



wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 1, 2020 – 10:25 AM EST

PDB ID : 7K80
Title : KIR3DL1*001 in complex with HLA-A*24:02 presenting the RYPLTFGW peptide
Authors : MacLachlan, B.J.; Rossjohn, J.; Vivian, J.P.
Deposited on : 2020-09-24
Resolution : 2.40 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.14.6
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.14.6

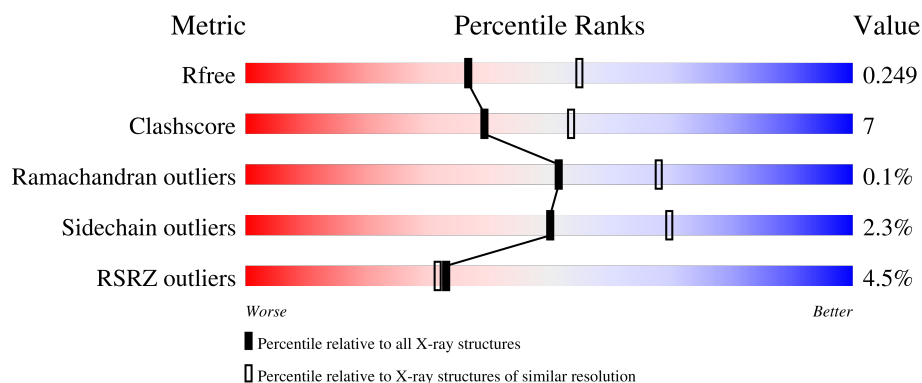
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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 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 $\leq 5\%$. 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	276	<div> <div>5%</div> <div>79%</div> <div>20%</div> <div>.</div> </div>
1	D	276	<div> <div>4%</div> <div>91%</div> <div>8%</div> <div>.</div> </div>
2	B	100	<div> <div>5%</div> <div>82%</div> <div>18%</div> </div>
2	E	100	<div> <div>2%</div> <div>87%</div> <div>13%</div> </div>
3	C	8	<div> <div>75%</div> <div>25%</div> </div>

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Mol	Chain	Length	Quality of chain
3	F	8	 75% 25%
4	G	299	 5% 80% 16%
4	H	299	 5% 72% 20% 8%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
7	NAG	G	402	-	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 11001 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 MHC class I antigen.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	276	Total	C	N	O	S	0	0	0
			2231	1389	402	430	10			
1	D	276	Total	C	N	O	S	0	0	0
			2227	1387	402	428	10			

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total	C	N	O	S	0	0	0
			837	533	141	159	4			
2	E	100	Total	C	N	O	S	0	0	0
			833	531	141	157	4			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	expression tag	UNP P61769
E	0	MET	-	expression tag	UNP P61769

- Molecule 3 is a protein called ARG-TYR-PRO-LEU-THR-PHE-GLY-TRP.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	8	Total	C	N	O	0	0	0
			75	52	12	11			
3	F	8	Total	C	N	O	0	0	0
			75	52	12	11			

- Molecule 4 is a protein called Killer cell immunoglobulin-like receptor 3DL1.

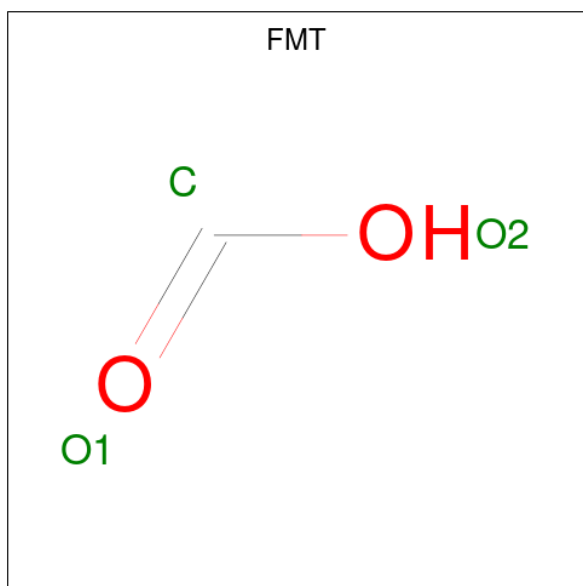
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	G	290	Total	C	N	O	S	0	1	0
			2273	1442	412	405	14			

