



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 09:09 PM GMT

PDB ID : 1NST
Title : THE SULFOTRANSFERASE DOMAIN OF HUMAN HAPARIN SULFATE
N-DEACETYLASE/N-SULFOTRANSFERASE
Authors : Kakuta, Y.; Pedersen, L.C.; Negishi, M.
Deposited on : 1998-09-07
Resolution : 2.30 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

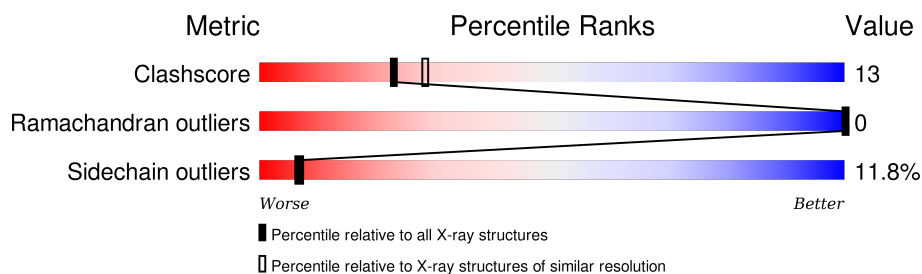
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	102246	4452 (2.30-2.30)
Ramachandran outliers	100387	4410 (2.30-2.30)
Sidechain outliers	100360	4409 (2.30-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	325	 57% 26% • 13%

2 Entry composition [i](#)

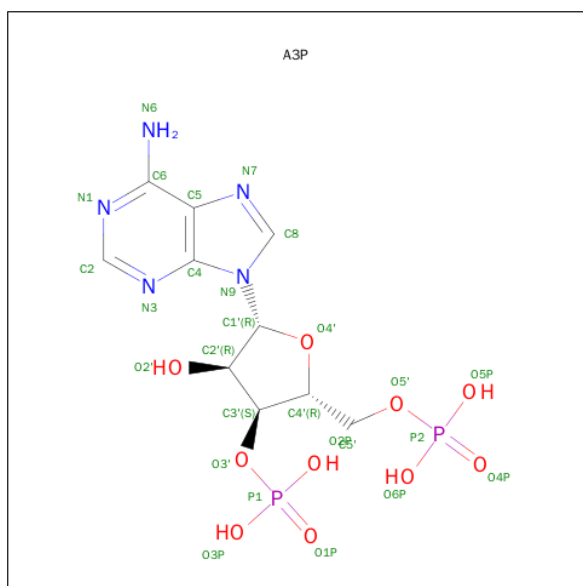
There are 3 unique types of molecules in this entry. The entry contains 2383 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called HEPARAN SULFATE N-DEACETYLASE/N-SULFOTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	282	Total	C	N	O	S	0	0	0
			2283	1482	389	403	9			

- Molecule 2 is ADENOSINE-3'-5'-DIPHOSPHATE (three-letter code: A3P) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 3 is water.

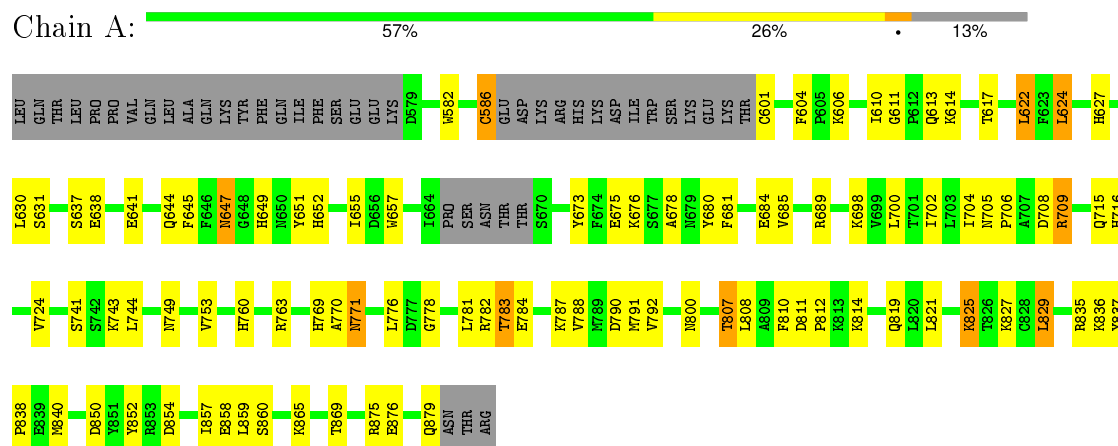
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	73	Total 73 O	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

