



wwPDB X-ray Structure Validation Summary Report ⓘ

May 16, 2020 – 05:14 pm BST

PDB ID : 4ZOQ
Title : Crystal Structure of a Lanthipeptide Protease
Authors : Dong, S.H.; Nair, S.K.
Deposited on : 2015-05-06
Resolution : 2.35 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

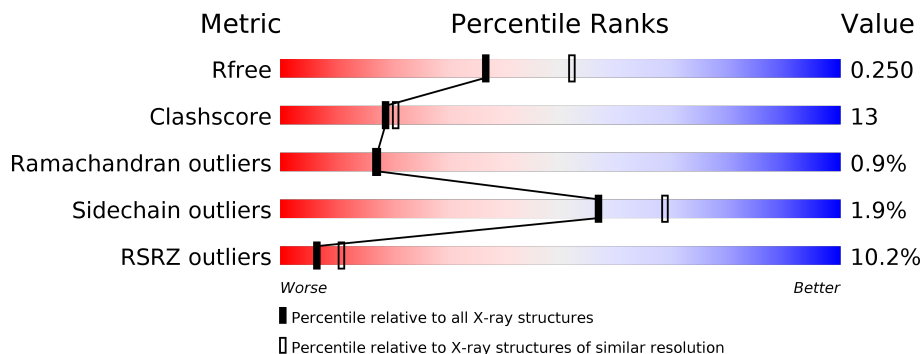
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 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	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">8%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 8%, orange 12%, yellow 22%, green 39%, grey 39%);"></div> </div>
1	B	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">12%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 12%, orange 12%, yellow 10%, green 50%, grey 40%);"></div> </div>
1	C	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">11%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 11%, orange 11%, yellow 18%, green 41%, grey 40%);"></div> </div>
1	D	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">29%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 29%, orange 29%, yellow 28%, green 31%, grey 40%);"></div> </div>
1	E	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">43%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 43%, orange 43%, yellow 25%, green 30%, grey 39%);"></div> </div>
1	F	100	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;">38%</div> <div style="width: 100%; height: 15px; background: linear-gradient(to right, red 38%, orange 38%, yellow 34%, green 25%, grey 38%);"></div> </div>

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Mol	Chain	Length	Quality of chain
1	G	100	<p>46% 20% 30% 11% 38%</p>
1	H	100	<p>48% 18% 26% 12% 6% 38%</p>
2	I	343	<p>% 80% 18% 2%</p>
2	J	343	<p>% 82% 16% 2%</p>
2	K	343	<p>% 80% 16% 4%</p>
2	L	343	<p>3% 78% 19% 2%</p>
2	M	343	<p>4% 76% 20% 2%</p>
2	N	343	<p>5% 76% 20% 2%</p>
2	O	343	<p>3% 77% 19% 2%</p>
2	P	343	<p>8% 77% 19% 2%</p>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 25562 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 Intracellular serine protease.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	61	486	314	79	93	0	0	0
1	B	60	477	309	78	90	0	0	0
1	C	60	477	309	78	90	0	0	0
1	D	60	473	306	77	90	0	0	0
1	E	61	478	309	78	91	0	0	0
1	F	62	487	314	79	94	0	0	0
1	G	62	483	312	79	92	0	0	0
1	H	62	487	315	80	92	0	0	0

- Molecule 2 is a protein called Intracellular serine protease.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	I	337	2586	1623	451	502	10	0	0	0
2	J	337	2586	1623	451	502	10	0	0	0
2	K	335	2571	1612	449	500	10	0	0	0
2	L	337	2586	1623	451	502	10	0	0	0
2	M	333	2557	1607	447	494	9	0	0	0
2	N	335	2571	1612	449	500	10	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	O	335	Total	C	N	O	S	0	0	0
			2571	1612	449	500	10			
2	P	337	Total	C	N	O	S	0	0	0
			2586	1623	451	502	10			

