Recently, aryldiazonium salts were successfully coupled with 3-N,N-dimethyl-aminol-oxo-2-propenes yielding 2-aryl-hydrazonepropanals. Likewise, it was found that diazotized anthranilonitrile $1a$ couples readily with the enamiones $2a–e$ to yield products of coupling and hydrolysis of dimethylamine moiety. The coupling products can thus be formulated as the arylhydrazonepropanals $5$ or potential tautomeric enol azo forms $4, 5A–C$ or a mixture of one or more of these forms.

The aforementioned $5a–e$ were produced by coupling at C-2* of the $\alpha,\beta$-unsaturated ketone with diazonium ion followed by hydrolysis of the substituent at 3-position into the formyl group by action of the aqueous base existing in the medium.

Similar to their behaviour towards diazotized anthranilonitrile $1a$, $2a–e$ coupled also with diazotized methyl anthranilate $1b$ yielding a product of coupling and hydrolysis of the dimethylamine moiety. Again, the hydrazone structure $5f–j$ was established for these products based on the appearance of the formyl proton at $\delta$ 10.23 in $^1H$ NMR and the hydrazone hydrogen proton at $\delta$ 15.66 ppm.

When diazotized anthranilonitrile $1a$ was coupled with $2f$, a product of coupling and dimethylamine hydrolysis was also obtained. $^1H$ NMR of this product show that it exists in DMSO as an equilibrium mixture of E-form $5A$, Z-form $5B$ and the enol azo form $5C$, as $^1H$ NMR revealed three signals for a total of one proton at $\delta$ 9.0, 9.6 and 10.2 ppm. The signal at $\delta$ 9.00 ppm is assigned for CH in the hydroxymethyl form while the signal at $\delta$ 9.6 ppm is assigned for the formyl proton in the Z-form and the one at $\delta$ 10.2 ppm is assigned for the formyl proton in the E-form.

From integrals, it could be calculated that the major constituent in this equilibrium mixture (70%) is the E-form, while (20%) of the Z-form also exist and the remaining (10%) exist in the enol azo form. All these forms are stabilized by hydrogen bonding.

The so obtained arylhydrazones have been utilized as starting materials for preparing the targeted condensed pyridazine ring system. Thus, the arylhydrazones $5f,g,j$ condensed readily and smoothly with the malononitrile $6a$ in presence of a base in refluxing ethanol or dioxane yielding products of water and methanol elimination which can thus be formulated as the pyridazino[2,3-a]quinolinones $9a–c$. The formation of $9$ from $5$ and $6a$ is assumed to proceed via intermediary of non-isolable $7$ and $8$. Similarly, condensation of arylhydrazones $5f,g,j$ with ethyl cyanoacetate $6b$ afforded the pyridazino-quinazolines $9d–f$, while condensing the arylhydrazones $5f–i$ with either cyanoacetamide $6c$ or benzoylacetonitrile $6d$ afforded the pyridazino[2,3-a]quinazolines $9g–l$.

Similarly, hydrazone $5l$ condensed with malononitrile $6a$ and benzoyl acetonitrile $6d$ yielded the tricyclic pyridazino[2,3-a]quinazolines.
Also, arylhydrazones 5a–e condensed with malonitrile 6a yielding products of condensation and water elimination. These can be formulated as the arylhydrazone 10, pyridazin-6-ime 11, or pyridazino[2,3-a]quinazolines 12.

Similar to their behaviour towards 6a, compounds 5a–e condensed also with 6b–d yielding the pyridazin-6-imines 11d–m, whose UV indicated that the targeted pyridazino[2,3-a]quinazoline ring was not formed.

The diazotized 2-aminocyclohexenethiophene 14 coupled readily with 2a–d,f to yield 14a–e. Those compounds condensed with malononitrile 6a to yield 16a–f most likely via intermediacy of 15.

Similarly, compound 13 coupled with 2f yielding the hydrazone 14e which condensed with 6a,d yielding 16e and 16f.

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Paper 99/53

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