



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 09:48 AM GMT

PDB ID : 3JQG
Title : Crystal structure of pteridine reductase 1 (PTR1) from Trypanosoma brucei in ternary complex with cofactor (NADP+) and inhibitor 6-[(4-methoxybenzyl)sulfanyl]pyrimidine-2,4-diamine (AX6)
Authors : Tulloch, L.B.; Hunter, W.N.
Deposited on : 2009-09-06
Resolution : 1.90 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) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

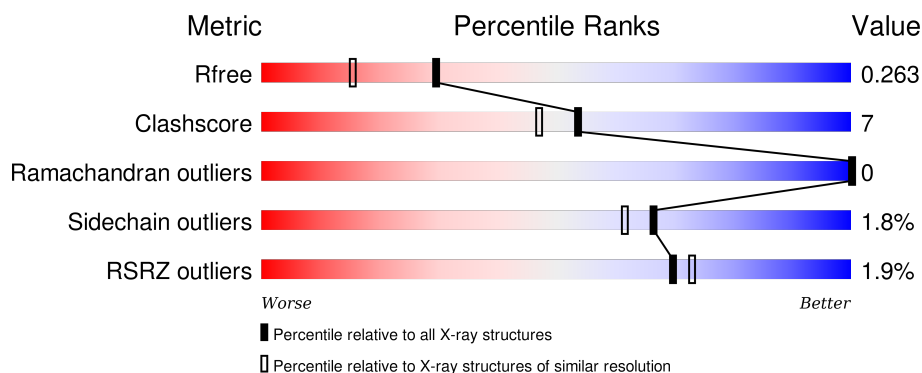
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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))
R_{free}	91344	4755 (1.90-1.90)
Clashscore	102246	5398 (1.90-1.90)
Ramachandran outliers	100387	5338 (1.90-1.90)
Sidechain outliers	100360	5339 (1.90-1.90)
RSRZ outliers	91569	4766 (1.90-1.90)

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.

Mol	Chain	Length	Quality of chain
1	A	288	
1	C	288	
2	B	288	
2	D	288	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8333 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 Pteridine reductase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total	C	N	O	S	0	6	0
			1889	1190	332	356	11			
1	C	248	Total	C	N	O	S	0	1	0
			1854	1166	326	350	12			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	EXPRESSION TAG	UNP Q581W1
A	-18	GLY	-	EXPRESSION TAG	UNP Q581W1
A	-17	SER	-	EXPRESSION TAG	UNP Q581W1
A	-16	SER	-	EXPRESSION TAG	UNP Q581W1
A	-15	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-14	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-13	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-12	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-11	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-10	HIS	-	EXPRESSION TAG	UNP Q581W1
A	-9	SER	-	EXPRESSION TAG	UNP Q581W1
A	-8	SER	-	EXPRESSION TAG	UNP Q581W1
A	-7	GLY	-	EXPRESSION TAG	UNP Q581W1
A	-6	LEU	-	EXPRESSION TAG	UNP Q581W1
A	-5	VAL	-	EXPRESSION TAG	UNP Q581W1
A	-4	PRO	-	EXPRESSION TAG	UNP Q581W1
A	-3	ARG	-	EXPRESSION TAG	UNP Q581W1
A	-2	GLY	-	EXPRESSION TAG	UNP Q581W1
A	-1	SER	-	EXPRESSION TAG	UNP Q581W1
A	0	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-19	MET	-	EXPRESSION TAG	UNP Q581W1
C	-18	GLY	-	EXPRESSION TAG	UNP Q581W1
C	-17	SER	-	EXPRESSION TAG	UNP Q581W1
C	-16	SER	-	EXPRESSION TAG	UNP Q581W1
C	-15	HIS	-	EXPRESSION TAG	UNP Q581W1

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-14	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-13	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-12	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-11	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-10	HIS	-	EXPRESSION TAG	UNP Q581W1
C	-9	SER	-	EXPRESSION TAG	UNP Q581W1
C	-8	SER	-	EXPRESSION TAG	UNP Q581W1
C	-7	GLY	-	EXPRESSION TAG	UNP Q581W1
C	-6	LEU	-	EXPRESSION TAG	UNP Q581W1
C	-5	VAL	-	EXPRESSION TAG	UNP Q581W1
C	-4	PRO	-	EXPRESSION TAG	UNP Q581W1
C	-3	ARG	-	EXPRESSION TAG	UNP Q581W1
C	-2	GLY	-	EXPRESSION TAG	UNP Q581W1
C	-1	SER	-	EXPRESSION TAG	UNP Q581W1
C	0	HIS	-	EXPRESSION TAG	UNP Q581W1