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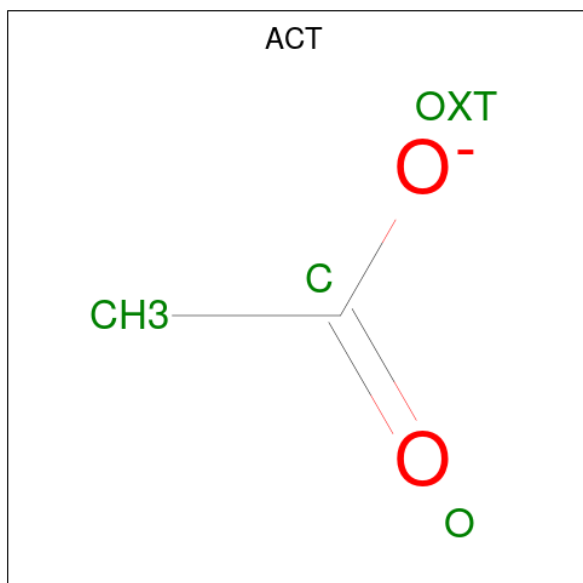
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	H	275	Total	C	N	O	S	0	0	0
			2162	1373	391	385	13			

- Molecule 5 is FORMIC ACID (three-letter code: FMT) (formula: CH_2O_2).



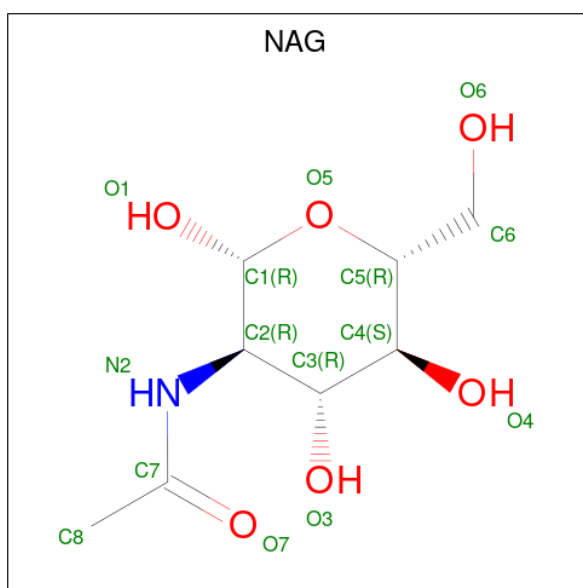
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			3	1	2		

- Molecule 6 is ACETATE ION (three-letter code: ACT) (formula: $\text{C}_2\text{H}_3\text{O}_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	E	1	Total	C	O	0	0
			4	2	2		
6	E	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	G	1	Total	C	N	O	0	0
			14	8	1	5		
7	G	1	Total	C	N	O	0	0
			14	8	1	5		
7	G	1	Total	C	N	O	0	0
			14	8	1	5		
7	H	1	Total	C	N	O	0	0
			14	8	1	5		
7	H	1	Total	C	N	O	0	0
			14	8	1	5		

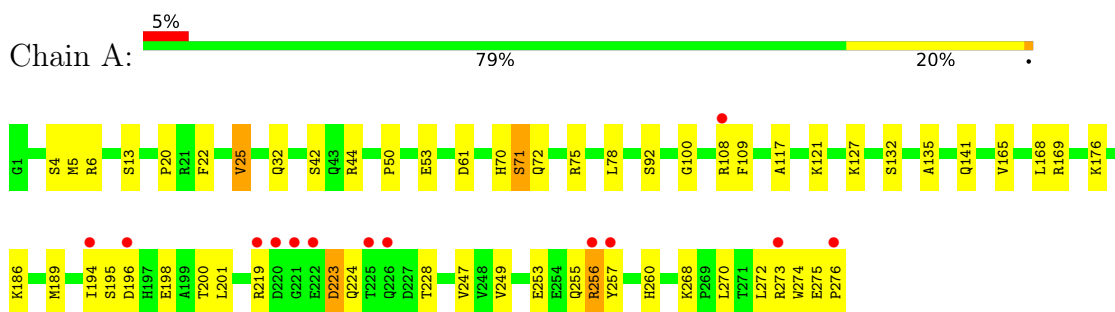
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	24	Total 24	O 24	0	0
8	B	12	Total 12	O 12	0	0
8	C	1	Total 1	O 1	0	0
8	D	60	Total 60	O 60	0	0
8	E	19	Total 19	O 19	0	0
8	F	2	Total 2	O 2	0	0
8	G	49	Total 49	O 49	0	0
8	H	28	Total 28	O 28	0	0

