WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

May 26, 2025 – 04:57 AM EDT

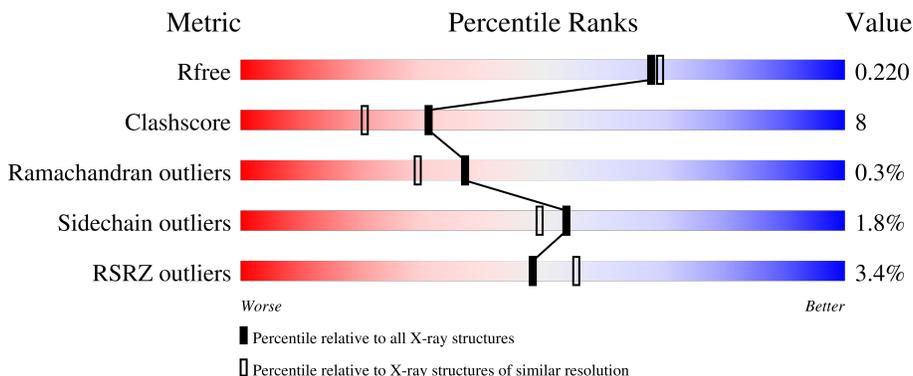|		
PDB ID	:	2F25 / pdb_00002f25
Title	:	Crystal Structure of the Human Sialidase Neu2 E111Q Mutant in Complex with DANA Inhibitor
Authors	:	Chavas, L.M.G.; Kato, R.; Fusi, P.; Tringali, C.; Venerando, B.; Tettamanti, G.; Monti, E.; Wakatsuki, S.
Deposited on	:	2005-11-15
Resolution	:	1.95 Å(reported)

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 1.95 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	Percentile Ranks	Value
Rfree		0.220
Clashscore		8
Ramachandran outliers		0.3%
Sidechain outliers		1.8%
RSRZ outliers		3.4%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	3187 (1.96-1.96)
Clashscore	180529	3412 (1.96-1.96)
Ramachandran outliers	177936	3390 (1.96-1.96)
Sidechain outliers	177891	3390 (1.96-1.96)
RSRZ outliers	164620	3186 (1.96-1.96)

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 of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. 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 <=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.

Mol	Chain	Length	Quality of chain
1	A	382	4% / 80% / 16% / · ·
1	B	382	3% / 72% / 24% / · ·

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 6410 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 Sialidase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	373	Total	C	N	O	S	0	0	0
			2935	1855	526	542	12			
1	B	370	Total	C	N	O	S	0	0	0
			2915	1844	523	536	12			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	cloning artifact	UNP Q9Y3R4
A	0	SER	-	cloning artifact	UNP Q9Y3R4
A	111	GLN	GLU	engineered mutation	UNP Q9Y3R4
B	-1	GLY	-	cloning artifact	UNP Q9Y3R4
B	0	SER	-	cloning artifact	UNP Q9Y3R4
B	111	GLN	GLU	engineered mutation	UNP Q9Y3R4

- Molecule 2 is 2-DEOXY-2,3-DEHYDRO-N-ACETYL-NEURAMINIC ACID (CCD ID: DAN) (formula: $C_{11}H_{17}NO_8$).
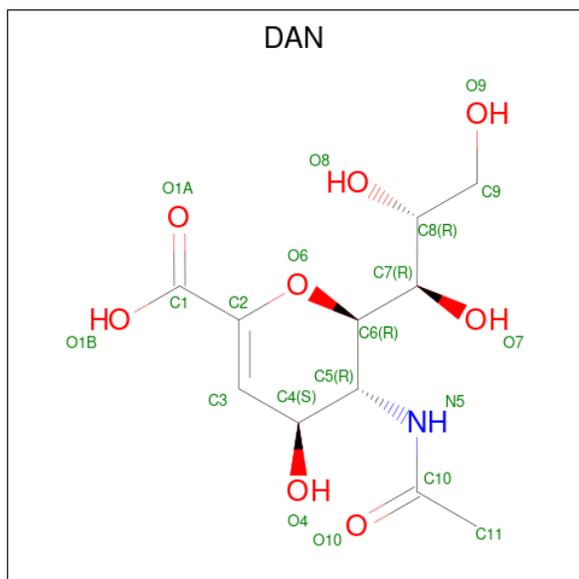
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 20	C 11	N 1	O 8	0	0
2	B	1	Total 20	C 11	N 1	O 8	0	0

- Molecule 3 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (CCD ID: EPE) (formula: $C_8H_{18}N_2O_4S$).
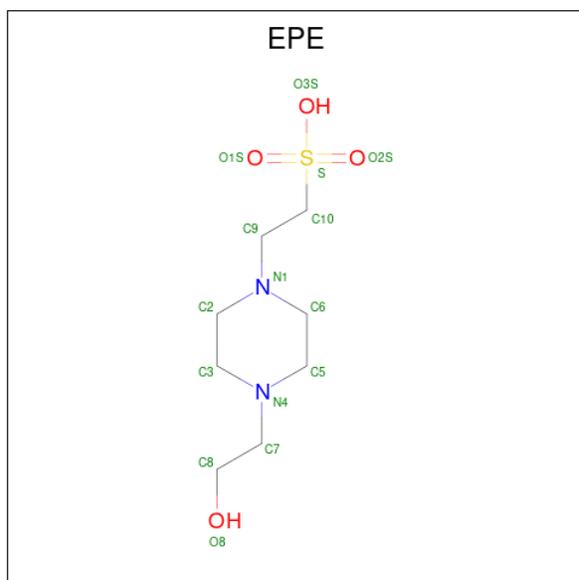
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 15	C 8	N 2	O 4	S 1	0	0
3	A	1	Total 15	C 8	N 2	O 4	S 1	0	0
3	B	1	Total 15	C 8	N 2	O 4	S 1	0	0
3	B	1	Total 15	C 8	N 2	O 4	S 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	245	Total 245	O 245	0	0
4	B	215	Total 215	O 215	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes 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.