- Molecule 1: HEPARAN SULFATE N-DEACETYLASE/N-SULFOTRANSFERASE



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	45.42 Å 54.50 Å 68.94 Å 90.00° 100.05° 90.00°	Depositor
Resolution (Å)	50.00 – 2.30	Depositor
% Data completeness (in resolution range)	90.0 (50.00-2.30)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
Refinement program	SHELX-96, X-PLOR 3.851	Depositor
R, R_{free}	0.210 , 0.257	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2383	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A3P

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.40	0/2351	0.60	0/3188

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2283	0	2214	61	0
2	A	27	0	11	1	0
3	A	73	0	0	3	0
All	All	2383	0	2225	61	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 13.

All (61) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:582:TRP:HB3	1:A:655:ILE:HD11	1.58	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:783:THR:HG23	1:A:784:GLU:HG3	1.69	0.74
1:A:807:THR:O	1:A:807:THR:HG23	1.90	0.72
1:A:807:THR:O	1:A:807:THR:CG2	2.38	0.72
1:A:622:LEU:HD23	1:A:829:LEU:HD22	1.75	0.68
1:A:810:PHE:O	1:A:812:PRO:HD3	1.94	0.67
1:A:876:GLU:O	1:A:879:GLN:HG2	1.96	0.65
1:A:821:LEU:HB2	1:A:825:LYS:HB3	1.79	0.65
1:A:606:LYS:HE3	3:A:24:HOH:O	1.98	0.63
1:A:821:LEU:HD11	1:A:827:LYS:HB2	1.81	0.63
1:A:783:THR:CG2	1:A:784:GLU:HG3	2.28	0.62
1:A:647:ASN:H	1:A:647:ASN:HD22	1.49	0.61
1:A:724:VAL:HG21	1:A:743:LYS:HB3	1.82	0.60
1:A:854:ASP:HA	1:A:857:ILE:HD12	1.83	0.59
1:A:808:LEU:HD23	1:A:819:GLN:HA	1.85	0.59
1:A:645:PHE:O	1:A:651:TYR:HB2	2.03	0.59
1:A:709:ARG:NH2	3:A:21:HOH:O	2.37	0.58
1:A:760:HIS:HD2	1:A:763:ARG:HH12	1.51	0.58
1:A:647:ASN:H	1:A:647:ASN:ND2	2.03	0.57
1:A:836:LYS:CG	1:A:836:LYS:O	2.54	0.56
1:A:706:PRO:HB2	1:A:852:TYR:CE1	2.41	0.55
1:A:649:HIS:O	1:A:652:HIS:ND1	2.40	0.54
1:A:617:THR:HG22	1:A:702:ILE:HD12	1.90	0.54
1:A:716:HIS:CD2	1:A:835:ARG:HH12	2.26	0.53
1:A:644:GLN:CA	1:A:647:ASN:HD21	2.22	0.53
1:A:582:TRP:HB3	1:A:655:ILE:CD1	2.34	0.53
1:A:749:ASN:ND2	1:A:753:VAL:HG21	2.23	0.53
1:A:647:ASN:HD22	1:A:680:TYR:HE2	1.56	0.52
1:A:649:HIS:O	1:A:652:HIS:CE1	2.63	0.52
1:A:769:HIS:ND1	1:A:770:ALA:N	2.58	0.51
1:A:614:LYS:NZ	1:A:716:HIS:HD2	2.09	0.51
1:A:781:LEU:HA	1:A:788:VAL:HG11	1.93	0.50
1:A:836:LYS:HG2	1:A:836:LYS:O	2.10	0.50
1:A:875:ARG:NH1	1:A:875:ARG:HG2	2.27	0.50
1:A:624:LEU:HD22	1:A:630:LEU:HD13	1.94	0.49
1:A:631:SER:O	1:A:673:TYR:HA	2.13	0.48
1:A:627:HIS:HB3	1:A:630:LEU:HD12	1.94	0.48
1:A:875:ARG:HH11	1:A:875:ARG:HG2	1.78	0.48
1:A:811:ASP:HB3	1:A:814:LYS:HB3	1.96	0.47
1:A:704:ILE:HG22	1:A:778:GLY:HA3	1.97	0.47
1:A:788:VAL:HA	1:A:791:MET:HG3	1.95	0.47
1:A:644:GLN:C	1:A:647:ASN:HD21	2.18	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:788:VAL:O	1:A:792:VAL:HG23	2.15	0.46
1:A:586:CYS:SG	1:A:601:CYS:CB	3.04	0.46
1:A:837:TYR:HB2	1:A:838:PRO:CD	2.46	0.45
1:A:700:LEU:HD21	1:A:776:LEU:HG	1.98	0.45
1:A:829:LEU:HG	2:A:301:A3P:N1	2.32	0.45
1:A:760:HIS:HD2	1:A:763:ARG:NH1	2.15	0.44
1:A:771:ASN:C	1:A:771:ASN:HD22	2.21	0.43
1:A:724:VAL:HG11	1:A:744:LEU:HA	2.01	0.43
1:A:645:PHE:HD1	1:A:657:TRP:CZ3	2.36	0.42
1:A:787:LYS:O	1:A:791:MET:HG3	2.20	0.42
1:A:613:GLN:HG2	1:A:678:ALA:HB3	2.01	0.41
1:A:610:ILE:O	1:A:681:PHE:HB2	2.20	0.41
1:A:705:ASN:HB3	1:A:708:ASP:OD2	2.20	0.41
1:A:685:VAL:O	1:A:689:ARG:HG3	2.21	0.41
1:A:611:GLY:HA2	1:A:617:THR:HG21	2.04	0.40
1:A:698:LYS:HG2	3:A:47:HOH:O	2.21	0.40
1:A:837:TYR:HB2	1:A:838:PRO:HD2	2.01	0.40
1:A:613:GLN:HG2	1:A:678:ALA:CB	2.51	0.40
1:A:715:GLN:HA	1:A:715:GLN:NE2	2.37	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	276/325 (85%)	263 (95%)	13 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	237/289 (82%)	209 (88%)	28 (12%)	6 7

