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SALTS OF NICOTINIC ACID WITH A SERIES OF SUBSTITUTED AMINES

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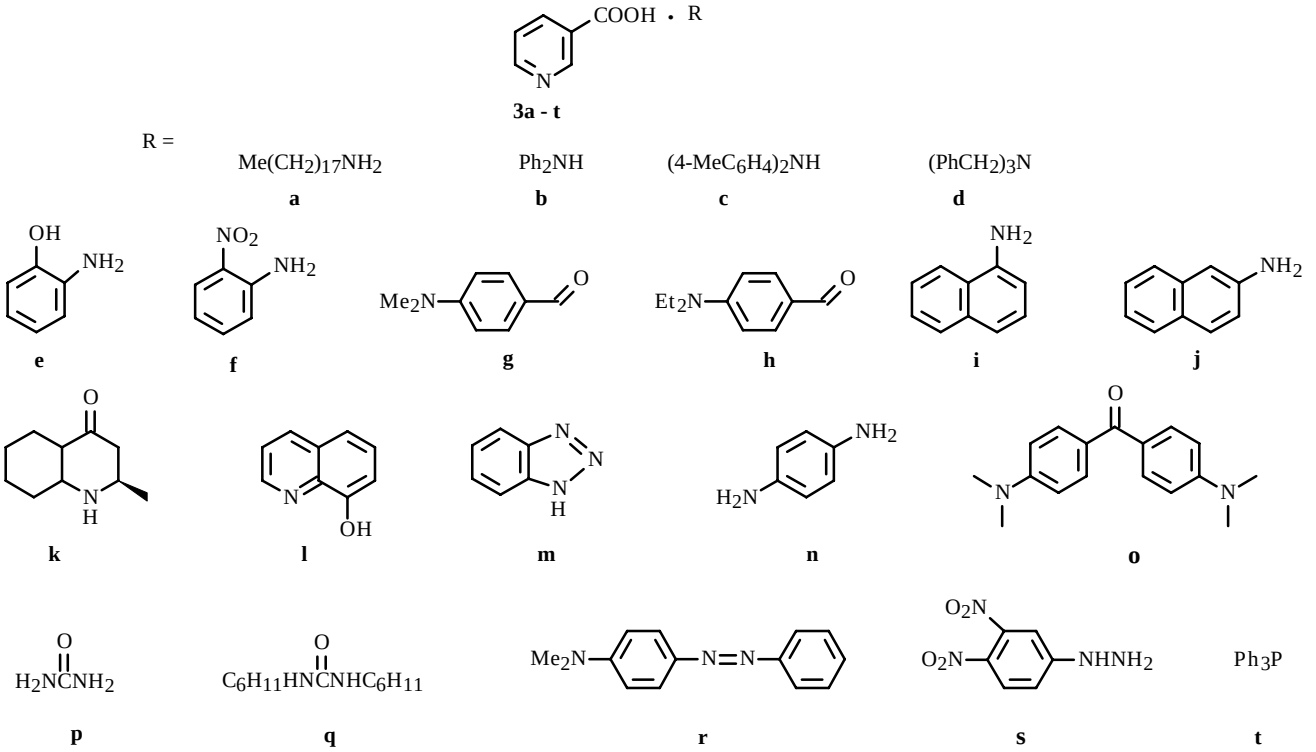
Nicotinic (3-pyridinecarboxylic) acid, or vitamin PP (**1**), is not only one of the most important vitamins but also a compound with a broad spectrum of physiological activity [1, 2]. It and its amide are very important for vital functions of an organism. They represent prosthetic groups of enzymes, codehydrases I and II, act as H-transfer agents, and perform redox processes. Codehydrase II also participates in phosphate transfer [1, 2]. Salts of nicotinic acid with amines exhibit anticancer [3], anti-inflammatory [4], and radioprotective activities [5]. The ionic character and strength of H-bonds in salts of nicotinic acid have been investigated [6].

Our goal was to develop a preparative synthetic method for new potentially biologically active functionally substituted N- and P-containing salts of this acid. The optimal conditions for preparing previously unknown salts **3a-t** by reaction of **1** with aliphatic, aromatic, and heterocyclic amines **2a-s** and triphenylphosphine (**2t**) in a 1:1 ratio in absolute CH_3OH were determined. Use of other organic solvents gave unsatisfactory results. The reaction was complete in 5-10 min at 20-23°C. Removal of CH_3OH in vacuum for 5-6 h with heating not higher than 30-35°C gave **3a-t** in 91-97% yields.



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The resulting salts had the following melting points and compositions: **3a**, mp 47°C, $C_{24}H_{44}N_2O_2$; **3b**, mp 43°C, $C_{18}H_{16}N_2O_2$; **3c**, mp 65°C, $C_{20}H_{20}N_2O_2$; **3d**, mp 81°C, $C_{27}H_{26}N_2O_2$; **3e**, mp 137°C, $C_{12}H_{12}N_2O_3$; **3f**, mp 63°C, $C_{12}H_{11}N_3O_4$; **3g**, mp 59°C, $C_{15}H_{16}N_2O_3$; **3h**, mp 33°C, $C_{17}H_{20}N_2O_3$; **3i**, mp 37°C, $C_{16}H_{14}N_2O_2$; **3j**, mp 102°C, $C_{16}H_{14}N_2O_2$, **3k**, mp 141°C, $C_{16}H_{22}N_2O_3$, **3l**, mp 62°C, $C_{15}H_{12}N_2O_3$; **3m**, mp 74°C, $C_{12}H_{10}N_4O_2$; **3n**, mp 119°C, $C_{12}H_{13}N_3O_2$; **3o**, mp 162°C, $C_{23}H_{25}N_3O_3$; **3p**, mp 118°C, $C_7H_9N_3O_3$, **3q**, mp 191°C, $C_{19}H_{29}N_3O_3$; **3r**, mp 106°C, $C_{20}H_{20}N_4O_2$; **3s**, mp 188°C, $C_{12}H_{11}N_5O_6$, **3t**, mp 70°C, $C_{24}H_{20}NPO_2$.

Salts **3a-t** are colorless or lightly colored crystalline compounds that are very soluble in acetone and C_{1-4} alcohols and poorly soluble in water. They are not hygroscopic and stable to storage in sealed ampuls at 0-5°C in the dark.

The structures of **3a-t** were confirmed by elemental analysis, PMR, IR and UV spectra. The IR spectra of the salts exhibit abrosption bands for aromatic rings (3100-3065, 1595-1628, 745-816 cm^{-1}) and C–O deformations at 1320-1299 cm^{-1}. The UV spectra of the salts have absorption maxima at 210, 248, 260, and 270 nm. The spectral data agree well with those in the literature [6] for analogous compounds. The purity of the prepared compounds was 98 ± 1% according to PMR spectroscopy.

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