

**SULPHONATED ECO-SOL OF
THIT SEIN (BELLERIC MYROBLAN) OIL
AS AN ADJUVANT**

PhD DISSERTATION

CHO CHO

**DEPARTMENT OF CHEMISTRY
UNIVERSITY OF YANGON
MYANMAR**

MARCH, 2005

ABSTRACT

Studies have shown that an agricultural adjuvant, spreader activator named as sulphonated eco-sol (SES) can be prepared from an indigenous seed oil, called Thit Sein oil (Belleric Myroblan) by sulphonation using 98% concentrated sulphuric acid. On sulphonation, a yield of 99% was achieved at the optimum conditions pertaining to a volume ratio 1:3 between the oil and concentrated sulphuric acid at the temperature of $35^{\circ}\text{C} \pm 1^{\circ}\text{C}$ within a reaction time of two hours. The time period depends on the amount of oil taken. When identified and characterized by using FTIR, EDXRF, XRD and SEM, the prepared SES showed to be sulphated and sulphonated. It contains sulphur content and also it is amorphous in eco-sol state, but becomes semi-crystalline in the pyrolyzed state. It was also characterized qualitatively and quantitatively. It was found that eco-sol contains about 35.71 % sulphur content. As regard to its physicochemical properties; SES showed a hydrophile lipophile balance (HLB number) of 13, its krafft point (T_K) was 55°C and its critical micelle concentration (CMC) was $3.0 \times 10^{-3} \text{ g cm}^{-3}$. Physical properties such as foaming power, foam stability and emulsion stability were also evaluated. It confirmed that, prepared SES is an anionic surfactant as well as oil in water (o/w) emulsifying agent. It has amphiphilic character showing compatibility and solubility properties. As it is a cleaning and cleansing product like detergent, it has good foaming power, foam stability and emulsion stability. Prepared SES can be used not only as an adjuvant, spreader-activator but also as an insecticide activator and as well as to prevent and control the spoilage of farm

products in agriculture. Spreader-activators help to hold chemicals on the leaf surface for extended periods of time and are usually used only with insecticides and fungicides. Thus, SES (30 %) has been found to have valuable insecticidal powers even when used without the addition of toxic substances. On the other hand, the 10-20% SES can be used to act as an activator, that is, it enhances the activity of insecticide power. SES was also found to be effective against *aphids*, *spodoptera* and other soft-bodied insects. Its insecticidal and biomicrobial potency can be attributed to the high sulphur content. Its residue on the leaves was evaluated by the chemical method and EDXRF analysis. Since, SES is a water soluble compound, it was found that, no significant residual SES was detected when the leaves were washed two or three times with water. Therefore, SES can be used as a potential substitute in place of other more poisonous insecticides, because it is not only biofriendly and user friendly but also in maintaining sustainable biodiversity in the spray applications.

Keywords: *Sulphonated eco-sol, adjuvant, spreader activator, biofriendly*