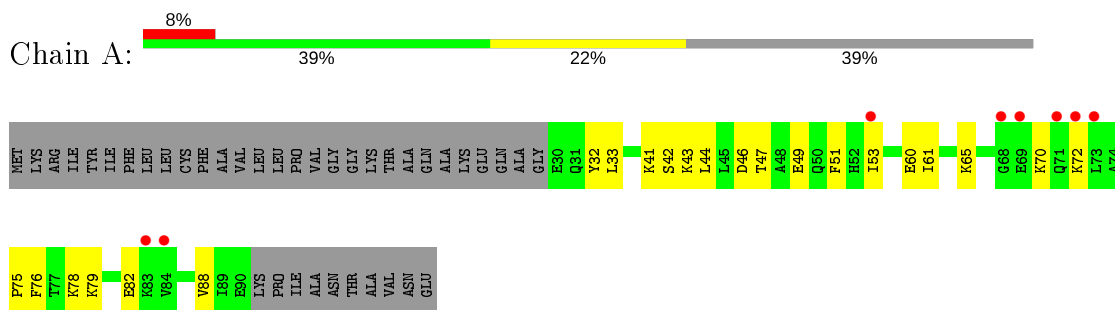
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	18	Total	O	0	0
			18	18		
3	I	176	Total	O	0	0
			176	176		
3	B	20	Total	O	0	0
			20	20		
3	J	150	Total	O	0	0
			150	150		
3	C	21	Total	O	0	0
			21	21		
3	K	164	Total	O	0	0
			164	164		
3	D	4	Total	O	0	0
			4	4		
3	L	98	Total	O	0	0
			98	98		
3	E	9	Total	O	0	0
			9	9		
3	M	109	Total	O	0	0
			109	109		
3	F	3	Total	O	0	0
			3	3		
3	N	113	Total	O	0	0
			113	113		
3	G	5	Total	O	0	0
			5	5		
3	O	110	Total	O	0	0
			110	110		
3	H	3	Total	O	0	0
			3	3		
3	P	97	Total	O	0	0
			97	97		

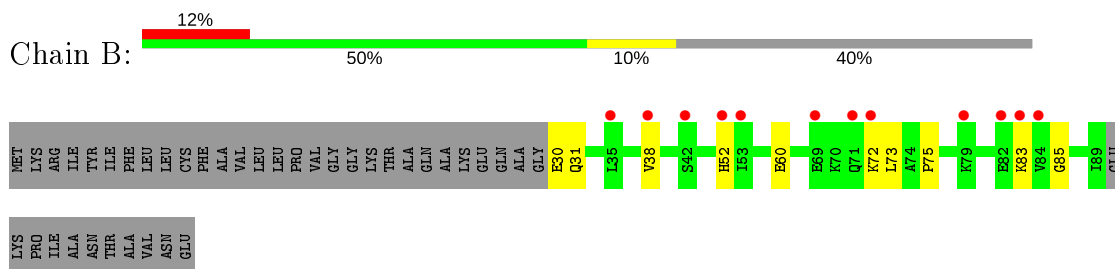
3 Residue-property plots [i](#)

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.

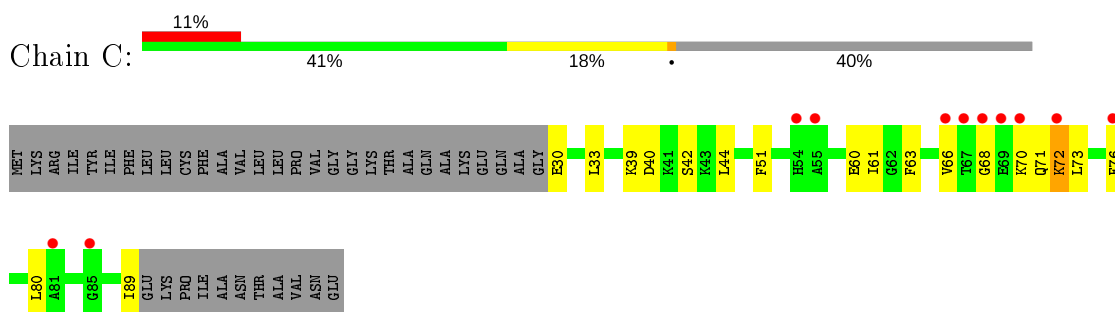
- Molecule 1: Intracellular serine protease