- Molecule 1: Sialidase 2

Chain A:

- Molecule 1: Sialidase 2

Chain B:
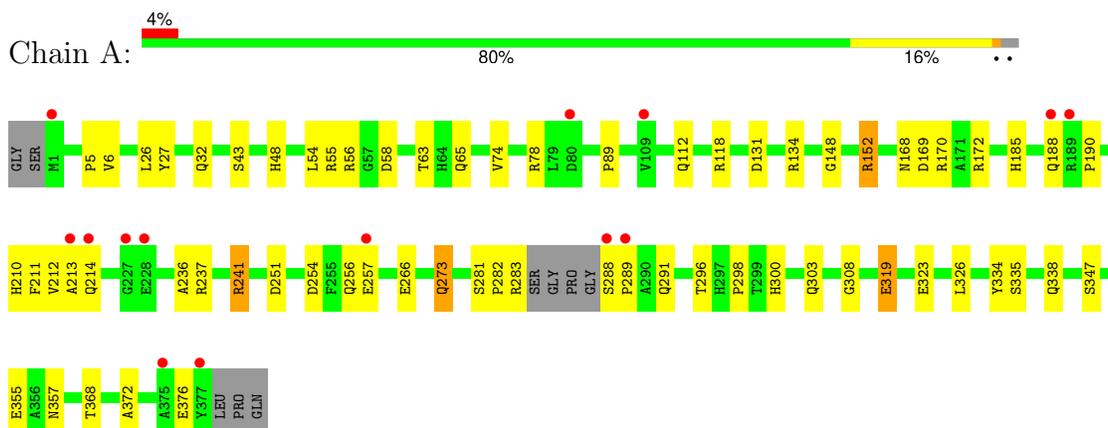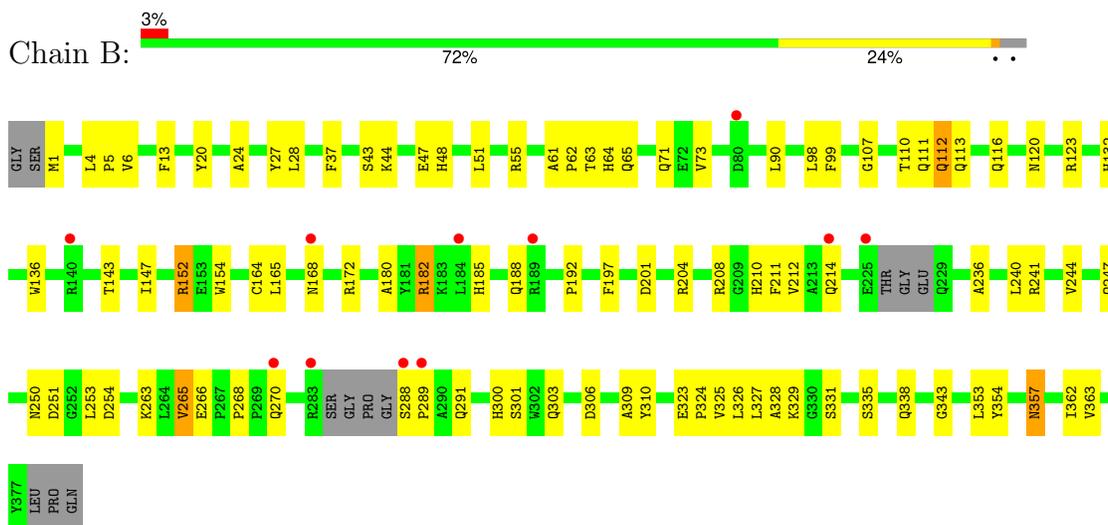
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	157.37Å 73.64Å 78.95Å 90.00° 90.31° 90.00°	Depositor
Resolution (Å)	79.06 – 1.95 78.95 – 1.95	Depositor EDS
% Data completeness (in resolution range)	96.6 (79.06-1.95) 96.6 (78.95-1.95)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.02 (at 1.92Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.192 , 0.222 0.188 , 0.220	Depositor DCC
R_{free} test set	3209 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	20.1	Xtriage
Anisotropy	0.361	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 57.7	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.040 for -h,-k,l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6410	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.90% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0/3017	0.93	11/4114 (0.3%)
1	B	0.50	0/2996	0.98	18/4084 (0.4%)
All	All	0.45	0/6013	0.96	29/8198 (0.4%)

There are no bond length outliers.