- Molecule 2 is a protein called Pteridine reductase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	248	Total	C	N	O	S	0	3	0
			1860	1171	327	351	11			
2	D	249	Total	C	N	O	S	0	0	0
			1854	1165	327	351	11			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-19	MET	-	EXPRESSION TAG	UNP Q581W1
B	-18	GLY	-	EXPRESSION TAG	UNP Q581W1
B	-17	SER	-	EXPRESSION TAG	UNP Q581W1
B	-16	SER	-	EXPRESSION TAG	UNP Q581W1
B	-15	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-14	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-13	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-12	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-11	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-10	HIS	-	EXPRESSION TAG	UNP Q581W1
B	-9	SER	-	EXPRESSION TAG	UNP Q581W1
B	-8	SER	-	EXPRESSION TAG	UNP Q581W1
B	-7	GLY	-	EXPRESSION TAG	UNP Q581W1
B	-6	LEU	-	EXPRESSION TAG	UNP Q581W1
B	-5	VAL	-	EXPRESSION TAG	UNP Q581W1

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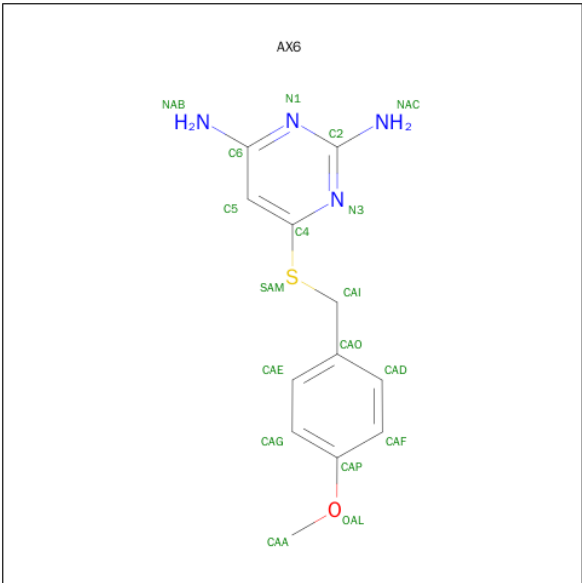
Chain	Residue	Modelled	Actual	Comment	Reference
B	-4	PRO	-	EXPRESSION TAG	UNP Q581W1
B	-3	ARG	-	EXPRESSION TAG	UNP Q581W1
B	-2	GLY	-	EXPRESSION TAG	UNP Q581W1
B	-1	SER	-	EXPRESSION TAG	UNP Q581W1
B	0	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-19	MET	-	EXPRESSION TAG	UNP Q581W1
D	-18	GLY	-	EXPRESSION TAG	UNP Q581W1
D	-17	SER	-	EXPRESSION TAG	UNP Q581W1
D	-16	SER	-	EXPRESSION TAG	UNP Q581W1
D	-15	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-14	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-13	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-12	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-11	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-10	HIS	-	EXPRESSION TAG	UNP Q581W1
D	-9	SER	-	EXPRESSION TAG	UNP Q581W1
D	-8	SER	-	EXPRESSION TAG	UNP Q581W1
D	-7	GLY	-	EXPRESSION TAG	UNP Q581W1
D	-6	LEU	-	EXPRESSION TAG	UNP Q581W1
D	-5	VAL	-	EXPRESSION TAG	UNP Q581W1
D	-4	PRO	-	EXPRESSION TAG	UNP Q581W1
D	-3	ARG	-	EXPRESSION TAG	UNP Q581W1
D	-2	GLY	-	EXPRESSION TAG	UNP Q581W1
D	-1	SER	-	EXPRESSION TAG	UNP Q581W1
D	0	HIS	-	EXPRESSION TAG	UNP Q581W1

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: C₂₁H₂₈N₇O₁₇P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	C	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	D	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is 6-[(4-METHOXYBENZYL)SULFANYL]PYRIMIDINE-2,4-DIAMINE (three-letter code: AX6) (formula: C₁₂H₁₄N₄OS).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			18	12	4	1	1		
4	B	1	Total	C	N	O	S	0	0
			18	12	4	1	1		
4	C	1	Total	C	N	O	S	0	0
			18	12	4	1	1		
4	D	1	Total	C	N	O	S	0	0
			18	12	4	1	1		

