is measured and the strain vs stress curves of the samples were compared. According to the graphs, the sample NR-2.5M-5 / IDA 2.5M-1-2.5 has shown the highest stress resistant value of 12,900,000 Nm^{-2}.

Oil absorption properties of these DN polymers were analyzed extensively in diesel, coconut oil and discard oil. The oil absorption properties of DNs were mainly depending on the chemical architecture of the macromolecular matrices. The prepared DNs have shown much higher oil absorption in diesel and coconut oil. The highest oil absorbency (diesel, coconut oil or discard oil) was shown by the DN sample NR-2.5M-30-5/ IDA 2.5M-0.1-2.5. Results conclude that the efficient absorbency for the entrapment of these oils is DN networks over SN networks.

Considering all the results, it could be concluded that the developed DN systems have better mechanical properties as well as the oil absorbtive properties than conventionally SN samples.

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Technical Sessions : A - 26

Development of a pH sensitive indicator from *Terminalia catappa* leaves

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A pH indicator is a chemical compound used to visually determine the acidity or basicity of a solution. Extracts of both red and green leaves from Terminalia catappa were investigated to develop a natural pH sensitive indicator.

A 1 mol dm^{-3} stock solution of HCl was diluted to prepare a series of solutions from pH 0 to 6. To prepare the pH series from pH 8 to 14, a 1 mol dm-3 stock solution of NaOH was diluted accordingly. The pH 7 solution was prepared with deionized water and adjusting its pH with NaOH and/or HCl. Leaves of Terminalia catappa were washed well with water, wiped clean and dried in air. The leaves were then deveined and cut into small pieces. 20 g of these leaves were placed in a mortar along with a small volume of methanol and crushed. The crushed leaves were transferred to a large beaker and more methanol was added so that the total volume of methanol was 80 ml. The beaker was covered with a watch glass and left for 1 hour. The resulting solution was filtered, stored in a glass container and 25 times and 50 times diluted solutions of the extract in methanol were prepared. Portions of 2.00 mL from each pH solution were pipetted into a set of labeled test tubes and 0.20 mL of the leaf extract was added to each tube. The same procedure was adapted to two other sets of labelled test tubes using the 25 times and 50 times diluted extract. The green leaf extract showed a colour change only in the pH range 12-14. Therefore, only the red leaf extract was used for further investigations. A wavelength scan from 200-800 nm was performed on each mixture using Hitachi U-2910 Spectrophotometer.

The methanol extract of red leaves produced the colour changes shown in Figure 1 when added to solutions of different pH.

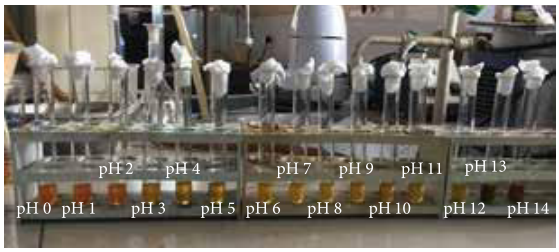

Figure 1: Change in colour of the methanolic extract of red *catappa* leaves with pH

Isosbestic point is a wavelength at which the absorbance of a solution containing two chemical species remains constant as the equilibrium between them changes. The wavelength/s at which the spectra of two or more species cross each other are taken as the isosbestic point/s.1 In the above plots, the observed isosbestic points could be attributed to colour changes in the pH series.
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