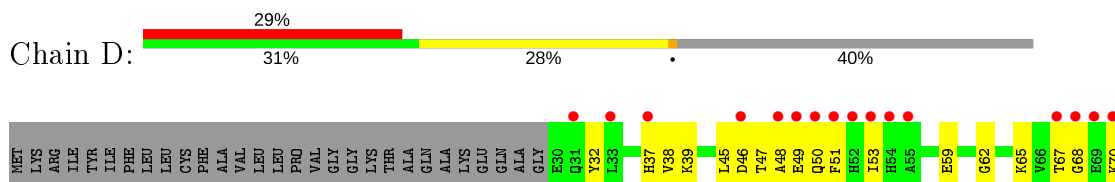
- Molecule 1: Intracellular serine protease

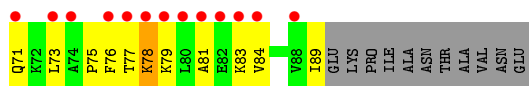


- Molecule 1: Intracellular serine protease

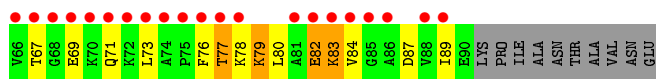
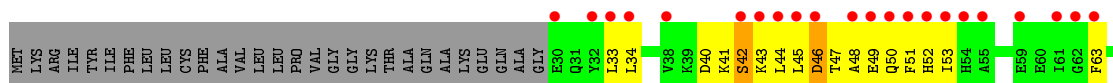
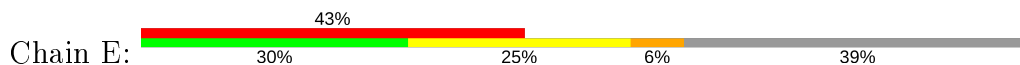


- Molecule 1: Intracellular serine protease

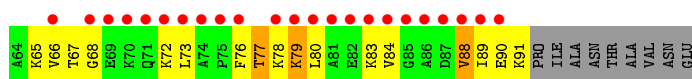
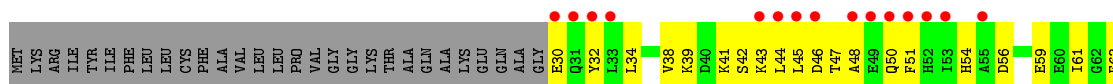
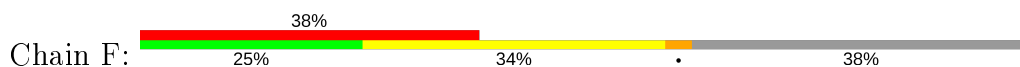




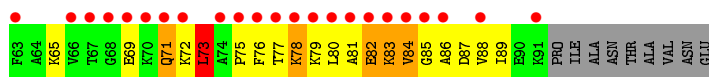
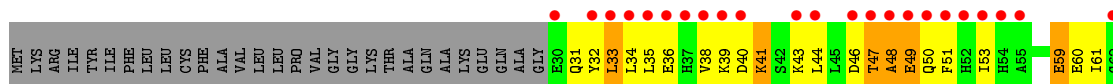
- Molecule 1: Intracellular serine protease



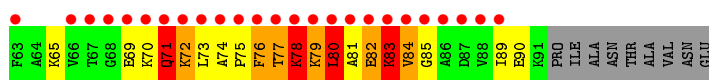
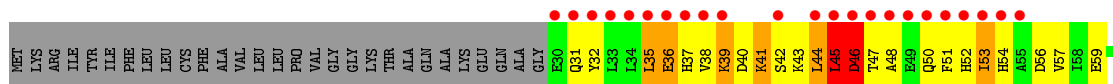
- Molecule 1: Intracellular serine protease



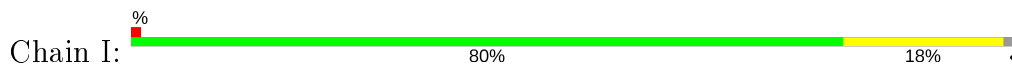
- Molecule 1: Intracellular serine protease