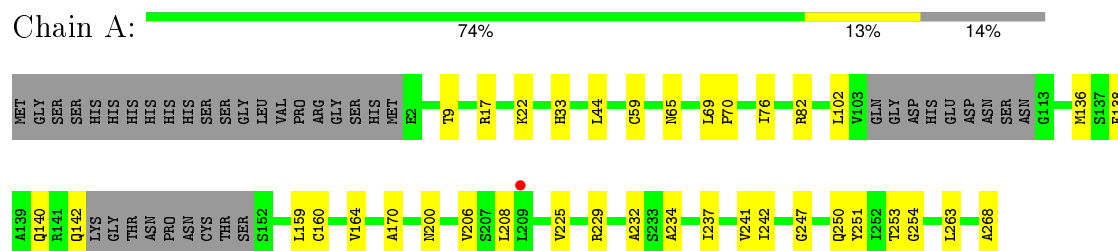
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	191	Total	O	0	0
			191	191		
5	B	164	Total	O	0	0
			164	164		
5	C	129	Total	O	0	0
			129	129		
5	D	128	Total	O	0	0
			128	128		

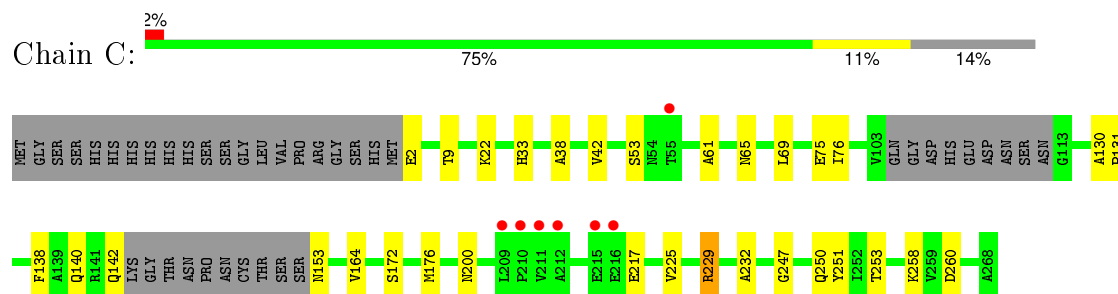
3 Residue-property plots

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.