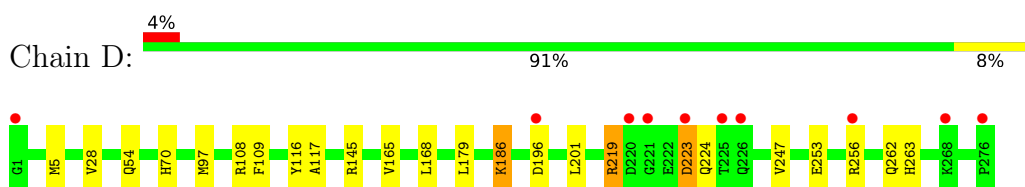
3 Residue-property plots [i](#)

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.

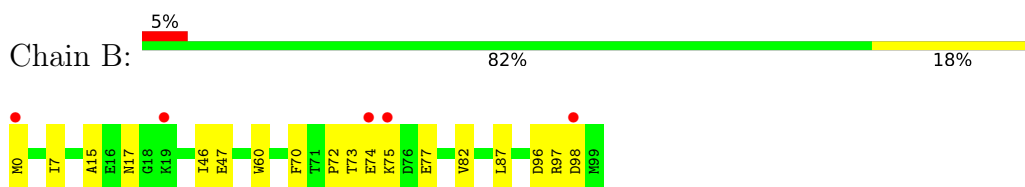
- Molecule 1: MHC class I antigen



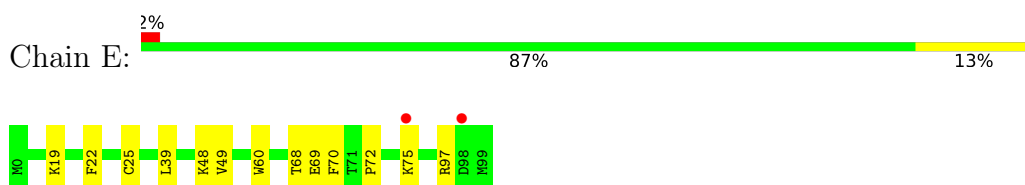
- Molecule 1: MHC class I antigen



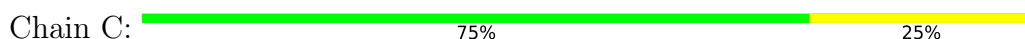
- Molecule 2: Beta-2-microglobulin



- Molecule 2: Beta-2-microglobulin

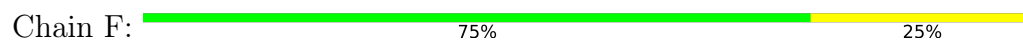


- Molecule 3: ARG-TYR-PRO-LEU-THR-PHE-GLY-TRP

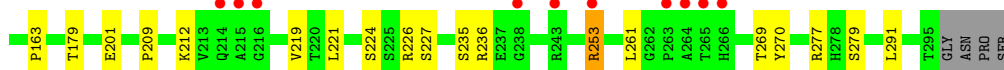
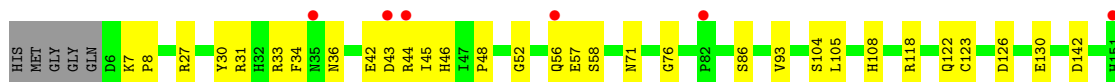
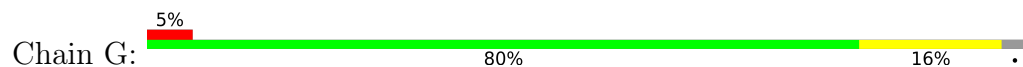




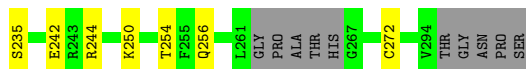
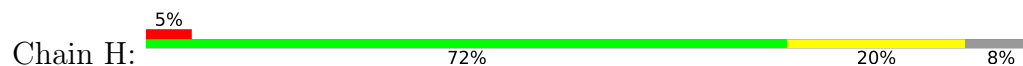
- Molecule 3: ARG-TYR-PRO-LEU-THR-PHE-GLY-TRP