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	265	VAL	N-CA-C	7.07	118.20	110.21
1	A	148	GLY	CA-C-N	6.88	127.45	119.47
1	A	148	GLY	C-N-CA	6.88	127.45	119.47
1	B	357	ASN	N-CA-C	6.81	119.53	111.02
1	B	236	ALA	N-CA-C	6.74	119.97	109.52
1	A	323	GLU	N-CA-C	-6.24	101.13	110.24
1	B	212	VAL	N-CA-C	-5.92	101.07	108.89
1	B	211	PHE	N-CA-C	5.77	118.64	110.50
1	B	132	HIS	N-CA-C	5.74	119.48	111.74
1	B	4	LEU	N-CA-C	5.69	117.67	109.48
1	A	372	ALA	N-CA-C	5.67	117.54	111.36
1	B	363	VAL	N-CA-C	5.61	116.66	108.53
1	B	343	GLY	CA-C-N	5.57	125.41	119.28
1	B	343	GLY	C-N-CA	5.57	125.41	119.28
1	B	165	LEU	N-CA-C	5.54	117.81	109.23
1	A	169	ASP	N-CA-C	-5.48	103.46	110.53
1	A	357	ASN	N-CA-C	5.41	117.78	111.02
1	A	32	GLN	N-CA-C	-5.39	103.97	111.52
1	B	325	VAL	N-CA-C	-5.37	100.65	108.17
1	B	28	LEU	CA-C-N	5.37	125.44	119.32
1	B	28	LEU	C-N-CA	5.37	125.44	119.32
1	A	74	VAL	N-CA-C	-5.36	100.48	106.21

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	323	GLU	N-CA-C	-5.35	102.43	110.24
1	A	211	PHE	N-CA-C	5.31	118.34	110.48
1	B	197	PHE	N-CA-C	-5.24	101.98	110.32
1	B	354	TYR	N-CA-C	5.18	117.13	108.99
1	A	236	ALA	N-CA-C	5.16	117.98	109.72
1	B	251	ASP	N-CA-C	5.14	118.68	111.74
1	A	251	ASP	N-CA-C	5.09	118.46	111.54

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	2935	0	2846	32	0
1	B	2915	0	2829	61	0
2	A	20	0	16	0	0
2	B	20	0	16	0	0
3	A	30	0	36	2	0
3	B	30	0	36	3	0
4	A	245	0	0	5	0
4	B	215	0	0	10	0
All	All	6410	0	5779	95	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 8.

All (95) 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:B:27:TYR:H	1:B:338:GLN:HE21	1.15	0.91
1:A:27:TYR:H	1:A:338:GLN:HE21	1.30	0.78
3:A:1003:EPE:H52	1:B:6:VAL:O	1.85	0.76
1:A:6:VAL:O	3:B:1004:EPE:H52	1.85	0.75
1:B:263:LYS:HG2	4:B:1146:HOH:O	1.87	0.74

