



wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 01:10 am BST

PDB ID : 2C6S
Title : human adenovirus penton base 2 12 chimera
Authors : Zubieta, C.; Blanchoin, L.; Cusack, S.
Deposited on : 2005-11-11
Resolution : 3.60 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:

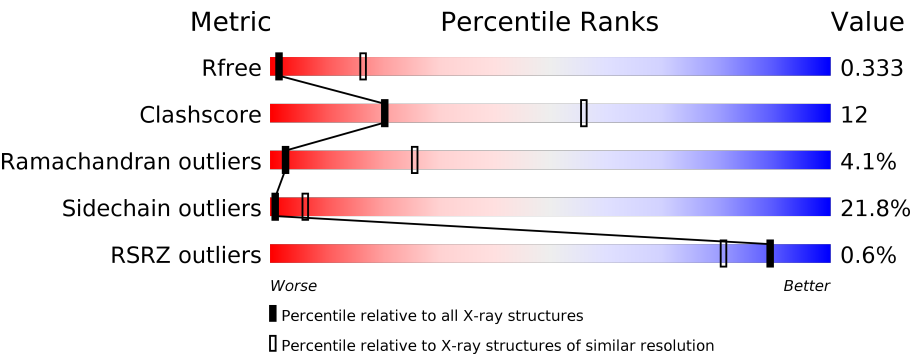
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.60 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	1257 (3.70-3.50)
Clashscore	141614	1353 (3.70-3.50)
Ramachandran outliers	138981	1307 (3.70-3.50)
Sidechain outliers	138945	1307 (3.70-3.50)
RSRZ outliers	127900	1161 (3.70-3.50)

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	523	
1	B	523	
1	C	523	
1	D	523	
1	E	523	
1	F	523	

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Mol	Chain	Length	Quality of chain
1	G	523	<div><div><div>%</div><div><div></div><div></div><div></div><div></div><div></div></div><div>38%31%13%•15%</div></div></div>
1	H	523	<div><div><div></div><div></div><div></div><div></div><div></div></div><div>38%31%13%•15%</div></div>
1	I	523	<div><div><div></div><div></div><div></div><div></div><div></div></div><div>37%34%11%•15%</div></div>
1	J	523	<div><div><div></div><div></div><div></div><div></div><div></div></div><div>37%33%12%•15%</div></div>
1	K	523	<div><div><div></div><div></div><div></div><div></div><div></div></div><div>33%33%15%•15%</div></div>
1	L	523	<div><div><div>%</div><div><div></div><div></div><div></div><div></div><div></div></div><div>34%34%13%•15%</div></div></div>
1	M	523	<div><div><div></div><div></div><div></div><div></div><div></div></div><div>38%33%12%•15%</div></div>
1	N	523	<div><div><div>%</div><div><div></div><div></div><div></div><div></div><div></div></div><div>36%34%11%•15%</div></div></div>
1	O	523	<div><div><div>%</div><div><div></div><div></div><div></div><div></div><div></div></div><div>37%33%12%•15%</div></div></div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 53010 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 ADENOVIRUS 2,12 PENTON BASE CHIMERA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	B	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	C	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	D	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	E	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	F	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	G	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	H	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	I	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	J	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	K	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	L	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	M	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	N	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			
1	O	444	Total	C	N	O	S	0	0	1
			3534	2235	611	676	12			