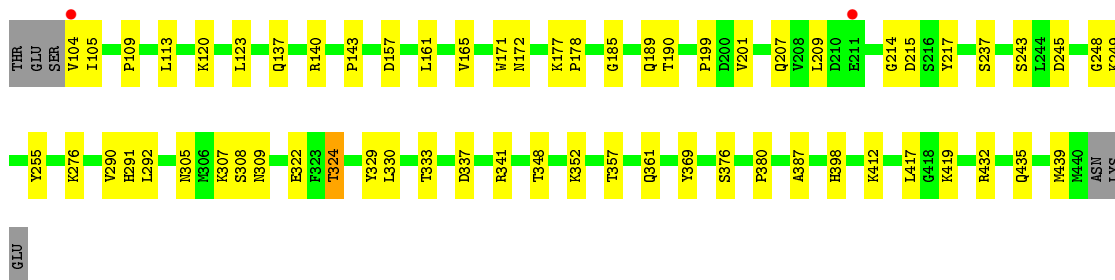


- Molecule 1: Intracellular serine protease

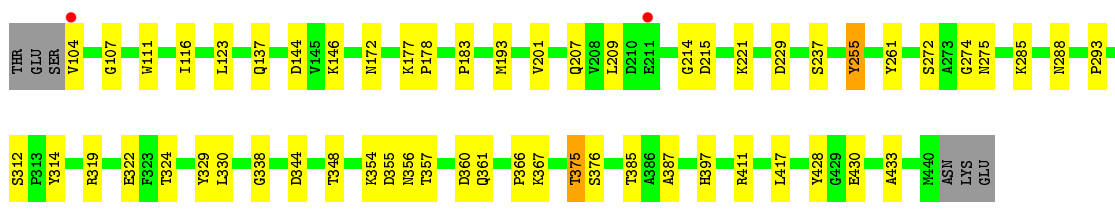
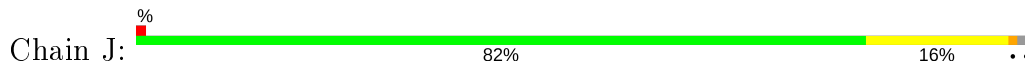


- Molecule 2: Intracellular serine protease

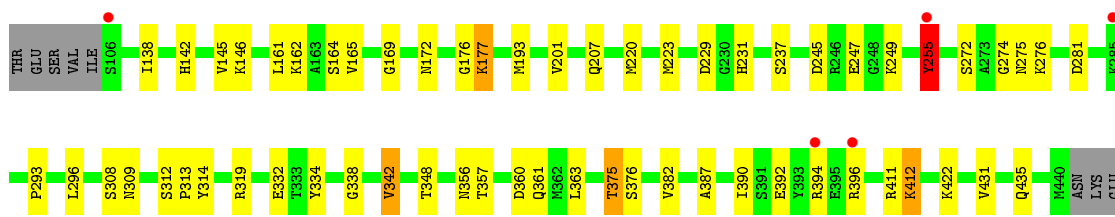
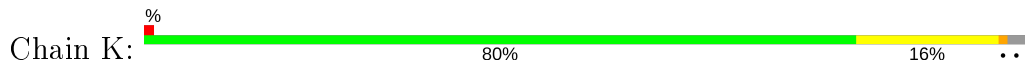




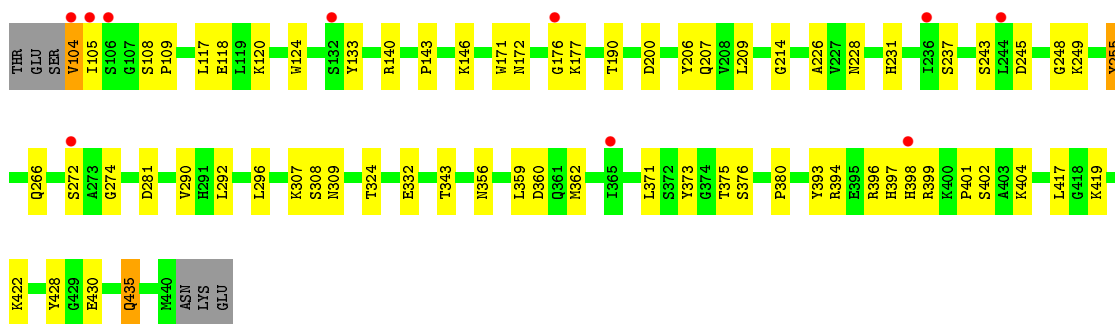
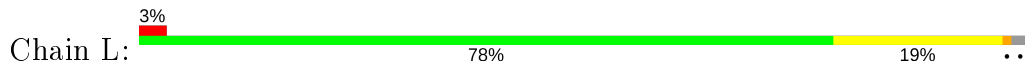
• Molecule 2: Intracellular serine protease