- Molecule 4: Killer cell immunoglobulin-like receptor 3DL1



- Molecule 4: Killer cell immunoglobulin-like receptor 3DL1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	51.27Å 85.02Å 94.83Å 82.47° 85.97° 77.92°	Depositor
Resolution (Å)	40.00 – 2.40 43.09 – 2.40	Depositor EDS
% Data completeness (in resolution range)	96.9 (40.00-2.40) 97.0 (43.09-2.40)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.07 (at 2.39Å)	Xtriage
Refinement program	PHENIX (1.17.1_3660: ???)	Depositor
R, R_{free}	0.198 , 0.249 0.198 , 0.249	Depositor DCC
R_{free} test set	2982 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	48.6	Xtriage
Anisotropy	0.072	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 49.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11001	wwPDB-VP
Average B, all atoms (Å ²)	70.0	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 79.15 % 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 5.9359e-07. 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, 0.333 respectively for untwinned datasets, and 0.375, 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: FMT, NAG, ACT

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	0.34	0/2292	0.58	3/3109 (0.1%)
1	D	0.28	0/2288	0.49	0/3104
2	B	0.29	0/860	0.54	0/1162
2	E	0.28	0/856	0.47	0/1157
3	C	0.29	0/79	0.87	1/106 (0.9%)
3	F	0.24	0/79	0.51	0/106
4	G	0.27	0/2353	0.49	0/3201
4	H	0.28	0/2232	0.47	0/3032
All	All	0.29	0/11039	0.51	4/14977 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	4	LEU	CA-CB-CG	6.88	131.12	115.30
1	A	272	LEU	CB-CG-CD2	6.00	121.20	111.00
1	A	25	VAL	CG1-CB-CG2	5.33	119.43	110.90
1	A	176	LYS	CD-CE-NZ	5.28	123.83	111.70

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	2231	0	2088	45	0
1	D	2227	0	2082	21	0
2	B	837	0	803	11	0
2	E	833	0	799	7	0
3	C	75	0	71	2	0
3	F	75	0	71	2	0
4	G	2273	0	2197	41	0
4	H	2162	0	2083	32	0
5	A	3	0	1	0	0
6	A	4	0	3	0	0
6	D	8	0	6	1	0
6	E	8	0	6	0	0
7	G	42	0	39	1	0
7	H	28	0	26	1	0
8	A	24	0	0	0	0
8	B	12	0	0	1	0
8	C	1	0	0	0	0
8	D	60	0	0	1	0
8	E	19	0	0	0	0
8	F	2	0	0	0	0
8	G	49	0	0	3	0
8	H	28	0	0	0	0
All	All	11001	0	10275	155	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.

The worst 5 of 155 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)
4:G:226:ARG:HH12	4:G:253:ARG:CZ	1.34	1.37
4:G:226:ARG:NH1	4:G:253:ARG:CZ	2.18	1.07
4:G:226:ARG:HH12	4:G:253:ARG:NH1	1.59	0.99
4:G:253:ARG:H	4:G:253:ARG:HD3	1.32	0.95
1:D:262:GLN:HG2	1:D:263:HIS:N	1.88	0.88

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	274/276 (99%)	269 (98%)	5 (2%)	0	100	100
1	D	274/276 (99%)	267 (97%)	7 (3%)	0	100	100
2	B	98/100 (98%)	96 (98%)	2 (2%)	0	100	100
2	E	98/100 (98%)	95 (97%)	3 (3%)	0	100	100
3	C	6/8 (75%)	6 (100%)	0	0	100	100
3	F	6/8 (75%)	6 (100%)	0	0	100	100
4	G	289/299 (97%)	281 (97%)	8 (3%)	0	100	100
4	H	269/299 (90%)	256 (95%)	12 (4%)	1 (0%)	34	48
All	All	1314/1366 (96%)	1276 (97%)	37 (3%)	1 (0%)	51	68

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	H	57	GLU

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	231/232 (100%)	224 (97%)	7 (3%)	41	61
1	D	230/232 (99%)	227 (99%)	3 (1%)	69	84
2	B	95/95 (100%)	92 (97%)	3 (3%)	39	59
2	E	94/95 (99%)	91 (97%)	3 (3%)	39	59

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	7/7 (100%)	7 (100%)	0	100	100
3	F	7/7 (100%)	7 (100%)	0	100	100
4	G	251/256 (98%)	246 (98%)	5 (2%)	55	74
4	H	239/256 (93%)	234 (98%)	5 (2%)	53	72
All	All	1154/1180 (98%)	1128 (98%)	26 (2%)	50	70