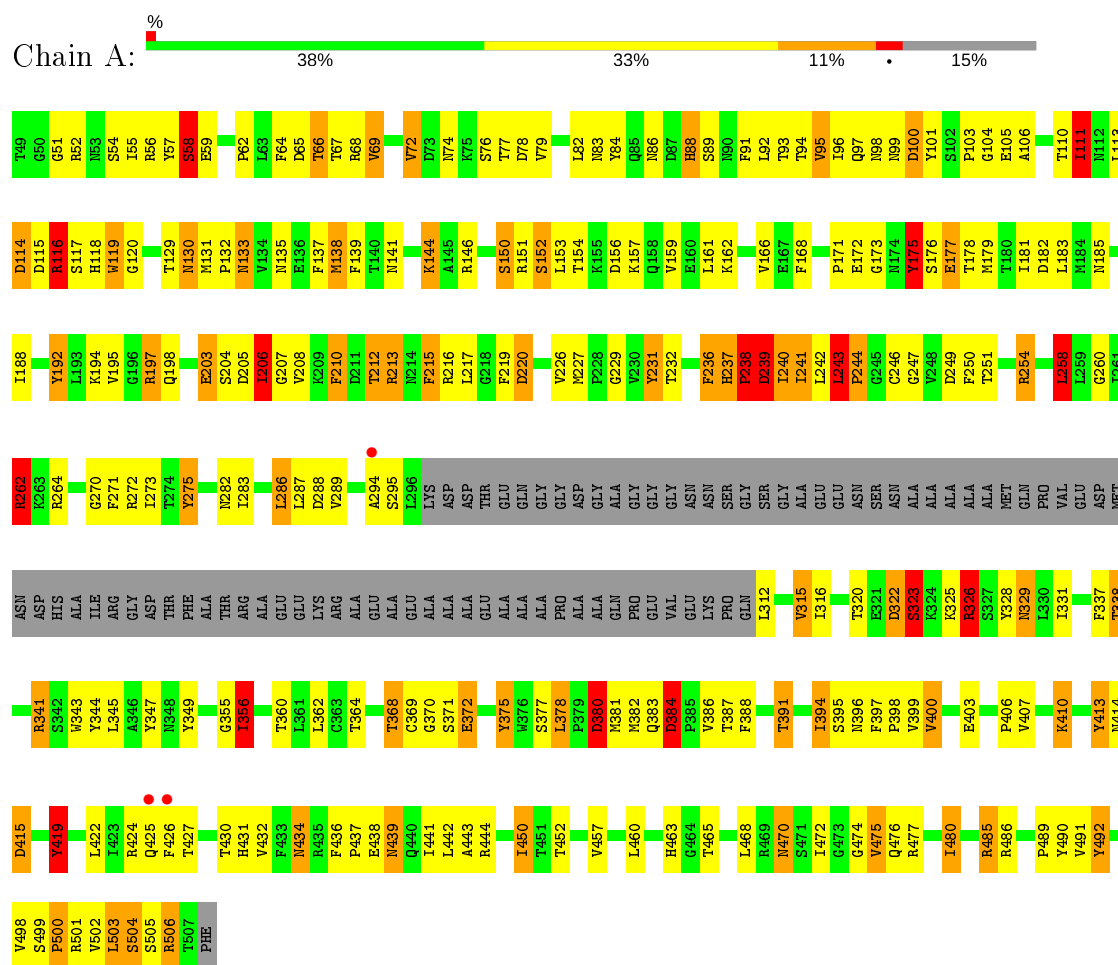
There are 15 discrepancies between the modelled and reference sequences:

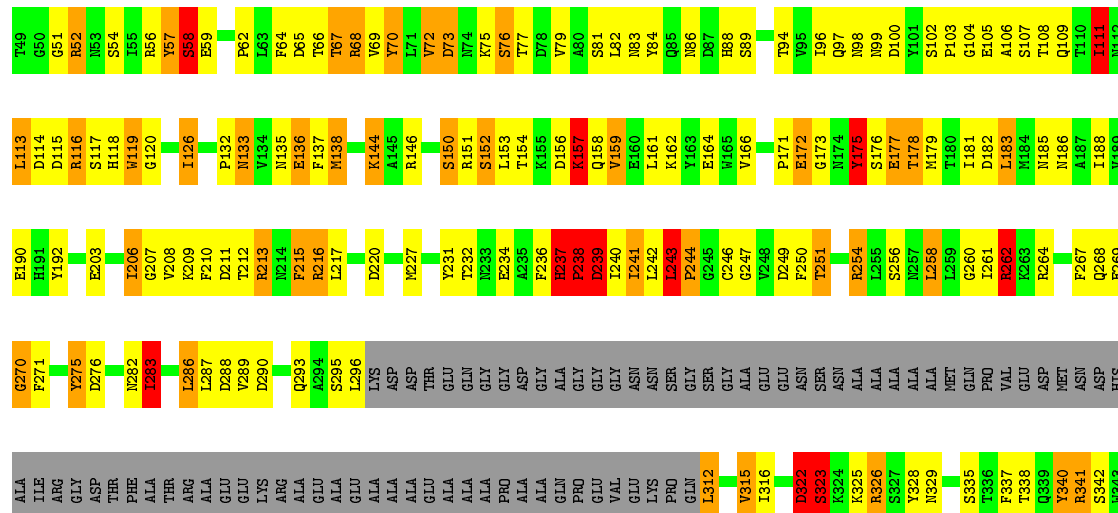
Chain	Residue	Modelled	Actual	Comment	Reference
A	312	LEU	LYS	conflict	UNP P03276
B	312	LEU	LYS	conflict	UNP P03276
C	312	LEU	LYS	conflict	UNP P03276
D	312	LEU	LYS	conflict	UNP P03276
E	312	LEU	LYS	conflict	UNP P03276
F	312	LEU	LYS	conflict	UNP P03276
G	312	LEU	LYS	conflict	UNP P03276
H	312	LEU	LYS	conflict	UNP P03276
I	312	LEU	LYS	conflict	UNP P03276
J	312	LEU	LYS	conflict	UNP P03276
K	312	LEU	LYS	conflict	UNP P03276
L	312	LEU	LYS	conflict	UNP P03276
M	312	LEU	LYS	conflict	UNP P03276
N	312	LEU	LYS	conflict	UNP P03276
O	312	LEU	LYS	conflict	UNP P03276