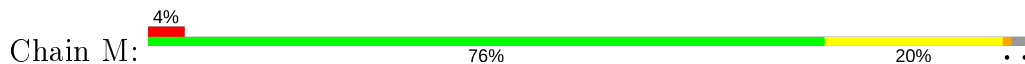
• Molecule 2: Intracellular serine protease

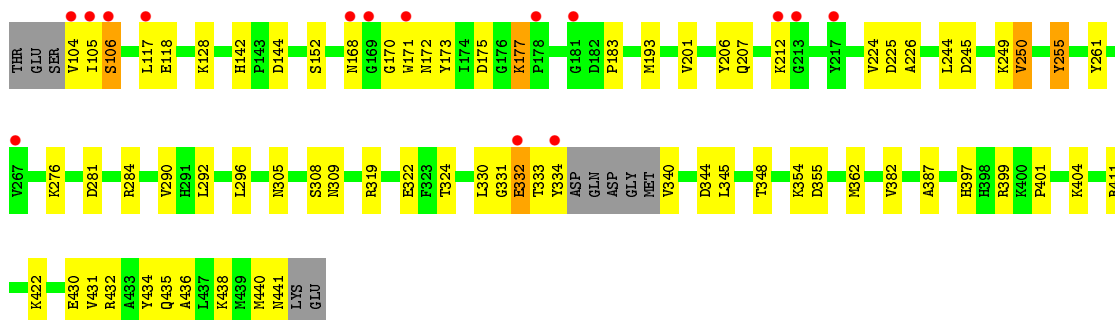


• Molecule 2: Intracellular serine protease

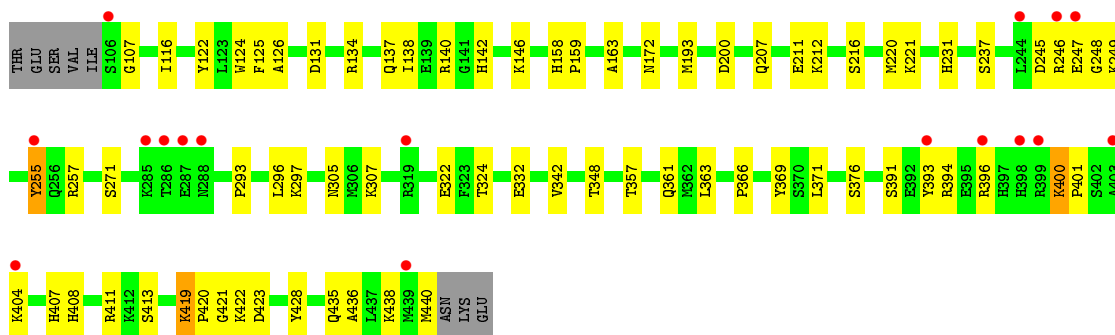
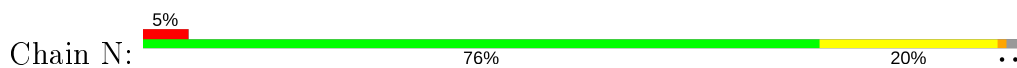