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:273:GLN:HE22	1:A:335:SER:H	1.33	0.74
1:B:90:LEU:HB2	1:B:164:CYS:HB2	1.73	0.69
1:B:210:HIS:HD2	1:B:254:ASP:OD1	1.76	0.69
1:A:152:ARG:HH21	1:A:152:ARG:HB2	1.58	0.69
1:B:152:ARG:HH21	1:B:152:ARG:HB2	1.61	0.66
1:B:112:GLN:HE22	1:B:116:GLN:HG3	1.61	0.66
1:A:319:GLU:H	1:A:319:GLU:CD	2.05	0.65
1:B:98:LEU:HD23	1:B:99:PHE:N	2.13	0.64
1:B:27:TYR:H	1:B:338:GLN:NE2	1.92	0.63
1:B:43:SER:OG	1:B:48:HIS:HD2	1.82	0.63
1:B:309:ALA:HB2	1:B:327:LEU:HD11	1.82	0.62
1:A:5:PRO:HG2	4:A:1085:HOH:O	2.00	0.61
1:B:168:ASN:ND2	1:B:172:ARG:HH12	1.99	0.61
1:B:241:ARG:NH1	1:B:268:PRO:HB3	2.15	0.61
1:B:13:PHE:HB2	1:B:362:ILE:HB	1.83	0.61
1:B:110:THR:OG1	1:B:113:GLN:HG3	2.02	0.58
1:A:210:HIS:HD2	1:A:254:ASP:OD1	1.87	0.58
1:B:1:MET:HE2	4:B:1170:HOH:O	2.04	0.57
1:A:170:ARG:HB2	1:A:170:ARG:NH1	2.19	0.57
1:B:111:GLN:NE2	4:B:1155:HOH:O	2.37	0.57
1:B:201:ASP:CG	1:B:204:ARG:HB3	2.28	0.57
1:B:214:GLN:HG2	1:B:244:VAL:HG21	1.87	0.57
1:A:56:ARG:HD3	1:A:58:ASP:OD1	2.06	0.56
1:B:306:ASP:HA	1:B:328:ALA:O	2.06	0.56
1:B:112:GLN:NE2	1:B:116:GLN:HG3	2.20	0.55
1:B:168:ASN:HA	1:B:172:ARG:NH1	2.20	0.55
1:A:185:HIS:HB3	1:A:188:GLN:HB2	1.88	0.55
1:B:123:ARG:NH2	1:B:143:THR:HG21	2.22	0.55
1:A:300:HIS:HB3	1:A:303:GLN:O	2.07	0.55
1:B:27:TYR:N	1:B:338:GLN:HE21	1.96	0.54
1:A:212:VAL:O	1:A:214:GLN:N	2.38	0.53
1:A:288:SER:N	1:A:289:PRO:HD2	2.23	0.53
1:A:241:ARG:HG3	4:A:1102:HOH:O	2.09	0.52
1:A:257:GLU:O	1:A:257:GLU:HG3	2.11	0.51
1:B:51:LEU:HD13	1:B:73:VAL:HG11	1.91	0.51
1:B:288:SER:N	1:B:289:PRO:HD2	2.25	0.51
1:A:43:SER:OG	1:A:48:HIS:HD2	1.93	0.50
1:B:112:GLN:HE22	1:B:116:GLN:CG	2.23	0.50
1:A:131:ASP:CG	1:A:134:ARG:HB3	2.37	0.50
3:A:1003:EPE:H91	4:A:1126:HOH:O	2.11	0.50
1:B:289:PRO:HG2	4:B:1104:HOH:O	2.12	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:241:ARG:HH11	1:B:268:PRO:HB3	1.76	0.49
1:B:120:ASN:HB2	1:B:154:TRP:O	2.12	0.49
1:B:265:VAL:HG22	1:B:266:GLU:N	2.26	0.49
1:B:180:ALA:O	1:B:192:PRO:HA	2.13	0.49
1:B:210:HIS:CD2	1:B:254:ASP:OD1	2.62	0.49
1:B:24:ALA:HB3	1:B:37:PHE:HB2	1.94	0.48
1:B:310:TYR:CZ	1:B:324:PRO:HB3	2.49	0.48
1:A:256:GLN:NE2	4:A:1228:HOH:O	2.48	0.47
1:B:168:ASN:HA	1:B:172:ARG:HH11	1.79	0.47
1:B:98:LEU:HD22	1:B:136:TRP:CH2	2.50	0.46
1:B:185:HIS:HB3	1:B:188:GLN:HB2	1.97	0.46
1:B:250:ASN:ND2	1:B:253:LEU:HB3	2.31	0.46
1:B:64:HIS:HE1	4:B:1097:HOH:O	1.99	0.46
1:B:47:GLU:HB3	1:B:110:THR:HG22	1.98	0.46
1:B:152:ARG:HB2	1:B:152:ARG:NH2	2.30	0.46
1:A:63:THR:O	1:A:65:GLN:HG2	2.15	0.46
1:B:44:LYS:HB3	3:B:1006:EPE:H82	1.98	0.46
1:B:268:PRO:HD3	1:B:301:SER:O	2.17	0.45
1:B:61:ALA:HB3	1:B:62:PRO:HD3	1.99	0.45
1:B:331:SER:HB3	1:B:357:ASN:HA	1.98	0.45
1:B:310:TYR:CE2	1:B:324:PRO:HB3	2.51	0.45
1:A:283:ARG:NH1	1:A:376:GLU:OE2	2.50	0.44
1:B:1:MET:HE3	4:B:1084:HOH:O	2.18	0.44
1:B:182:ARG:H	1:B:182:ARG:HG2	1.54	0.44
1:B:291:GLN:NE2	4:B:1144:HOH:O	2.50	0.43
1:B:335:SER:HA	1:B:353:LEU:O	2.17	0.43
1:A:347:SER:OG	1:A:368:THR:HB	2.18	0.43
1:A:298:PRO:HB2	4:A:1107:HOH:O	2.18	0.43
1:B:270:GLN:O	1:B:270:GLN:HG2	2.19	0.43
1:A:152:ARG:HB2	1:A:152:ARG:NH2	2.31	0.43
1:A:78:ARG:HG2	1:A:78:ARG:HH21	1.84	0.42
1:B:240:LEU:O	1:B:241:ARG:HB2	2.20	0.42
1:A:54:LEU:HD12	1:A:55:ARG:H	1.84	0.42
1:A:118:ARG:NH1	1:A:190:PRO:HD3	2.35	0.42
3:B:1004:EPE:H21	4:B:1007:HOH:O	2.20	0.42
1:B:5:PRO:HG2	4:B:1038:HOH:O	2.19	0.42
1:B:326:LEU:HD21	1:B:329:LYS:HG2	2.01	0.42
1:A:168:ASN:OD1	1:A:172:ARG:NH1	2.53	0.42
1:B:20:TYR:HB2	4:B:1078:HOH:O	2.18	0.42
1:A:26:LEU:HD22	1:A:89:PRO:HB2	2.02	0.41
1:A:237:ARG:HA	1:A:266:GLU:OE1	2.20	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:63:THR:O	1:B:65:GLN:HG2	2.21	0.41
1:A:281:SER:HA	1:A:282:PRO:HD3	1.90	0.41
1:A:334:TYR:HB2	1:A:355:GLU:CD	2.45	0.41
1:B:55:ARG:HG2	1:B:71:GLN:HA	2.02	0.41
1:B:168:ASN:CG	1:B:172:ARG:HH12	2.29	0.41
1:B:300:HIS:HB3	1:B:303:GLN:O	2.21	0.40
1:A:296:THR:HA	1:A:308:GLY:O	2.20	0.40
1:B:147:ILE:HA	1:B:208:ARG:HD3	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	369/382 (97%)	349 (95%)	19 (5%)	1 (0%)	37	29
1	B	364/382 (95%)	347 (95%)	16 (4%)	1 (0%)	37	29
All	All	733/764 (96%)	696 (95%)	35 (5%)	2 (0%)	37	29

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	213	ALA
1	B	107	GLY

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	312/318 (98%)	305 (98%)	7 (2%)	47	41
1	B	310/318 (98%)	306 (99%)	4 (1%)	65	62
All	All	622/636 (98%)	611 (98%)	11 (2%)	54	49