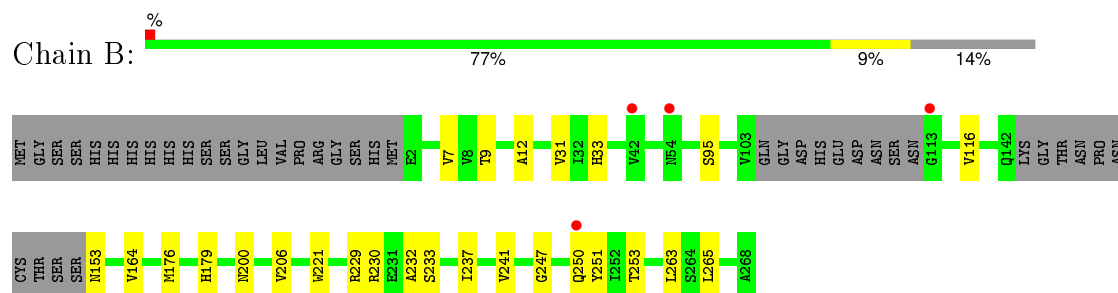
• Molecule 1: Pteridine reductase 1



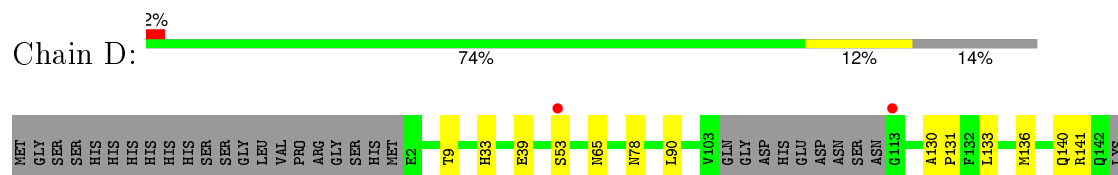
• Molecule 1: Pteridine reductase 1

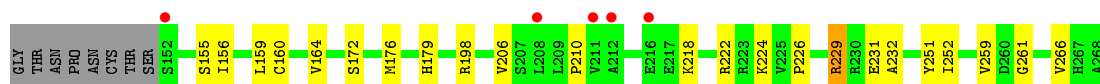


• Molecule 2: Pteridine reductase 1



• Molecule 2: Pteridine reductase 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	74.53 Å 89.84 Å 82.44 Å 90.00° 115.53° 90.00°	Depositor
Resolution (Å)	53.20 – 1.90 53.20 – 1.90	Depositor EDS
% Data completeness (in resolution range)	96.3 (53.20-1.90) 96.3 (53.20-1.90)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.83 (at 1.90 Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.211 , 0.267 0.211 , 0.263	Depositor DCC
R_{free} test set	3738 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	18.8	Xtriage
Anisotropy	0.973	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.4	EDS
Estimated twinning fraction	0.003 for h,-k,-h-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	3 of 74400 reflections (0.004%)	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8333	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 20.75 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 8.1205e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAP, AX6, CSX

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	0.71	0/1929	0.71	0/2613
1	C	0.61	0/1876	0.68	0/2543
2	B	0.65	0/1896	0.71	0/2573
2	D	0.62	0/1881	0.66	0/2552
All	All	0.65	0/7582	0.69	0/10281

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 [i](#)

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	1889	0	1936	29	0
1	C	1854	0	1880	25	0
2	B	1860	0	1892	24	0
2	D	1854	0	1877	30	0
3	A	48	0	25	1	0
3	B	48	0	25	0	0
3	C	48	0	25	0	0
3	D	48	0	25	0	0
4	A	18	0	14	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	18	0	14	5	0
4	C	18	0	14	1	0
4	D	18	0	14	2	0
5	A	191	0	0	8	0
5	B	164	0	0	10	0
5	C	129	0	0	9	0
5	D	128	0	0	7	0
All	All	8333	0	7741	101	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 7.