• Molecule 2: Intracellular serine protease

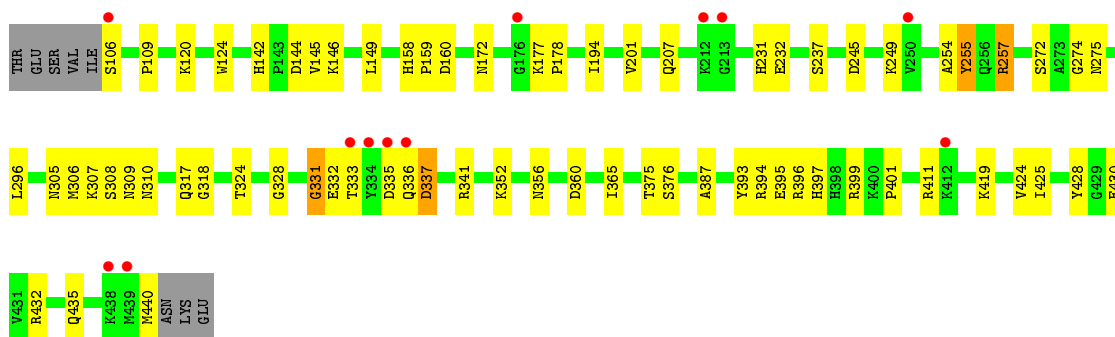
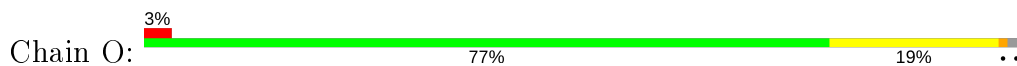




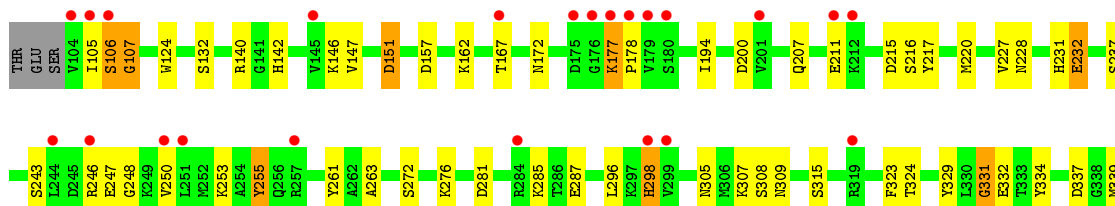
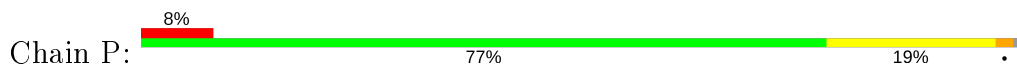
- Molecule 2: Intracellular serine protease

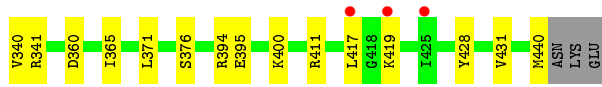


- Molecule 2: Intracellular serine protease



- Molecule 2: Intracellular serine protease





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	71.04Å 112.78Å 114.77Å 82.17° 89.68° 82.85°	Depositor
Resolution (Å)	38.03 – 2.35 38.54 – 2.35	Depositor EDS
% Data completeness (in resolution range)	98.5 (38.03-2.35) 98.5 (38.54-2.35)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.80 (at 2.34Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.200 , 0.250 0.201 , 0.250	Depositor DCC
R_{free} test set	7186 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	42.1	Xtrriage
Anisotropy	0.143	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 43.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	25562	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.49% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical 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	0.49	0/493	0.77	0/661
1	B	0.43	0/484	0.64	0/649
1	C	0.45	0/484	0.80	1/649 (0.2%)
1	D	0.48	0/480	0.80	1/645 (0.2%)
1	E	0.54	0/485	1.07	1/652 (0.2%)
1	F	0.62	0/494	0.93	1/664 (0.2%)
1	G	0.56	0/490	1.12	4/659 (0.6%)
1	H	0.85	0/494	1.82	15/663 (2.3%)
2	I	0.51	0/2639	0.64	0/3576
2	J	0.50	0/2639	0.65	2/3576 (0.1%)
2	K	0.55	1/2624 (0.0%)	0.70	2/3555 (0.1%)
2	L	0.47	0/2639	0.66	1/3576 (0.0%)
2	M	0.48	0/2609	0.68	1/3535 (0.0%)
2	N	0.47	0/2624	0.66	1/3555 (0.0%)
2	O	0.47	0/2624	0.66	0/3555
2	P	0.47	0/2639	0.69	2/3576 (0.1%)
All	All	0.50	1/24941 (0.0%)	0.74	32/33746 (0.1%)