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	112	GLN
1	A	152	ARG
1	A	241	ARG
1	A	273	GLN
1	A	291	GLN
1	A	319	GLU
1	A	326	LEU
1	B	112	GLN
1	B	152	ARG
1	B	182	ARG
1	B	247	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	GLN
1	A	48	HIS
1	A	67	GLN
1	A	86	ASN
1	A	108	GLN
1	A	113	GLN
1	A	116	GLN
1	A	210	HIS
1	A	214	GLN
1	A	256	GLN
1	A	259	GLN
1	A	270	GLN
1	A	273	GLN
1	A	291	GLN
1	A	338	GLN
1	B	48	HIS
1	B	64	HIS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	69	GLN
1	B	86	ASN
1	B	108	GLN
1	B	111	GLN
1	B	112	GLN
1	B	168	ASN
1	B	210	HIS
1	B	220	GLN
1	B	247	GLN
1	B	259	GLN
1	B	338	GLN
1	B	357	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

6 ligands are 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	#$|Z| > 2$
3	EPE	B	1004	-	15,15,15	1.90	3 (20%)	19,20,20	1.39	2 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
3	EPE	A	1003	-	15,15,15	1.93	3 (20%)	19,20,20	1.38	2 (10%)
3	EPE	A	1005	-	15,15,15	2.14	3 (20%)	19,20,20	1.14	2 (10%)
3	EPE	B	1006	-	15,15,15	2.02	3 (20%)	19,20,20	1.11	2 (10%)
2	DAN	A	1001	-	20,20,20	3.37	7 (35%)	24,28,28	1.87	5 (20%)
2	DAN	B	1002	-	20,20,20	3.23	5 (25%)	24,28,28	1.87	5 (20%)

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
3	EPE	B	1004	-	-	2/9/19/19	0/1/1/1
3	EPE	A	1003	-	-	1/9/19/19	0/1/1/1
3	EPE	A	1005	-	-	2/9/19/19	0/1/1/1
3	EPE	B	1006	-	-	1/9/19/19	0/1/1/1
2	DAN	A	1001	-	-	0/18/34/34	0/1/1/1
2	DAN	B	1002	-	-	0/18/34/34	0/1/1/1

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	DAN	C3-C2	10.35	1.51	1.33
2	B	1002	DAN	C3-C2	10.23	1.51	1.33
2	B	1002	DAN	O10-C10	6.38	1.37	1.23
2	A	1001	DAN	O10-C10	6.24	1.37	1.23
2	A	1001	DAN	O1A-C1	5.95	1.37	1.22
2	B	1002	DAN	O1A-C1	5.77	1.36	1.22
3	A	1005	EPE	O3S-S	5.28	1.67	1.47
3	B	1006	EPE	O3S-S	5.24	1.66	1.47
3	A	1003	EPE	O3S-S	4.95	1.65	1.47
3	B	1004	EPE	O3S-S	4.82	1.65	1.47
3	A	1005	EPE	C10-S	4.37	1.83	1.77
2	A	1001	DAN	C4-C3	4.18	1.55	1.50
3	B	1006	EPE	C10-S	3.65	1.82	1.77
3	B	1004	EPE	C10-S	3.62	1.82	1.77
2	B	1002	DAN	C4-C3	3.56	1.54	1.50
3	A	1003	EPE	C10-S	3.43	1.82	1.77
3	A	1003	EPE	C7-N4	3.06	1.54	1.47
3	A	1005	EPE	C7-N4	2.89	1.54	1.47
3	B	1006	EPE	C7-N4	2.87	1.53	1.47

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1004	EPE	C7-N4	2.77	1.53	1.47
2	A	1001	DAN	C2-C1	-2.72	1.42	1.48
2	A	1001	DAN	C7-C6	2.72	1.56	1.52
2	B	1002	DAN	C2-C1	-2.69	1.42	1.48
2	A	1001	DAN	O6-C2	-2.01	1.30	1.37

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1001	DAN	C4-C3-C2	-5.62	111.94	121.45
2	B	1002	DAN	C4-C3-C2	-5.60	111.97	121.45
2	B	1002	DAN	C4-C5-N5	-4.09	106.54	111.13
3	B	1004	EPE	O3S-S-O1S	-3.85	101.77	111.40
2	A	1001	DAN	C4-C5-N5	-3.73	106.95	111.13
3	A	1003	EPE	O3S-S-O1S	-3.68	102.19	111.40
3	A	1005	EPE	O3S-S-O1S	-3.15	103.51	111.40
3	A	1003	EPE	C6-N1-C2	3.05	115.41	108.84
3	B	1006	EPE	O3S-S-O1S	-3.04	103.79	111.40
3	B	1004	EPE	C6-N1-C2	2.88	115.03	108.84
2	A	1001	DAN	O1B-C1-C2	2.80	120.41	114.06
2	B	1002	DAN	O1B-C1-O1A	-2.59	117.73	123.90
2	A	1001	DAN	O1B-C1-O1A	-2.45	118.08	123.90
2	B	1002	DAN	O1B-C1-C2	2.36	119.41	114.06
2	A	1001	DAN	O10-C10-C11	-2.31	117.94	122.05
3	A	1005	EPE	O1S-S-C10	2.13	109.95	106.73
2	B	1002	DAN	O10-C10-C11	-2.10	118.32	122.05
3	B	1006	EPE	O1S-S-C10	2.05	109.83	106.73