All (101) 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)
2:D:259:VAL:HG12	5:D:312:HOH:O	1.29	1.26
2:B:233:SER:O	5:B:547:HOH:O	1.60	1.20
1:A:237:ILE:O	5:A:441:HOH:O	1.60	1.16
1:C:258:LYS:HB3	5:C:310:HOH:O	1.61	1.00
1:C:172:SER:O	1:C:176:MET:HG3	1.66	0.95
2:B:237:ILE:HG12	5:B:547:HOH:O	1.73	0.89
1:C:2:GLU:HB2	5:C:361:HOH:O	1.76	0.85
1:C:251:TYR:CD2	5:D:312:HOH:O	2.34	0.80
4:B:270:AX6:HAAB	5:B:558:HOH:O	1.80	0.80
2:D:222:ARG:HD3	2:D:231:GLU:OE2	1.83	0.78
1:C:251:TYR:HD2	5:D:312:HOH:O	1.68	0.74
1:A:65:ASN:HA	1:A:69:LEU:HD22	1.72	0.72
1:A:59:CSX:OD	1:A:76:ILE:HA	1.88	0.72
1:A:241:VAL:HG23	5:A:441:HOH:O	1.90	0.71
2:D:210:PRO:HG3	4:D:270:AX6:HAD	1.73	0.69
1:A:250[A]:GLN:HG2	5:B:459:HOH:O	1.93	0.68
1:A:136:MET:O	1:A:140:GLN:HG3	1.97	0.64
2:B:164:VAL:HG22	2:B:179:HIS:CD2	2.32	0.64
1:A:160:CYS:HB3	5:A:463:HOH:O	1.97	0.64
1:A:102:LEU:O	5:A:452:HOH:O	2.15	0.64
1:A:241:VAL:N	5:A:441:HOH:O	2.00	0.62
2:D:78:ASN:OD1	2:D:141:ARG:NH1	2.31	0.62
2:B:237:ILE:N	5:B:547:HOH:O	2.09	0.61
2:D:65:ASN:ND2	5:D:353:HOH:O	2.00	0.60
1:A:254:GLY:HA3	2:B:265:LEU:HD11	1.83	0.59
2:D:133:LEU:HD23	2:D:136:MET:CE	2.33	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:164:VAL:HG22	2:D:179:HIS:CD2	2.38	0.59
2:D:133:LEU:HD23	2:D:136:MET:HE1	1.85	0.58
1:A:225:VAL:O	1:A:229:ARG:HD3	2.02	0.58
1:A:17:ARG:HG3	1:A:44:LEU:HD22	1.86	0.58
1:C:258:LYS:CB	5:C:310:HOH:O	2.29	0.57
2:D:206:VAL:HG12	2:D:231:GLU:HB2	1.85	0.57
2:D:198:ARG:HD2	2:D:252:ILE:O	2.06	0.55
2:B:241:VAL:HG23	5:B:548:HOH:O	2.04	0.55
2:D:206:VAL:HG12	2:D:231:GLU:CB	2.37	0.55
1:C:9:THR:HA	1:C:33:HIS:HB3	1.90	0.54
1:A:232:ALA:HB2	2:B:251:TYR:CE2	2.43	0.53
2:B:221:TRP:CE2	4:B:270:AX6:HAA	2.44	0.52
2:D:210:PRO:HG3	4:D:270:AX6:CAD	2.38	0.52
1:C:153:ASN:N	5:C:309:HOH:O	2.42	0.52
2:B:9:THR:HA	2:B:33:HIS:HB3	1.92	0.52
1:C:75:GLU:OE1	5:C:290:HOH:O	2.19	0.51
2:B:116:VAL:HG21	2:D:136:MET:HE1	1.94	0.50
1:A:22:LYS:HG2	1:A:242:ILE:HG13	1.92	0.50
4:B:270:AX6:CAA	5:B:558:HOH:O	2.48	0.50
2:D:229:ARG:NH2	5:D:355:HOH:O	2.43	0.50
2:B:153:ASN:HA	5:B:482:HOH:O	2.12	0.50
2:B:206:VAL:HG23	2:B:263:LEU:HD22	1.95	0.49
1:C:130:ALA:HB3	1:C:131:PRO:HD3	1.95	0.49
2:B:241:VAL:N	5:B:548:HOH:O	2.06	0.49
2:D:218:LYS:O	2:D:222:ARG:HG3	2.12	0.49
1:A:208:LEU:HD11	1:A:234:ALA:HB2	1.95	0.49
2:D:136:MET:O	2:D:140:GLN:HG3	2.12	0.48
2:D:172:SER:O	2:D:176:MET:HG3	2.13	0.48
2:D:164:VAL:HG22	2:D:179:HIS:NE2	2.28	0.48
1:A:232:ALA:HB2	2:B:251:TYR:CD2	2.48	0.48
1:C:225:VAL:O	1:C:229:ARG:HD2	2.14	0.47
1:C:232:ALA:HB2	2:D:251:TYR:CE2	2.49	0.47
1:C:251:TYR:CE2	2:D:232:ALA:HB2	2.49	0.47
4:C:270:AX6:CAO	4:C:270:AX6:H5	2.44	0.47
1:A:247:GLY:HA2	1:A:250[B]:GLN:HG3	1.96	0.47
2:B:206:VAL:HG23	2:B:263:LEU:CD2	2.45	0.47
1:A:206:VAL:HG13	1:A:263:LEU:HD22	1.97	0.46
2:D:226:PRO:HD2	2:D:261:GLY:O	2.15	0.46
1:C:247:GLY:HA2	1:C:250:GLN:HG3	1.97	0.46
2:B:221:TRP:CD2	4:B:270:AX6:HAA	2.51	0.46
1:C:138:PHE:O	1:C:142:GLN:HG2	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:61:ALA:HB3	1:C:76:ILE:HD11	1.99	0.45
2:D:39:GLU:HG3	5:D:332:HOH:O	2.16	0.45
2:B:164:VAL:HG22	2:B:179:HIS:NE2	2.32	0.45
2:D:164:VAL:CG2	2:D:179:HIS:CD2	3.00	0.45
2:B:7:VAL:HG22	2:B:31:VAL:HB	1.98	0.45
1:C:2:GLU:HG2	5:C:336:HOH:O	2.17	0.45
1:A:170:ALA:HA	5:C:318:HOH:O	2.17	0.45
5:A:452:HOH:O	1:C:140:GLN:HB2	2.17	0.44
1:A:9:THR:HA	1:A:33:HIS:HB3	1.99	0.44
2:B:247:GLY:HA2	2:B:250:GLN:HG3	2.00	0.44
1:A:69:LEU:O	1:A:70:PRO:C	2.53	0.44
1:A:251:TYR:CD2	2:B:232:ALA:HB2	2.52	0.44
2:D:9:THR:HA	2:D:33:HIS:HB3	1.99	0.43
1:C:75:GLU:HG2	5:C:340:HOH:O	2.17	0.43
1:A:268:ALA:OXT	2:D:224:LYS:NZ	2.43	0.43
2:D:90:LEU:HB3	2:D:156:ILE:HG12	1.99	0.43
1:C:200:ASN:OD1	1:C:253:THR:HA	2.18	0.43
1:C:65:ASN:HA	1:C:69:LEU:HD22	2.01	0.43
1:A:138:PHE:O	1:A:142:GLN:HG2	2.18	0.42
1:A:160:CYS:O	3:A:269:NAP:H6N	2.19	0.42
1:A:200:ASN:OD1	1:A:253:THR:HA	2.19	0.42
2:B:12:ALA:HB3	5:B:411:HOH:O	2.18	0.42
1:C:229:ARG:HD2	1:C:229:ARG:N	2.34	0.42
2:D:130:ALA:HB3	2:D:131:PRO:HD3	2.01	0.42
1:C:251:TYR:CD2	2:D:232:ALA:HB2	2.55	0.42
2:B:95:SER:CB	4:B:270:AX6:HNAC	2.33	0.41
1:A:250[B]:GLN:CG	5:A:454:HOH:O	2.68	0.41
1:A:268:ALA:HB2	2:D:266:VAL:HB	2.02	0.41
2:B:200:ASN:OD1	2:B:253:THR:HA	2.21	0.41
1:C:38:ALA:O	1:C:42:VAL:HG23	2.21	0.40
2:D:160:CYS:HB3	5:D:306:HOH:O	2.20	0.40
1:C:260:ASP:CG	5:C:310:HOH:O	2.58	0.40
1:A:250[B]:GLN:HG3	5:A:454:HOH:O	2.21	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	249/288 (86%)	241 (97%)	8 (3%)	0	100	100
1	C	242/288 (84%)	235 (97%)	7 (3%)	0	100	100
2	B	245/288 (85%)	237 (97%)	8 (3%)	0	100	100
2	D	243/288 (84%)	237 (98%)	6 (2%)	0	100	100
All	All	979/1152 (85%)	950 (97%)	29 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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	203/230 (88%)	200 (98%)	3 (2%)	72	69
1	C	196/230 (85%)	191 (97%)	5 (3%)	54	45
2	B	199/231 (86%)	197 (99%)	2 (1%)	82	81
2	D	197/231 (85%)	193 (98%)	4 (2%)	63	57
All	All	795/922 (86%)	781 (98%)	14 (2%)	66	61