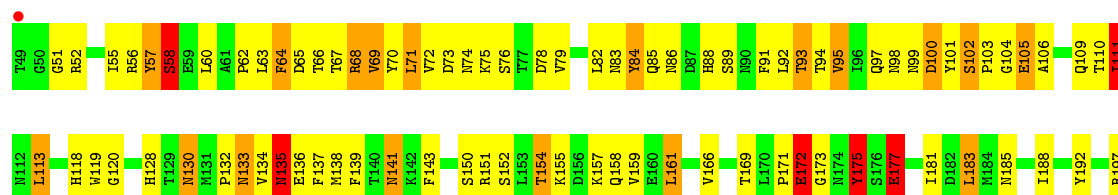
3 Residue-property plots

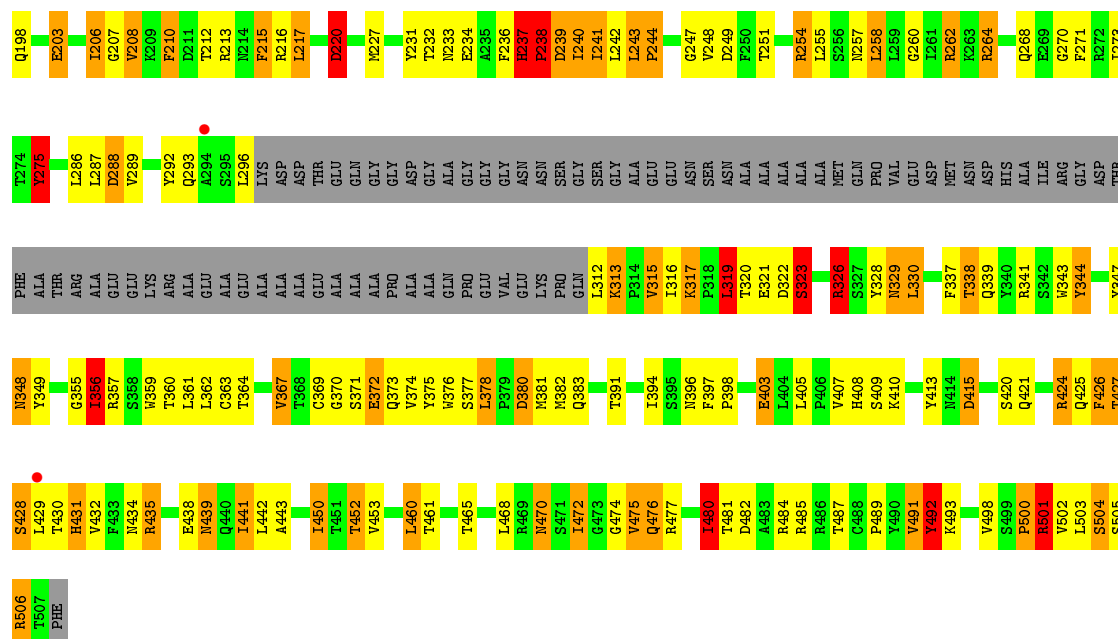
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: ADENOVIRUS 2,12 PENTON BASE CHIMERA