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	586	CYS
1	A	604	PHE
1	A	622	LEU
1	A	624	LEU
1	A	637	SER
1	A	638	GLU
1	A	641	GLU
1	A	647	ASN
1	A	675	GLU
1	A	676	LYS
1	A	684	GLU
1	A	709	ARG
1	A	741	SER
1	A	771	ASN
1	A	782	ARG
1	A	783	THR
1	A	790	ASP
1	A	800	ASN
1	A	807	THR
1	A	825	LYS
1	A	829	LEU
1	A	840	MET
1	A	850	ASP
1	A	858	GLU
1	A	859	LEU
1	A	860	SER
1	A	865	LYS
1	A	869	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	647	ASN
1	A	715	GLN
1	A	716	HIS
1	A	760	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	A3P	A	301	-	24,29,29	1.83	5 (20%)	28,45,45	2.47	10 (35%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	A3P	A	301	-	-	1/11/31/31	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	A3P	C8-N7	-3.29	1.28	1.34
2	A	301	A3P	P2-O5P	-2.45	1.45	1.54
2	A	301	A3P	C4-N3	2.63	1.39	1.35
2	A	301	A3P	O4'-C1'	4.12	1.46	1.41
2	A	301	A3P	C2'-C3'	4.60	1.63	1.53

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	A3P	N3-C2-N1	-3.47	126.24	128.89
2	A	301	A3P	C2'-C1'-N9	2.23	117.70	114.29
2	A	301	A3P	O4'-C1'-N9	2.26	112.83	108.10
2	A	301	A3P	O3'-C3'-C2'	2.41	120.88	111.51
2	A	301	A3P	C4'-O4'-C1'	3.02	113.04	109.72
2	A	301	A3P	O2'-C2'-C3'	3.17	120.32	111.16
2	A	301	A3P	C2'-C3'-C4'	3.36	109.60	103.29
2	A	301	A3P	O3'-P1-O1P	4.06	117.24	107.11
2	A	301	A3P	P1-O3'-C3'	5.78	135.43	121.56
2	A	301	A3P	C1'-N9-C4	6.79	137.19	126.94

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	A3P	P1-O3'-C3'-C2'

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	A3P	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section will therefore be empty.

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.