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	ARG
1	A	159	LEU

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Mol	Chain	Res	Type
1	A	164	VAL
2	B	229	ARG
2	B	230	ARG
1	C	22	LYS
1	C	53	SER
1	C	164	VAL
1	C	217	GLU
1	C	229	ARG
2	D	53	SER
2	D	155	SER
2	D	159	LEU
2	D	229	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	GLN
1	A	166	GLN
2	B	166	GLN
2	D	67	ASN
2	D	166	GLN
2	D	186	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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
1	CSX	A	59	1	3,6,7	0.53	0	3,6,8	1.39	1 (33%)
1	CSX	C	59	1	3,6,7	0.87	0	3,6,8	1.38	1 (33%)

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
1	CSX	A	59	1	-	0/1/5/7	0/0/0/0
1	CSX	C	59	1	-	0/1/5/7	0/0/0/0

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	C	59	CSX	O-C-CA	-2.20	119.76	125.49
1	A	59	CSX	O-C-CA	-2.01	120.26	125.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	59	CSX	1	0

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

8 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	NAP	A	269	-	42,52,52	1.58	3 (7%)	54,80,80	2.19	10 (18%)
4	AX6	A	270	-	19,19,19	1.28	2 (10%)	21,25,25	2.04	5 (23%)
3	NAP	B	269	-	42,52,52	1.45	4 (9%)	54,80,80	2.25	10 (18%)
4	AX6	B	270	-	19,19,19	0.92	1 (5%)	21,25,25	1.74	4 (19%)
3	NAP	C	269	-	42,52,52	1.55	3 (7%)	54,80,80	1.92	6 (11%)
4	AX6	C	270	-	19,19,19	1.03	0	21,25,25	2.02	6 (28%)
3	NAP	D	269	-	42,52,52	1.50	3 (7%)	54,80,80	2.10	9 (16%)
4	AX6	D	270	-	19,19,19	1.04	1 (5%)	21,25,25	2.03	3 (14%)