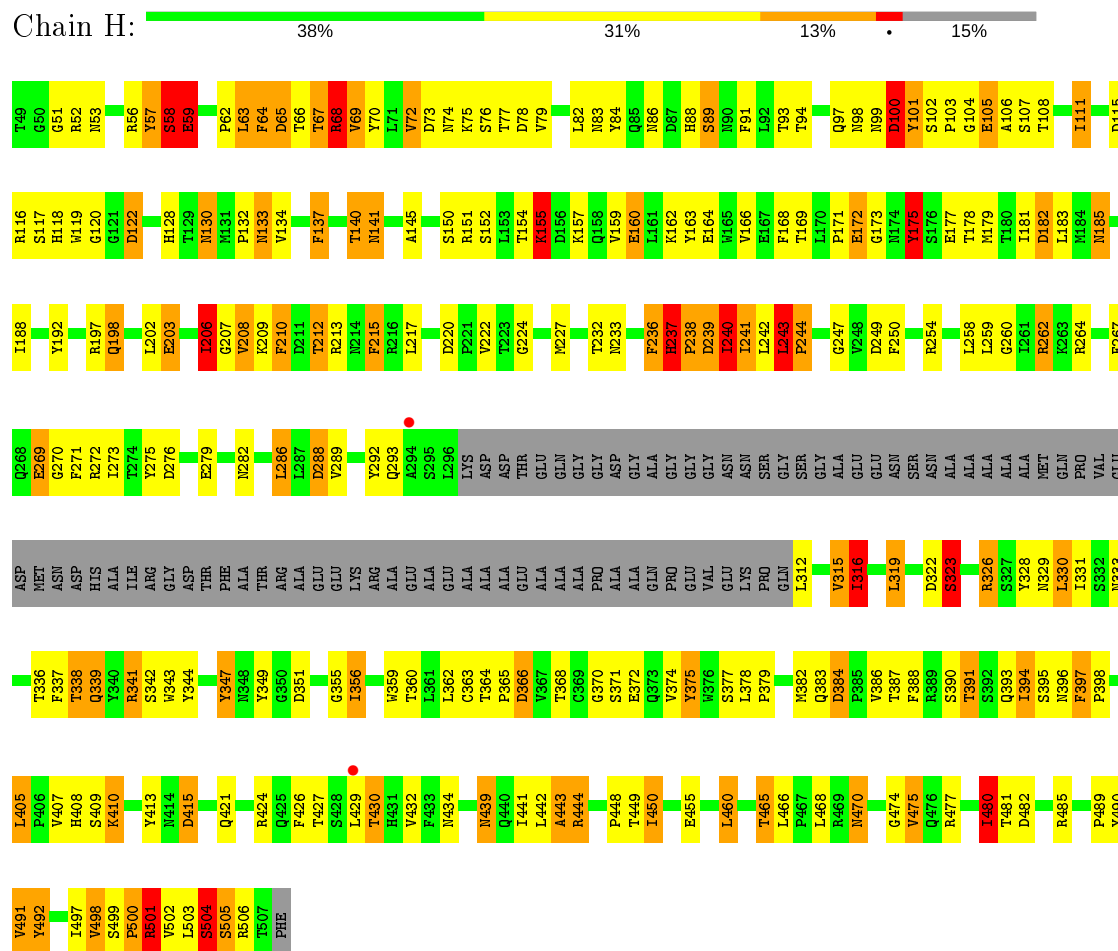






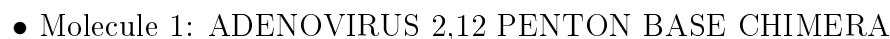


• Molecule 1: ADENOVIRUS 2,12 PENTON BASE CHIMERA

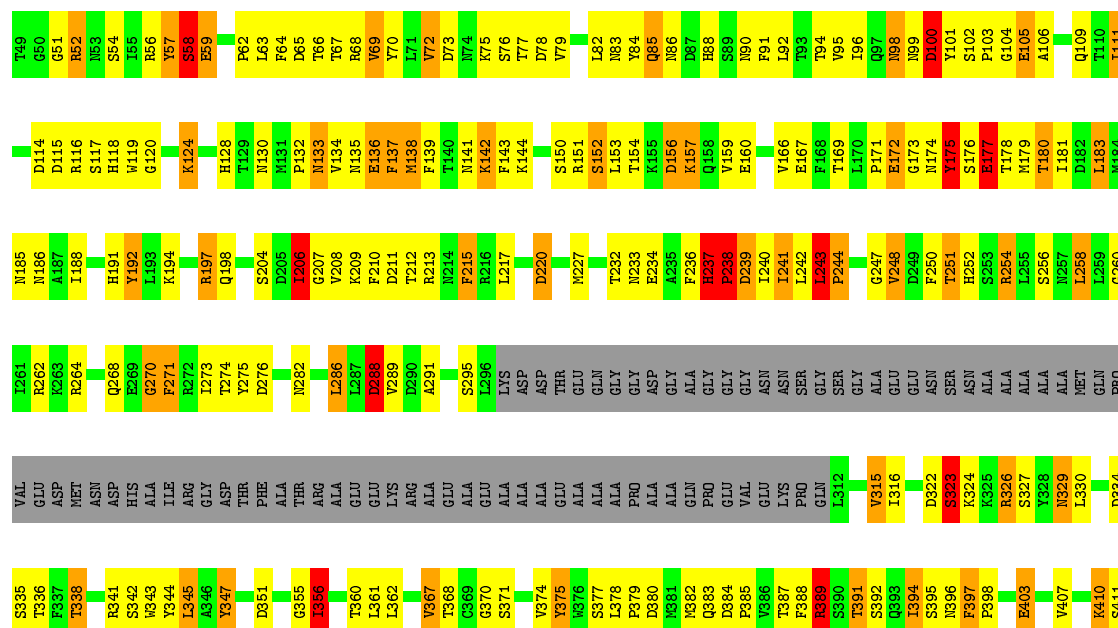


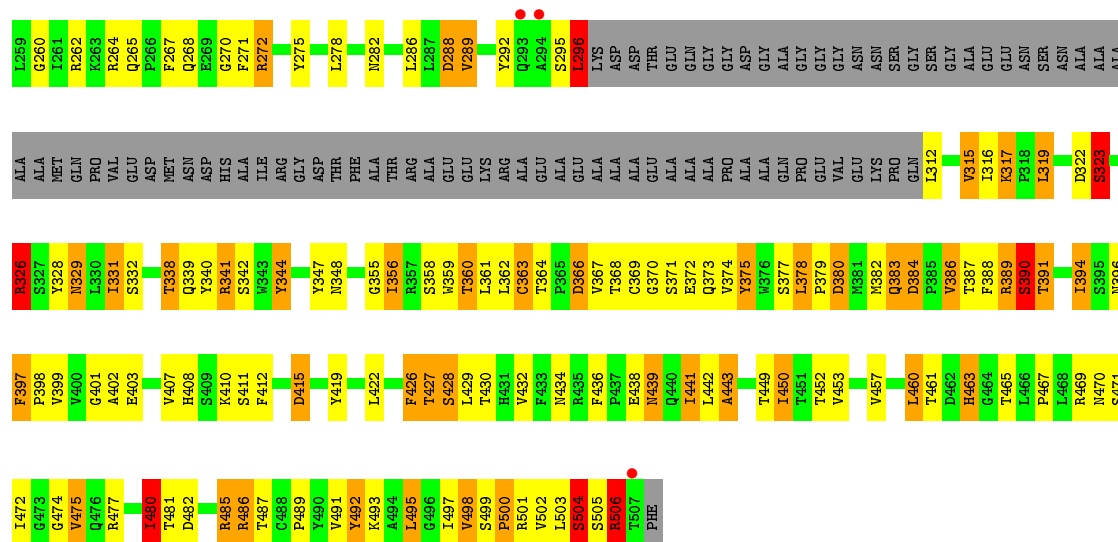