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	D	0	1
1	E	0	4
1	G	0	1
1	H	0	6
2	L	0	1
2	M	0	1
All	All	0	14

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	255	TYR	CD2-CE2	-5.10	1.31	1.39

The worst 5 of 32 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	80	LEU	CA-CB-CG	14.99	149.77	115.30
1	H	83	LYS	N-CA-C	11.79	142.84	111.00
1	H	44	LEU	CB-CG-CD2	-10.56	93.04	111.00
1	H	71	GLN	N-CA-C	9.38	136.33	111.00
1	H	45	LEU	CA-CB-CG	-9.10	94.36	115.30

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	79	LYS	Peptide
1	E	46	ASP	Peptide
1	E	77	THR	Peptide
1	E	79	LYS	Peptide
2	L	118	GLU	Peptide

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	486	0	499	19	0
1	B	477	0	493	10	0
1	C	477	0	493	13	0
1	D	473	0	482	23	0
1	E	478	0	484	30	0
1	F	487	0	490	46	0
1	G	483	0	486	46	0
1	H	487	0	497	57	0
2	I	2586	0	2557	42	0
2	J	2586	0	2557	39	0
2	K	2571	0	2537	49	0
2	L	2586	0	2557	49	0
2	M	2557	0	2534	55	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	N	2571	0	2537	63	0
2	O	2571	0	2537	62	1
2	P	2586	0	2557	60	0
3	A	18	0	0	8	0
3	B	20	0	0	5	0
3	C	21	0	0	3	0
3	D	4	0	0	1	0
3	E	9	0	0	0	0
3	F	3	0	0	3	0
3	G	5	0	0	3	0
3	H	3	0	0	2	0
3	I	176	0	0	11	0
3	J	150	0	0	13	1
3	K	164	0	0	14	0
3	L	98	0	0	8	0
3	M	109	0	0	18	0
3	N	113	0	0	15	0
3	O	110	0	0	12	1
3	P	97	0	0	13	0
All	All	25562	0	24297	638	2

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

The worst 5 of 638 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:G:33:LEU:HD11	1:G:86:ALA:HB1	1.31	1.09
1:H:41:LYS:HG3	1:H:45:LEU:HD13	1.30	1.08
1:B:30:GLU:N	3:B:201:HOH:O	1.89	1.02
2:L:272:SER:HB2	2:L:375:THR:HG23	1.40	1.00
2:J:274:GLY:H	2:J:375:THR:HG21	1.27	0.99

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:620:HOH:O	3:O:535:HOH:O[1_455]	2.02	0.18
2:M:434:TYR:OH	2:O:336:GLN:O[1_456]	2.09	0.11

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	59/100 (59%)	59 (100%)	0	0	100	100
1	B	58/100 (58%)	56 (97%)	2 (3%)	0	100	100
1	C	58/100 (58%)	54 (93%)	2 (3%)	2 (3%)	3	2
1	D	58/100 (58%)	54 (93%)	4 (7%)	0	100	100
1	E	59/100 (59%)	53 (90%)	4 (7%)	2 (3%)	3	2
1	F	60/100 (60%)	51 (85%)	6 (10%)	3 (5%)	2	0
1	G	60/100 (60%)	53 (88%)	3 (5%)	4 (7%)	1	0
1	H	60/100 (60%)	44 (73%)	7 (12%)	9 (15%)	0	0
2	I	335/343 (98%)	327 (98%)	8 (2%)	0	100	100
2	J	335/343 (98%)	329 (98%)	6 (2%)	0	100	100
2	K	333/343 (97%)	327 (98%)	5 (2%)	1 (0%)	41	47
2	L	335/343 (98%)	324 (97%)	9 (3%)	2 (1%)	25	27
2	M	329/343 (96%)	321 (98%)	6 (2%)	2 (1%)	25	27
2	N	333/343 (97%)	327 (98%)	6 (2%)	0	100	100
2	O	333/343 (97%)	322 (97%)	9 (3%)	2 (1%)	25	27
2	P	335/343 (98%)	326 (97%)	7 (2%)	2 (1%)	25	27
All	All	3140/3544 (89%)	3027 (96%)	84 (3%)	29 (1%)	17	17