There are no chirality outliers.
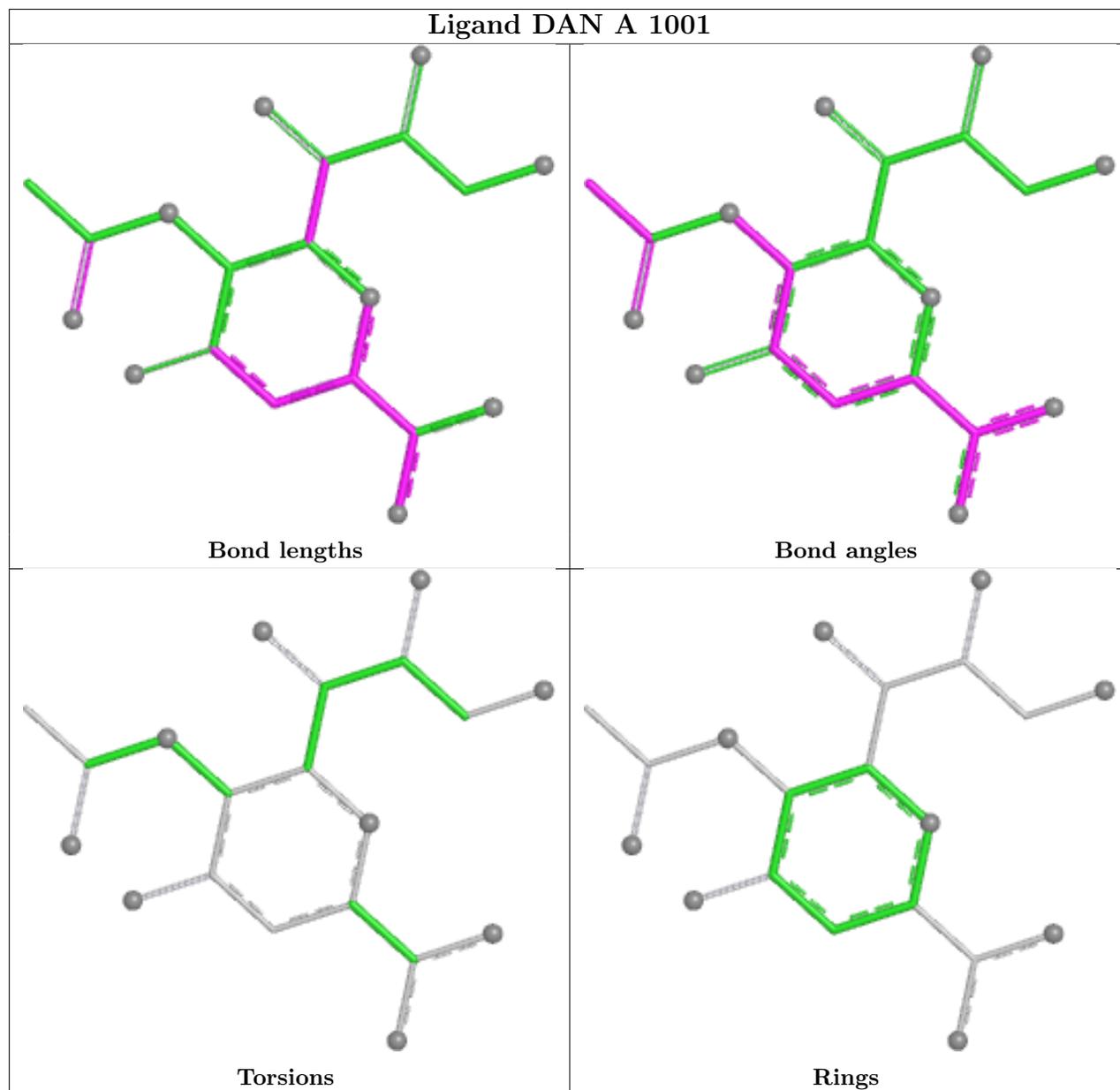
All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1003	EPE	C10-C9-N1-C2
3	B	1004	EPE	C10-C9-N1-C2
3	B	1006	EPE	N4-C7-C8-O8
3	A	1005	EPE	C8-C7-N4-C5
3	B	1004	EPE	N4-C7-C8-O8
3	A	1005	EPE	C8-C7-N4-C3

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1004	EPE	2	0
3	A	1003	EPE	2	0
3	B	1006	EPE	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand DAN A 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand DAN B 1002

