

### THE CHARACTERISATION OF PARACETAMOL SOLVATES

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This poster outlines the characterisation of five new paracetamol adducts with: morpholine, N-methylmorpholine, piperazine, 1,4-dimethylpiperazine and 4,4'-dipyridyl. Most of the structures crystallised in space group  $P2_1/c$  except for morpholine, which crystallised in space group  $P-1$ . In most of the solvates, the paracetamol molecules are linked through a C(4) graph. All solvates show chains of paracetamol molecules linked through hydrogen bonding to the solvent.

**Keywords: PARACETAMOL, SOLVATES, HYDROGEN BONDING**

### CONCOMITANT CRYSTALLIZATION: DIAMINOBENZENESULFONIC ACIDS

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In 1906, Groth (1) described some early examples of concomitant polymorphs (2), among them "m-diamidobenzenesulfonic acid" (2,4-diaminobenzenesulfonic acid). As part of an ongoing investigation into concomitant polymorphism, we have revisited the structural chemistry of this compound. Preliminary results suggest that Groth's compound was in fact two hydrates of the 2,4-derivative. Diaminobenzenesulfonic acids have long been used as starting materials for the making of azo dyes (3), and more recently in the manufacture of copolyamides (4).

Investigation of the crystal chemistry of the 2,4-derivative has led to the identification of two polymorphs, concomitant crystallization of a monohydrate and a dimorphic hydrate (gr =  $\frac{2}{3}$  i.e. three molecules of 2,4-derivative to two molecules of water), and a hydrochloride. These have been characterized using optical microscopy, single crystal and powder x-ray diffraction techniques, FT-IR and a variety of thermal methods. All molecular forms appear to be zwitterionic, and in the hydrochloride all three substituents on the benzene ring are charged: both  $-NH_3^+$  groups and the  $-SO_3^-$  group. Details of the characterization of these various crystal forms and a comparison of the crystal structures will be presented.

#### References

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### GROTH'S ORIGINAL CONCOMITANT POLYMORPHS REVISITED

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Three nonsolvated polymorphic forms ( $\alpha$ ,  $\beta$ ,  $\gamma$ ) of 1,3-bis(*m*-nitrophenyl)urea were reported in 1899 [1] and summarized by Groth [2]. Recent work reported the structures and characterization of the  $\alpha$ -[3] and  $\beta$ -[4] forms. In a reinvestigation of the crystal chemistry of this system, we have prepared the  $\alpha$ - and  $\beta$ -forms, a third nonsolvated form (habit different from that described by Groth) and a previously unreported monohydrate. From thermomicroscopy studies the  $\beta$  form (white needles) transforms on heating to the  $\alpha$ -form (yellow prisms), around 200° C. The different modifications were characterized by FT-IR and X-ray single-crystal diffraction. The three anhydrous forms are conformational polymorphs, distinguished by the relative orientation of the *m*-nitro groups with respect to the carbonyl:  $\alpha$ , anti-anti;  $\beta$ , syn-syn and the third form syn-anti. The monohydrate and the  $\beta$ -form crystallize in the same polar space group ( $C2$ ). The structures are very similar with hydrogen-bonded molecular chains being modulated by the water molecules. Additional details on the similarities and differences in structures and crystal chemistry will be reported.

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### CONFORMATIONAL POLYMORPHISM OF THE LOCAL ANAESTHETIC DRUG OXYBUPROCAINE HYDROCHLORIDE

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Oxybuprocaine Hydrochloride was found to exist in three enantiotropically related polymorphic modifications which have been characterized by thermal analysis, FTIR- and FT-Raman-spectroscopy and solid-state NMR-spectroscopy as well as X-ray powder- and single-crystal X-ray diffractometry. Modification II is the thermodynamically stable form at room temperature and transforms to mod. I on heating beyond 135°C. Mod. I is kinetically stable below its thermodynamic transition temperature, which lies at about 90°C. On cooling, mod. II transforms to a low temperature form (mod. III). This transformation is highly reversible within a few Kelvin. Magic-angle spinning carbon-13 NMR spectra reveal clearly that mod. I has one molecule in the asymmetric unit, whereas form II has two. The spectra have been assigned with the assistance of dipolar dephasing experiments. Low-temperature spectra show distinctive changes, which indicates the phase transition to mod. III. The crystal structures of all three forms were obtained showing that the molecules adopt essentially two types of conformation in the different structures, a linear (type I) and a bent type (type U). The potential high flexibility of the molecule is reduced by an intramolecular hydrogen bond. In mod. II both types of conformation could be found whereas in mod. I and III only one type of molecule conformation is present in the asymmetric unit. However, in the low temperature form III, two different sorts of the type U exist. The differences between mod. I and III are the orientation of the terminal alkyl groups and a greater variety of short intra- and inter-molecular contacts.

**Keywords: POLYMORPHISM, OXYBUPROCAINE  
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