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	NAP	A	269	-	-	0/27/67/67	0/5/5/5
4	AX6	A	270	-	-	0/7/7/7	0/2/2/2
3	NAP	B	269	-	-	0/27/67/67	0/5/5/5
4	AX6	B	270	-	-	0/7/7/7	0/2/2/2
3	NAP	C	269	-	-	0/27/67/67	0/5/5/5
4	AX6	C	270	-	-	0/7/7/7	0/2/2/2
3	NAP	D	269	-	-	0/27/67/67	0/5/5/5
4	AX6	D	270	-	-	0/7/7/7	0/2/2/2

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	269	NAP	O4B-C1B	-2.09	1.38	1.41
4	D	270	AX6	C4-SAM	2.44	1.80	1.76
3	C	269	NAP	C2A-N1A	2.45	1.38	1.33
4	B	270	AX6	C5-C4	2.45	1.41	1.38
3	B	269	NAP	C2A-N1A	2.65	1.38	1.33
3	A	269	NAP	C2A-N1A	2.73	1.39	1.33
3	D	269	NAP	C2A-N1A	2.80	1.39	1.33
3	B	269	NAP	C2A-N3A	3.08	1.37	1.32
3	C	269	NAP	C2A-N3A	3.28	1.38	1.32
4	A	270	AX6	C4-SAM	3.30	1.82	1.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	270	AX6	C5-C4	3.32	1.43	1.38
3	D	269	NAP	C2A-N3A	3.53	1.38	1.32
3	A	269	NAP	C2A-N3A	3.88	1.39	1.32
3	B	269	NAP	O7N-C7N	6.59	1.38	1.24
3	D	269	NAP	O7N-C7N	7.30	1.39	1.24
3	A	269	NAP	O7N-C7N	7.52	1.40	1.24
3	C	269	NAP	O7N-C7N	7.88	1.41	1.24

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	269	NAP	N3A-C2A-N1A	-11.56	120.04	128.89
3	B	269	NAP	N3A-C2A-N1A	-11.51	120.08	128.89
3	A	269	NAP	N3A-C2A-N1A	-11.33	120.22	128.89
3	C	269	NAP	N3A-C2A-N1A	-10.94	120.52	128.89
4	D	270	AX6	C5-C4-N3	-7.80	117.73	123.66
4	C	270	AX6	C5-C4-N3	-6.84	118.46	123.66
4	A	270	AX6	C5-C4-N3	-6.38	118.81	123.66
3	B	269	NAP	O7N-C7N-C3N	-5.69	113.37	119.59
4	B	270	AX6	C5-C4-N3	-4.23	120.45	123.66
4	B	270	AX6	CAA-OAL-CAP	-3.51	109.30	117.51
3	A	269	NAP	C4B-O4B-C1B	-3.49	105.88	109.72
3	D	269	NAP	C4B-O4B-C1B	-3.41	105.97	109.72
4	A	270	AX6	CAA-OAL-CAP	-3.28	109.84	117.51
3	A	269	NAP	O7N-C7N-C3N	-3.22	116.07	119.59
3	A	269	NAP	C4A-C5A-N7A	-3.18	106.56	109.48
3	A	269	NAP	C1B-N9A-C4A	-3.15	122.19	126.94
4	C	270	AX6	N3-C2-N1	-3.09	120.46	125.53
3	B	269	NAP	C4B-O4B-C1B	-3.02	106.40	109.72
3	C	269	NAP	C4B-O4B-C1B	-2.95	106.48	109.72
3	B	269	NAP	C1B-N9A-C4A	-2.93	122.52	126.94
4	B	270	AX6	N3-C2-N1	-2.90	120.78	125.53
4	A	270	AX6	N3-C2-N1	-2.68	121.14	125.53
4	C	270	AX6	CAI-SAM-C4	-2.67	98.94	102.36
4	D	270	AX6	N3-C2-N1	-2.54	121.38	125.53
3	A	269	NAP	O3-PA-O5B	-2.48	96.35	102.94
3	D	269	NAP	C1B-N9A-C4A	-2.44	123.25	126.94
3	D	269	NAP	C4A-C5A-N7A	-2.31	107.35	109.48
3	D	269	NAP	O3D-C3D-C4D	-2.23	104.36	111.05
4	C	270	AX6	CAA-OAL-CAP	-2.12	112.56	117.51
3	B	269	NAP	C4A-C5A-N7A	-2.04	107.60	109.48
4	A	270	AX6	CAI-CAO-CAE	-2.04	116.74	120.88

