Summary

The present investigation includes two parts:-

In the first part a facile synthesis for some new heterocyclic compounds starting with imidazolylacetic acid derivatives **(2)** was achieved. Thus the reaction of **(2)** with hydrazine hydrate afforded 6-phenyl-8- (phenyl-hydrazono) 2,4,8-trihydro-imidazo [5,1-c] [1,2,4] triazine-3-one **(3)** which used as a key intermediate for synthesis of newer compounds and study of its reactivity towards some nitrogen and carbon nucleophiles. The reaction of **(3)** with aromatic aldehydes in ethanolic solution containing a few drops of piperidine afforded the arylidene derivatives **(4a-c)**. Also the condensation of **(3)** with aryldiazonium chloride afforded the triazine derivatives **(5a-c)**.

The behaviour of triazine derivative **(3)** towards acrylonitrile was investigated to afford a Michael type reaction on the activated double bond giving 2-cyano ethyl 6-phenyl-8-(phenyl-hydrazono) 4,8-dihydro-imidazo [5,1-c] [1,2,4] triazine-3-one **(6)**.

Hydroxymethylation of **(3)** with formaldehyde in presence of ethanol afforded the triazine derivative **(7)**.

In this work the behaviour of imidazotriazine **(3)** toward formaldehyde and piperidine also investigated to afford Mannich base **(8)** and with $POCl_3/PCl_5$ afforded the chloro derivative **(9)**.

The latter compound reacted with aromatic amine to yield triazine derivatives **(10a-c)**. Also the reaction of **(9)** with glycine in pyridine gave N-glycyltriazine **(11)** which cyclized by acetic anhydride to afford the condensed product **(12)**.

Furthermore the reaction of **(9)** with thiourea gave the thione **(13)** which alkylated by chloroacetic acid to afford the acid **(14)**.

Also the reaction of (**9**) with hydrazine hydrate afforded the 3-hydrazono-6-phenyl-8-(phenyl-hydrazono) 2,4,8-trihydro-imidazo [5,1-c] [1,2,4] triazine (**15**).

The condensation of (**15**) with aromatic aldehydes afforded the corresponding arylidene hydrazones (**16a,b**). Also compound (**15**) used as a key intermediate for synthesis of pyrazole derivatives (**17**),(**18**) via condensation with acetylacetone and ethyl acetoacetate. The structures of all synthesized products were elucidated by elemental analysis, IR, ^{1}H NMR, MS.

Biological activities of some synthesized compounds have been investigated and it was found that some of them have remarkable biological effect against the selected micro-organisms.

On a program to find and prepare a suitable cheap organic extractant for separation Rare Earth Elements one of oxime derivatives was prepared, examined and applied. Namely 3-Hydroxy-2-phenyl-5-(phenyl-hydrazono)-3,5 dihydro-imidazol-4-one (M.wt = 280) was prepared and contacted with lanthanum (first rare earth elements member in their series) without diluent and modifier.