

MS22.01.05 A DATABASE STUDY OF THE BONDING AND CONFORMATION OF BIS-SULFONYLAMIDES AND IMIDES. By Alajos Kálmán* and Petra Bombicz, Central Research Institute for Chemistry, Hungarian Academy of Sciences, H-1525 Budapest 114, P.O.Box 17., Hungary.

The bonding and conformational characteristics of bis-sulfonylamides and analogous imides are compared. Structures (44 altogether) of type R-SO₂-NQ-SO₂-R' (R, R' = Me, Et, or Aryl) were retrieved from the Cambridge Structural Database (March 1994 release, 120481 entries). They are either neutral (Q = H, alkyl and aryl group or hetero atom like O and S) or charged (Q = e⁻ or metal, like In, Hg, etc.).

Analysis of the S-N bonds varying in the range 1.57-1.76 Å and their observed influence upon the other S-X and X-S-Y parameters enabled us:

- i. to characterize the S-N bonds against the differences in the nitrogen environment (charged N, N-metal and N-covalent bonds),
- ii. to prove the applicability of the *bond order conservation principle* (Johnston, 1961) and the *VSEPR* rules (Gillespie, 1963) on the S(VI)[O,O',N,C] tetrahedra,
- iii. to describe the intra- and intermolecular conditions of the folded conformation vs the energetically favourable open form of the C-SO₂-NQ-SO₂-C moieties,
- iv. and to substantiate the inequalities of the O-S-N angles which is attributable to the *synclinal* position of one of the S-O bonds with N-lone pair (Kálmán *et al.*, 1981).

The marked difference between the archetypes of the S-N bonds indicates that the interdependence of the S-X bonds in the NSO₂C tetrahedra are principally governed by the environment of the nitrogen atoms. (Sponsor: Hungarian Res. Fund, Grant No. OTKA T014539).

GILLESPIE, R.J. (1963). *J.Chem. Educ.*, 40, 295-301.

JOHNSTON, H.S. (1961). *Adv. Chem. Phys.* 3, 131-170.

KÁLMÁN, A., CZUGLER, M. & ARGAY, GY. (1981). *Acta Cryst.*, B37, 868-877.

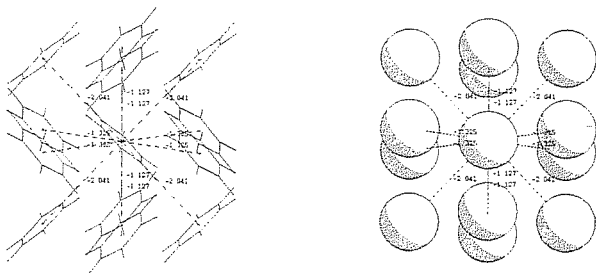
MS22.01.06 AUTOMATIC DETERMINATION OF STRUCTURAL SUBCLASSES. Shishan Guo, Suzanne Fortier, Janice I. Glasgow, Chemistry Department and Computing and Information Science, Queen's University, Kingston, Ontario, Canada K7L 3N6

With the rapid growth of crystallographic databases, fully automatic methods for mining knowledge from these databases are needed. Several classification algorithms are already incorporated into the databases. While these have greatly facilitated the analysis and classification of datasets, considerable user intervention is still required. For example, extensive examination of the dataset may be needed for the selection of clustering algorithm, data parameters, similarity measure, similarity threshold, stopping point, etc. Furthermore, different choices of algorithms and metrics often yield different results. It is thus important to evaluate the robustness of the results and assess their possible dependence on artifacts of the approach used. Thus, a fully automated classification approach requires methods for both pre-classification data preview and post-classification result assessment. This contribution presents a method for the automatic determination of structural subclasses in datasets retrieved from the CSD. Subclasses/clusters are obtained by undergoing a comprehensive automated data preview which is followed by applying clustering algorithms and then by undergoing post-clustering evaluation of the results. The automatic preview component is based on a comprehensive analysis of histograms and scattergrams generated for potential classification parameters. This process helps identify informative

parameters and gives a preliminary clustering of the dataset. For postclassification evaluation, plots of a clustering similarity index are used to assess how the results are affected by different algorithms and by the introduction of random noise into the dataset. These plots help understand the nature of the datasets being analysed by revealing characteristic features associated with the degree of overlap among the subclasses and by identifying where maximum similarity occurs. Application of the automatic classification approach to four representative datasets - valine, hexopyronose sugars, steroid side-chains and six-membered rings - will be presented.

PS22.01.07 PLUTO: CRYSTAL PACKING ENERGIES IN THE CAMBRIDGE STRUCTURAL DATABASE. Sam Motherwell, Cambridge Crystallographic Data Centre, 12 Union Rd., Cambridge, CB2 1EZ. U.K.

The Pluto program has been enhanced to allow visual exploration of the packing energy environment of organic molecules. Facilities allow selection of the N strongest interactions. This allows comparison of structures on the basis of the packing energy enclosure shell about a molecule. The energy is calculated by the empirical atom-pair method, using the tables collected by Gavezzotti and others. This allows one to easily compare energy shells for molecules in polymorphs, and in general examine packing patterns on an energy basis. Selective display is allowed at a given energy threshold revealing the most important interactions in the packing. It is also possible to pick any pair of molecules in the packing diagram for energy display. Molecules may be simplified to molecular centre points, or spheres, or enclosure surfaces as ellipsoids or contact probed by a hydrogen atom. Coordinate information may be presented in a simple free format, or the standard Cambridge Structural Database FDAT. or SHELX.



Example. Benzene interactions < -1 Kcal/mole

PS22.01.08 PREQUEST: A DATA INPUT PROGRAM FOR THE CAMBRIDGE STRUCTURAL DATABASE. Paul Edgington, Clare Macrae, Sam Motherwell, Cambridge Crystallographic Data Centre, 12 Union Rd., Cambridge, CB2 1EZ. UK

The Prequest program enables users to create new entries for the Cambridge Structural Database (CSD) from common input formats such as CIF and SHELX. Important checks are made for validity and self-consistency of data fields, enabling users to add entries to a local (private) CSD database fully searchable with Quest. This gives the user a method for quickly comparing molecular geometry parameters of current experimental results with the main CSD.

The program also prepares the way for trouble-free depositing of data with the Cambridge Crystallographic Data Centre (CCDC), as private communications to be added to the widely distributed main CSD file.

The use of the CIF input format is now well established.