5 of 29 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	72	LYS
2	L	398	HIS
1	E	42	SER
1	E	82	GLU
2	M	106	SER

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	52/82 (63%)	52 (100%)	0	100	100
1	B	51/82 (62%)	51 (100%)	0	100	100
1	C	51/82 (62%)	51 (100%)	0	100	100
1	D	50/82 (61%)	49 (98%)	1 (2%)	55	66
1	E	50/82 (61%)	48 (96%)	2 (4%)	31	39
1	F	51/82 (62%)	51 (100%)	0	100	100
1	G	50/82 (61%)	44 (88%)	6 (12%)	5	4
1	H	51/82 (62%)	42 (82%)	9 (18%)	2	1
2	I	277/283 (98%)	275 (99%)	2 (1%)	84	91
2	J	277/283 (98%)	274 (99%)	3 (1%)	73	84
2	K	275/283 (97%)	271 (98%)	4 (2%)	65	76
2	L	277/283 (98%)	274 (99%)	3 (1%)	73	84
2	M	274/283 (97%)	268 (98%)	6 (2%)	52	63
2	N	275/283 (97%)	269 (98%)	6 (2%)	52	63
2	O	275/283 (97%)	273 (99%)	2 (1%)	84	91
2	P	277/283 (98%)	272 (98%)	5 (2%)	59	70
All	All	2613/2920 (90%)	2564 (98%)	49 (2%)	57	68

5 of 49 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	N	255	TYR
1	G	41	LYS
2	P	151	ASP
2	N	400	LYS
1	G	47	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
2	N	142	HIS
2	O	408	HIS
2	N	397	HIS
1	E	50	GLN
2	N	305	ASN

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 [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	61/100 (61%)	0.89	8 (13%) 3 5	39, 59, 79, 88	0
1	B	60/100 (60%)	1.05	12 (20%) 1 2	43, 60, 82, 88	0
1	C	60/100 (60%)	1.01	11 (18%) 1 2	44, 60, 79, 90	0
1	D	60/100 (60%)	2.24	29 (48%) 0 0	50, 80, 107, 116	0
1	E	61/100 (61%)	2.85	43 (70%) 0 0	57, 95, 110, 122	0
1	F	62/100 (62%)	2.57	38 (61%) 0 0	57, 92, 110, 115	0
1	G	62/100 (62%)	3.12	46 (74%) 0 0	61, 95, 121, 124	0
1	H	62/100 (62%)	4.22	48 (77%) 0 0	68, 110, 136, 144	0
2	I	337/343 (98%)	0.09	2 (0%) 89 93	26, 37, 53, 77	0
2	J	337/343 (98%)	0.02	2 (0%) 89 93	27, 38, 56, 74	0
2	K	335/343 (97%)	0.15	5 (1%) 73 81	28, 38, 52, 80	0
2	L	337/343 (98%)	0.39	10 (2%) 50 61	33, 45, 63, 119	0
2	M	333/343 (97%)	0.36	15 (4%) 33 46	29, 44, 71, 95	0
2	N	335/343 (97%)	0.45	17 (5%) 28 40	29, 46, 75, 95	0
2	O	335/343 (97%)	0.32	12 (3%) 42 55	31, 47, 72, 103	0
2	P	337/343 (98%)	0.56	26 (7%) 13 20	34, 54, 78, 115	0
All	All	3174/3544 (89%)	0.59	324 (10%) 6 11	26, 46, 95, 144	0

The worst 5 of 324 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	104	VAL	16.8
2	P	104	VAL	16.5
2	L	105	ILE	16.3
1	H	84	VAL	14.6
1	H	75	PRO	14.4

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.