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	219	ARG
2	E	70	PHE
4	H	177	SER
1	D	223	ASP
2	E	48	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
4	G	36	ASN
4	H	184	GLN
4	G	56	GLN
1	D	114	HIS
4	H	149	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry

11 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
6	ACT	A	302	-	1,3,3	6.40	1 (100%)	0,3,3	0.00	-
7	NAG	G	400	4	14,14,15	0.28	0	17,19,21	0.55	0
7	NAG	G	401	4	14,14,15	0.18	0	17,19,21	0.59	0
6	ACT	E	101	-	1,3,3	6.45	1 (100%)	0,3,3	0.00	-
6	ACT	E	102	-	1,3,3	6.39	1 (100%)	0,3,3	0.00	-
7	NAG	H	401	4	14,14,15	0.20	0	17,19,21	0.42	0
6	ACT	D	302	-	1,3,3	6.45	1 (100%)	0,3,3	0.00	-
7	NAG	G	402	4	14,14,15	0.47	0	17,19,21	0.44	0
6	ACT	D	301	-	1,3,3	6.45	1 (100%)	0,3,3	0.00	-
5	FMT	A	301	-	0,2,2	0.00	-	0,1,1	0.00	-
7	NAG	H	400	4	14,14,15	0.26	0	17,19,21	0.52	0

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
7	NAG	H	400	4	-	2/6/23/26	0/1/1/1
7	NAG	G	402	4	-	4/6/23/26	0/1/1/1
7	NAG	G	400	4	-	2/6/23/26	0/1/1/1
7	NAG	H	401	4	-	4/6/23/26	0/1/1/1
7	NAG	G	401	4	-	1/6/23/26	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	E	101	ACT	CH3-C	6.45	1.57	1.48
6	D	302	ACT	CH3-C	6.45	1.57	1.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	301	ACT	CH3-C	6.45	1.57	1.48
6	A	302	ACT	CH3-C	6.40	1.56	1.48
6	E	102	ACT	CH3-C	6.39	1.56	1.48

There are no bond angle outliers.

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	H	401	NAG	C4-C5-C6-O6
7	H	401	NAG	O5-C5-C6-O6
7	G	402	NAG	O5-C5-C6-O6
7	H	401	NAG	C8-C7-N2-C2
7	H	401	NAG	O7-C7-N2-C2

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	G	400	NAG	1	0
6	D	302	ACT	1	0
7	H	400	NAG	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	276/276 (100%)	0.35	13 (4%) 31 30	40, 71, 125, 147	0
1	D	276/276 (100%)	0.22	10 (3%) 42 42	31, 54, 112, 139	0
2	B	100/100 (100%)	0.15	5 (5%) 28 27	39, 59, 115, 145	0
2	E	100/100 (100%)	0.07	2 (2%) 65 63	32, 58, 107, 123	0
3	C	8/8 (100%)	0.43	0 100 100	54, 66, 101, 115	0
3	F	8/8 (100%)	0.12	0 100 100	41, 48, 59, 70	0
4	G	290/299 (96%)	0.25	16 (5%) 25 24	35, 63, 123, 152	0
4	H	275/299 (91%)	0.36	14 (5%) 28 26	39, 75, 132, 164	0
All	All	1333/1366 (97%)	0.27	60 (4%) 33 31	31, 65, 121, 164	0

The worst 5 of 60 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	H	82	PRO	5.9
4	H	128	MET	5.2
4	G	265	THR	4.7
1	A	257	TYR	4.6
1	A	276	PRO	4.5

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides 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. 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
6	ACT	D	302	4/4	0.62	0.36	89,92,93,94	0
7	NAG	G	402	14/15	0.74	0.43	120,125,128,128	0
6	ACT	E	102	4/4	0.79	0.32	86,96,99,102	0
5	FMT	A	301	3/3	0.86	0.40	98,98,98,99	0
6	ACT	D	301	4/4	0.90	0.23	70,82,83,89	0
7	NAG	G	401	14/15	0.92	0.15	65,82,87,92	0
7	NAG	H	401	14/15	0.92	0.18	74,87,90,92	0
7	NAG	H	400	14/15	0.92	0.22	75,88,101,101	0
6	ACT	E	101	4/4	0.93	0.14	51,72,74,76	0
7	NAG	G	400	14/15	0.95	0.13	62,75,83,89	0
6	ACT	A	302	4/4	0.95	0.12	66,73,76,77	0

6.5 Other polymers [i](#)

There are no such residues in this entry.