Bond lengths

Bond angles

Torsions

Rings
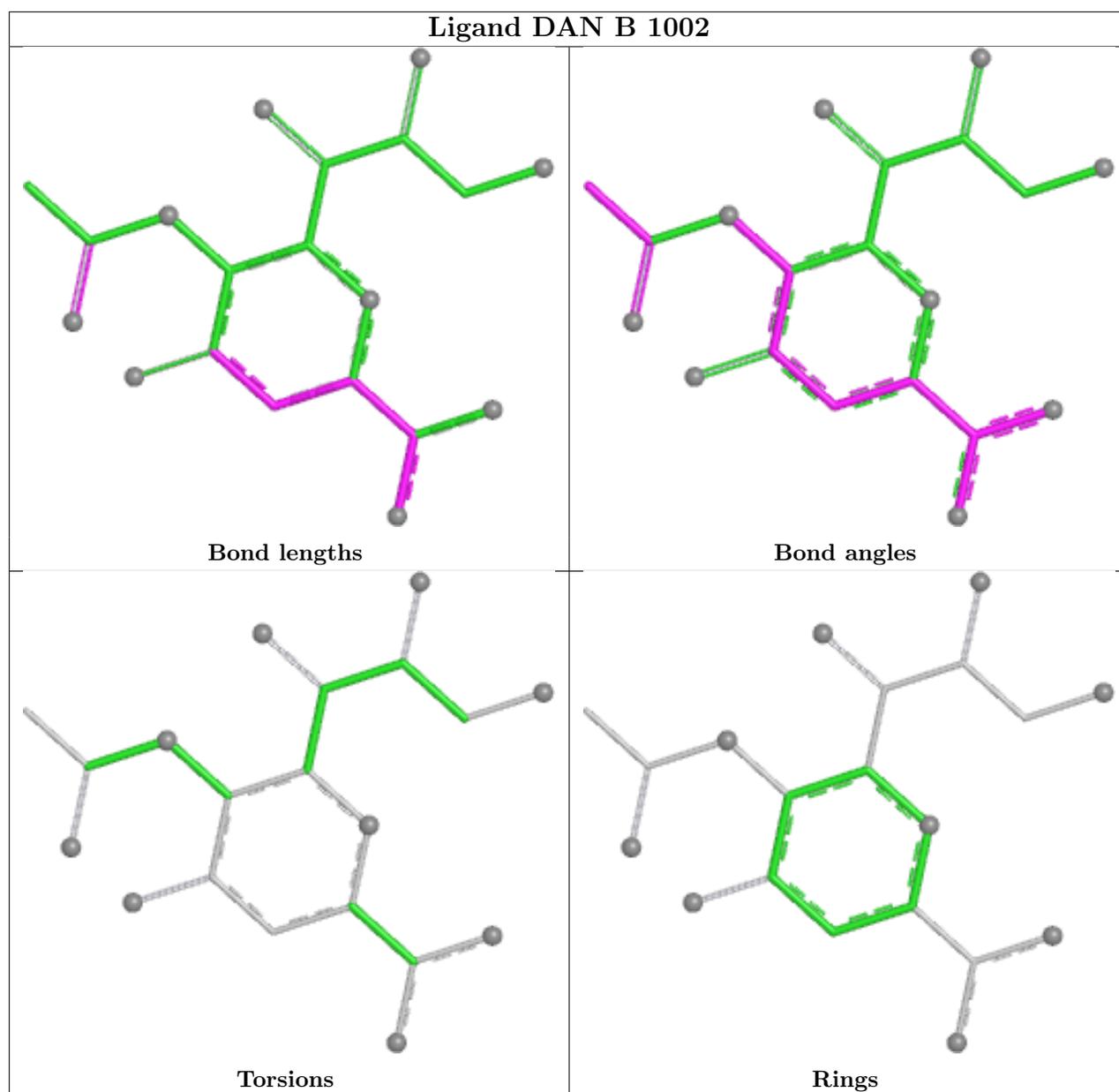
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å^2)	Q<0.9
1	A	373/382 (97%)	0.08	14 (3%)	44 51	10, 20, 36, 50	0
1	B	370/382 (96%)	0.16	11 (2%)	52 59	11, 22, 38, 50	0
All	All	743/764 (97%)	0.12	25 (3%)	48 55	10, 21, 38, 50	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	227	GLY	3.7
1	A	257	GLU	3.3
1	A	289	PRO	3.2
1	A	188	GLN	3.0
1	A	375	ALA	3.0
1	A	213	ALA	2.9
1	B	289	PRO	2.9
1	B	168	ASN	2.8
1	A	109	VAL	2.8
1	A	214	GLN	2.7
1	A	1	MET	2.7
1	A	189	ARG	2.6
1	A	377	TYR	2.6
1	B	283	ARG	2.5
1	B	270	GLN	2.5
1	B	80	ASP	2.5
1	A	228	GLU	2.3
1	B	288	SER	2.1
1	B	214	GLN	2.1
1	B	189	ARG	2.1
1	B	184	LEU	2.0
1	B	140	ARG	2.0
1	A	80	ASP	2.0