• Molecule 1: ADENOVIRUS 2,12 PENTON BASE CHIMERA

Frequency	Percentage
Daily	37%
Often	34%
Sometimes	11%
Rarely	1%
Never	15%



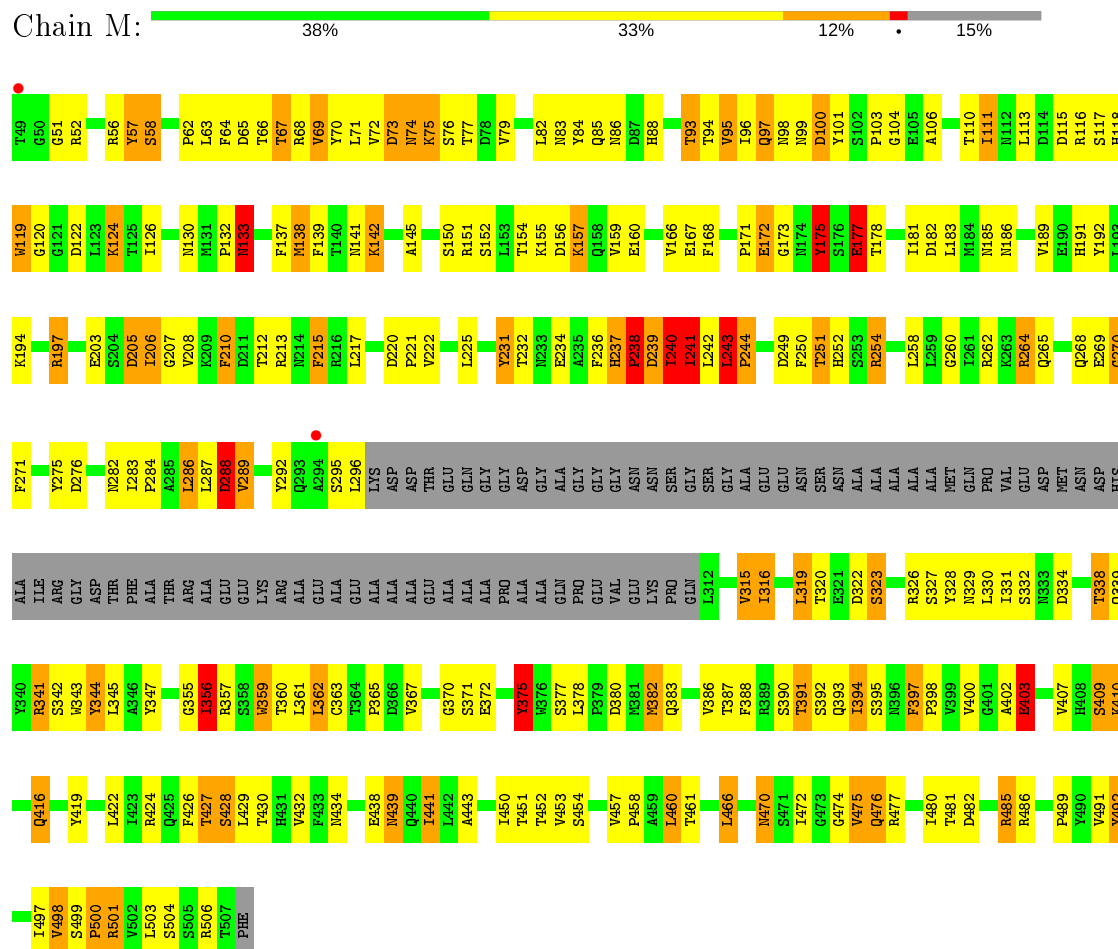
Frequency	Percentage
Daily	37%
Often	33%
Sometimes	12%
Rarely	15%
Never	3%