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	269	NAP	O7N-C7N-C3N	-2.02	117.38	119.59
4	D	270	AX6	C5-C4-SAM	2.00	123.46	118.25
3	D	269	NAP	C2N-C3N-C4N	2.04	120.57	118.29
4	C	270	AX6	C5-C4-SAM	2.05	123.58	118.25
3	B	269	NAP	O4D-C4D-C3D	2.19	109.56	105.15
3	C	269	NAP	C3N-C7N-N7N	2.31	120.35	117.82
3	A	269	NAP	O2A-PA-O3	2.32	115.60	105.09
3	C	269	NAP	P2B-O2B-C2B	2.37	127.25	121.56
3	B	269	NAP	C2N-C3N-C4N	2.61	121.19	118.29
4	C	270	AX6	NAC-C2-N1	2.64	121.58	117.20
3	D	269	NAP	C3N-C7N-N7N	2.69	120.76	117.82
4	B	270	AX6	C5-C4-SAM	2.80	125.54	118.25
4	A	270	AX6	C5-C4-SAM	2.84	125.64	118.25
3	B	269	NAP	O4D-C1D-N1N	3.16	111.61	108.13
3	A	269	NAP	O4B-C1B-N9A	3.55	115.53	108.10
3	B	269	NAP	C3N-C7N-N7N	3.58	121.73	117.82
3	D	269	NAP	O4B-C1B-N9A	3.78	116.02	108.10
3	B	269	NAP	O4B-C1B-N9A	4.21	116.91	108.10
3	A	269	NAP	C3N-C7N-N7N	4.24	122.46	117.82
3	C	269	NAP	O4B-C1B-N9A	4.30	117.10	108.10
3	A	269	NAP	O4D-C1D-N1N	4.33	112.89	108.13
3	D	269	NAP	O4D-C1D-N1N	4.92	113.54	108.13

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	269	NAP	1	0
4	B	270	AX6	5	0
4	C	270	AX6	1	0
4	D	270	AX6	2	0

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	248/288 (86%)	0.12	1 (0%)	93	93	6, 15, 26, 38	7 (2%)
1	C	247/288 (85%)	0.19	7 (2%)	56	60	8, 16, 30, 40	5 (2%)
2	B	248/288 (86%)	0.10	4 (1%)	74	78	7, 16, 26, 31	3 (1%)
2	D	249/288 (86%)	0.23	7 (2%)	56	60	8, 16, 28, 38	8 (3%)
All	All	992/1152 (86%)	0.16	19 (1%)	70	73	6, 16, 27, 40	23 (2%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	212	ALA	8.2
2	D	212	ALA	4.8
2	D	211	VAL	4.6
1	C	209	LEU	4.2
2	D	152	SER	3.8
2	B	113	GLY	3.5
1	C	215	GLU	3.0
2	B	42	VAL	3.0
1	C	210	PRO	3.0
2	D	113	GLY	3.0
2	D	216	GLU	2.9
1	C	216	GLU	2.9
1	A	209	LEU	2.8
2	D	208	LEU	2.8
2	B	54	ASN	2.5
2	B	250	GLN	2.2
2	D	53	SER	2.2
1	C	211	VAL	2.1
1	C	55	THR	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
1	CSX	C	59	7/8	0.88	0.14	-	14,17,19,22	0
1	CSX	A	59	7/8	0.95	0.12	-	15,18,23,29	0

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
4	AX6	D	270	18/18	0.83	0.17	0.72	26,38,50,52	0
4	AX6	C	270	18/18	0.88	0.18	0.69	15,28,41,42	0
3	NAP	C	269	48/48	0.96	0.11	0.22	6,17,23,24	0
4	AX6	A	270	18/18	0.90	0.12	-0.04	11,23,33,41	0
4	AX6	B	270	18/18	0.95	0.11	-0.06	6,16,30,31	0
3	NAP	A	269	48/48	0.96	0.09	-0.81	6,14,18,20	0
3	NAP	D	269	48/48	0.96	0.09	-0.98	4,18,26,32	0
3	NAP	B	269	48/48	0.97	0.08	-0.99	7,14,19,23	0

6.5 Other polymers [i](#)

There are no such residues in this entry.