1	B	225	GLU	2.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	288	SER	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	EPE	A	1005	15/15	0.88	0.13	29,36,46,47	0
3	EPE	B	1006	15/15	0.88	0.13	25,30,42,43	0
3	EPE	A	1003	15/15	0.92	0.11	15,20,21,24	0
3	EPE	B	1004	15/15	0.93	0.12	18,21,23,25	0
2	DAN	A	1001	20/20	0.94	0.07	13,16,22,23	0
2	DAN	B	1002	20/20	0.94	0.07	15,18,21,22	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around DAN A 1001:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around DAN B 1002:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
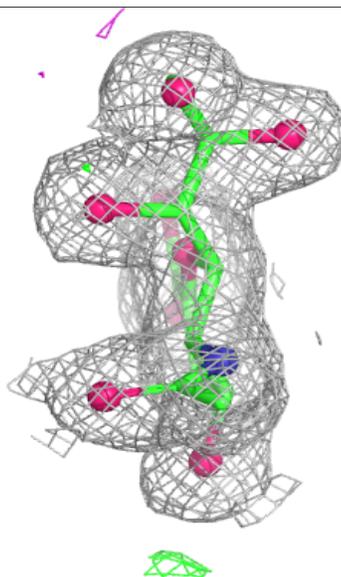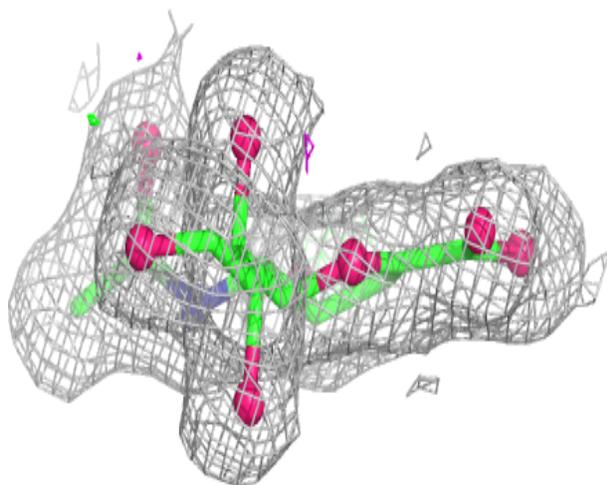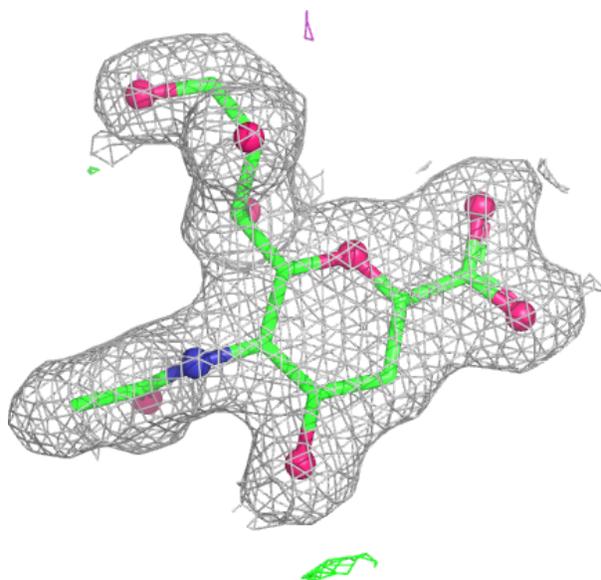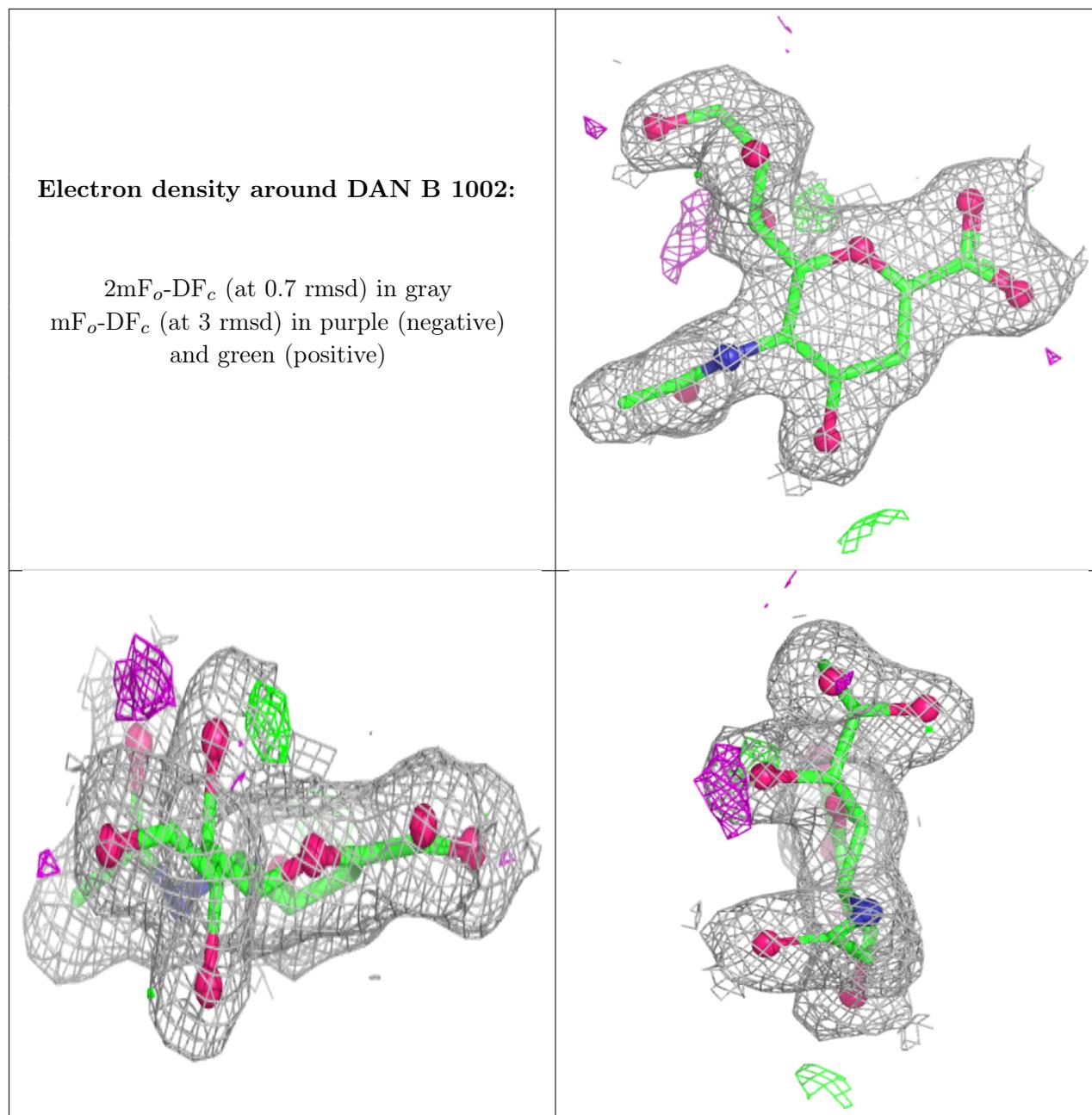
6.5 Other polymers (i)

There are no such residues in this entry.