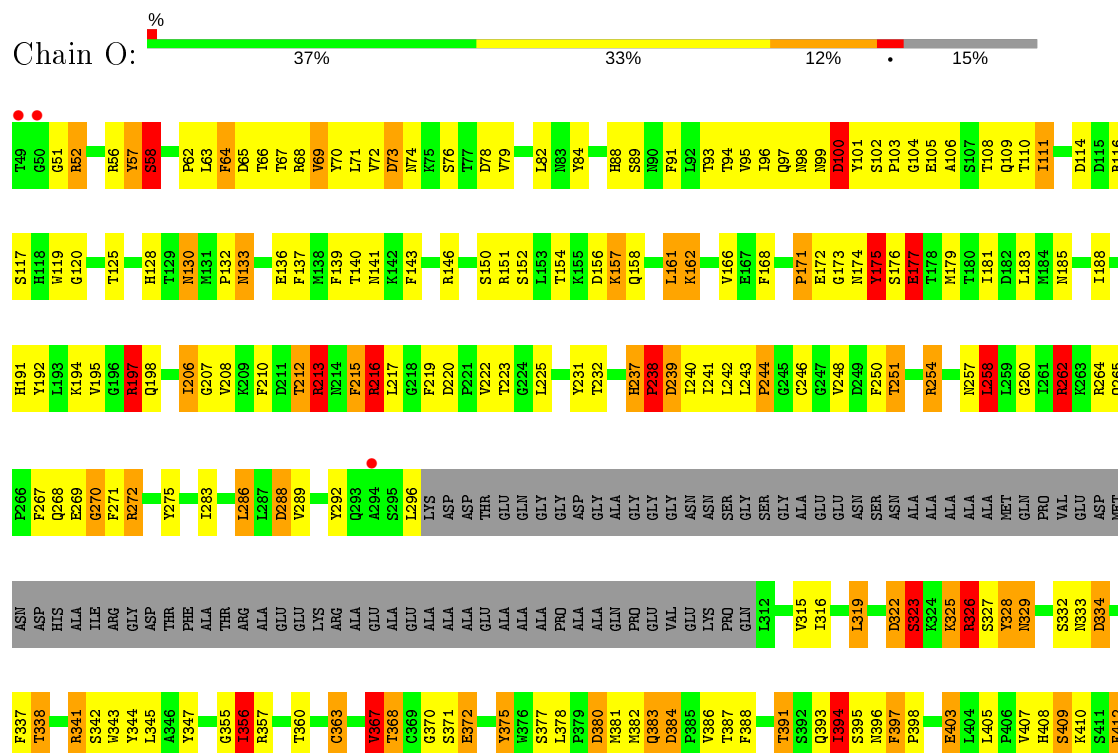
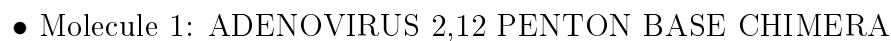
• Molecule 1: ADENOVIRUS 2,12 PENTON BASE CHIMERA

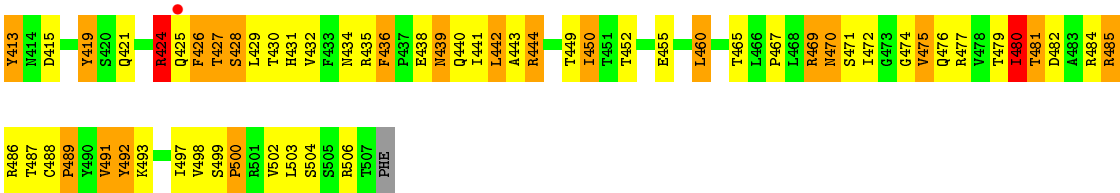
Chain M:



• Molecule 1: ADENOVIRUS 2,12 PENTON BASE CHIMERA







4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	266.50Å 292.90Å 307.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 3.60 15.00 – 3.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (15.00-3.60) 89.3 (15.00-3.60)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.36 (at 3.57Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.275 , 0.340 0.277 , 0.333	Depositor DCC
R_{free} test set	3041 reflections (2.50%)	wwPDB-VP
Wilson B-factor (Å ²)	131.0	Xtriage
Anisotropy	0.324	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.23 , 68.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.000 for -h,-l,-k	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	53010	wwPDB-VP
Average B, all atoms (Å ²)	136.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.50% of the height of the origin peak. No significant pseudotranslation is detected.*

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 ⓘ

5.1 Standard geometry ⓘ

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	1.08	6/3617 (0.2%)	1.06	13/4926 (0.3%)
1	B	1.23	23/3617 (0.6%)	1.17	16/4926 (0.3%)
1	C	1.17	16/3617 (0.4%)	1.11	21/4926 (0.4%)
1	D	1.06	13/3617 (0.4%)	1.11	21/4926 (0.4%)
1	E	1.08	9/3617 (0.2%)	1.09	13/4926 (0.3%)
1	F	1.20	20/3617 (0.6%)	1.13	20/4926 (0.4%)
1	G	1.16	21/3617 (0.6%)	1.11	19/4926 (0.4%)
1	H	1.05	13/3617 (0.4%)	1.09	18/4926 (0.4%)
1	I	0.96	5/3617 (0.1%)	1.07	12/4926 (0.2%)
1	J	1.03	9/3617 (0.2%)	1.06	13/4926 (0.3%)
1	K	1.12	20/3617 (0.6%)	1.11	20/4926 (0.4%)
1	L	1.07	17/3617 (0.5%)	1.09	20/4926 (0.4%)
1	M	1.25	24/3617 (0.7%)	1.12	17/4926 (0.3%)
1	N	1.11	19/3617 (0.5%)	1.11	16/4926 (0.3%)
1	O	1.31	26/3617 (0.7%)	1.17	22/4926 (0.4%)
All	All	1.13	241/54255 (0.4%)	1.11	261/73890 (0.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	109
1	B	0	105
1	C	0	111
1	D	0	107
1	E	0	103
1	F	0	108
1	G	0	113
1	H	0	114
1	I	0	115
1	J	0	112

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	K	0	119
1	L	0	115
1	M	0	105
1	N	0	116
1	O	0	115
All	All	0	1667

The worst 5 of 241 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	O	372	GLU	CD-OE1	28.94	1.57	1.25
1	A	372	GLU	CD-OE2	27.62	1.56	1.25
1	C	157	LYS	CE-NZ	23.22	2.07	1.49
1	C	157	LYS	CD-CE	19.96	2.01	1.51
1	F	194	LYS	CE-NZ	19.88	1.98	1.49

The worst 5 of 261 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	424	ARG	NE-CZ-NH2	-26.19	107.20	120.30
1	F	197	ARG	NE-CZ-NH2	-17.45	111.58	120.30
1	N	326	ARG	NE-CZ-NH2	-17.36	111.62	120.30
1	O	326	ARG	NE-CZ-NH2	-14.54	113.03	120.30
1	O	216	ARG	NE-CZ-NH2	-12.96	113.82	120.30

There are no chirality outliers.

5 of 1667 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	52	ARG	Mainchain
1	A	56	ARG	Sidechain,Mainchain
1	A	57	TYR	Sidechain
1	A	58	SER	Mainchain
1	A	62	PRO	Mainchain

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	3534	0	3463	82	0
1	B	3534	0	3463	107	0
1	C	3534	0	3463	95	0
1	D	3534	0	3463	80	0
1	E	3534	0	3463	100	0
1	F	3534	0	3463	91	0
1	G	3534	0	3463	89	0
1	H	3534	0	3463	82	0
1	I	3534	0	3463	92	0
1	J	3534	0	3463	107	0
1	K	3534	0	3463	107	0
1	L	3534	0	3463	100	0
1	M	3534	0	3463	90	0
1	N	3534	0	3463	94	0
1	O	3534	0	3463	91	0
All	All	53010	0	51945	1296	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 12.

The worst 5 of 1296 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:J:124:LYS:CG	1:J:124:LYS:CD	1.78	1.62
1:K:422:LEU:CG	1:K:422:LEU:CD2	1.76	1.62
1:E:157:LYS:CD	1:E:157:LYS:CE	1.81	1.59
1:O:162:LYS:CE	1:O:162:LYS:CD	1.77	1.59
1:C:157:LYS:CG	1:C:157:LYS:CD	1.83	1.57

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	440/523 (84%)	357 (81%)	65 (15%)	18 (4%)	3	26
1	B	440/523 (84%)	360 (82%)	62 (14%)	18 (4%)	3	26
1	C	440/523 (84%)	357 (81%)	65 (15%)	18 (4%)	3	26
1	D	440/523 (84%)	360 (82%)	62 (14%)	18 (4%)	3	26
1	E	440/523 (84%)	358 (81%)	63 (14%)	19 (4%)	2	24
1	F	440/523 (84%)	359 (82%)	62 (14%)	19 (4%)	2	24
1	G	440/523 (84%)	359 (82%)	63 (14%)	18 (4%)	3	26
1	H	440/523 (84%)	359 (82%)	63 (14%)	18 (4%)	3	26
1	I	440/523 (84%)	360 (82%)	62 (14%)	18 (4%)	3	26
1	J	440/523 (84%)	358 (81%)	64 (14%)	18 (4%)	3	26
1	K	440/523 (84%)	356 (81%)	65 (15%)	19 (4%)	2	24
1	L	440/523 (84%)	359 (82%)	63 (14%)	18 (4%)	3	26
1	M	440/523 (84%)	358 (81%)	64 (14%)	18 (4%)	3	26
1	N	440/523 (84%)	361 (82%)	61 (14%)	18 (4%)	3	26
1	O	440/523 (84%)	361 (82%)	61 (14%)	18 (4%)	3	26
All	All	6600/7845 (84%)	5382 (82%)	945 (14%)	273 (4%)	3	26

5 of 273 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	66	THR
1	A	172	GLU
1	A	237	HIS
1	A	286	LEU
1	A	323	SER

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	400/451 (89%)	310 (78%)	90 (22%)	1	6

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	400/451 (89%)	320 (80%)	80 (20%)	1	8
1	C	400/451 (89%)	317 (79%)	83 (21%)	1	7
1	D	400/451 (89%)	317 (79%)	83 (21%)	1	7
1	E	400/451 (89%)	314 (78%)	86 (22%)	1	6
1	F	400/451 (89%)	322 (80%)	78 (20%)	1	9
1	G	400/451 (89%)	315 (79%)	85 (21%)	1	7
1	H	400/451 (89%)	306 (76%)	94 (24%)	1	5
1	I	400/451 (89%)	321 (80%)	79 (20%)	1	8
1	J	400/451 (89%)	311 (78%)	89 (22%)	1	6
1	K	400/451 (89%)	303 (76%)	97 (24%)	0	4
1	L	400/451 (89%)	297 (74%)	103 (26%)	0	4
1	M	400/451 (89%)	312 (78%)	88 (22%)	1	6
1	N	400/451 (89%)	310 (78%)	90 (22%)	1	6
1	O	400/451 (89%)	319 (80%)	81 (20%)	1	8
All	All	6000/6765 (89%)	4694 (78%)	1306 (22%)	1	6

5 of 1306 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	74	ASN
1	I	407	VAL
1	N	430	THR
1	H	155	LYS
1	H	450	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 135 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	463	HIS
1	I	198	GLN
1	N	439	ASN
1	H	86	ASN
1	H	237	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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

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	444/523 (84%)	-0.50	3 (0%) 87 78	96, 131, 195, 200	0
1	B	444/523 (84%)	-0.44	2 (0%) 91 83	96, 131, 195, 200	0
1	C	444/523 (84%)	-0.44	4 (0%) 84 73	95, 131, 196, 200	0
1	D	444/523 (84%)	-0.43	2 (0%) 91 83	96, 131, 195, 200	0
1	E	444/523 (84%)	-0.49	0 100 100	96, 131, 195, 200	0
1	F	444/523 (84%)	-0.45	3 (0%) 87 78	94, 131, 196, 200	0
1	G	444/523 (84%)	-0.48	3 (0%) 87 78	94, 132, 195, 200	0
1	H	444/523 (84%)	-0.42	2 (0%) 91 83	95, 131, 195, 200	0
1	I	444/523 (84%)	-0.48	0 100 100	96, 131, 195, 200	0
1	J	444/523 (84%)	-0.44	2 (0%) 91 83	95, 131, 196, 200	0
1	K	444/523 (84%)	-0.46	1 (0%) 95 91	96, 131, 196, 200	0
1	L	444/523 (84%)	-0.46	4 (0%) 84 73	95, 131, 196, 200	0
1	M	444/523 (84%)	-0.45	2 (0%) 91 83	95, 132, 196, 200	0
1	N	444/523 (84%)	-0.46	5 (1%) 80 68	95, 131, 196, 200	0
1	O	444/523 (84%)	-0.45	4 (0%) 84 73	94, 131, 195, 200	0
All	All	6660/7845 (84%)	-0.46	37 (0%) 89 81	94, 131, 196, 200	0

The worst 5 of 37 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	429	LEU	4.1
1	O	425	GLN	3.5
1	D	425	GLN	3.5
1	C	426	PHE	3.4
1	L	294	ALA	3.3

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 carbohydrates in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.