Supplementary information

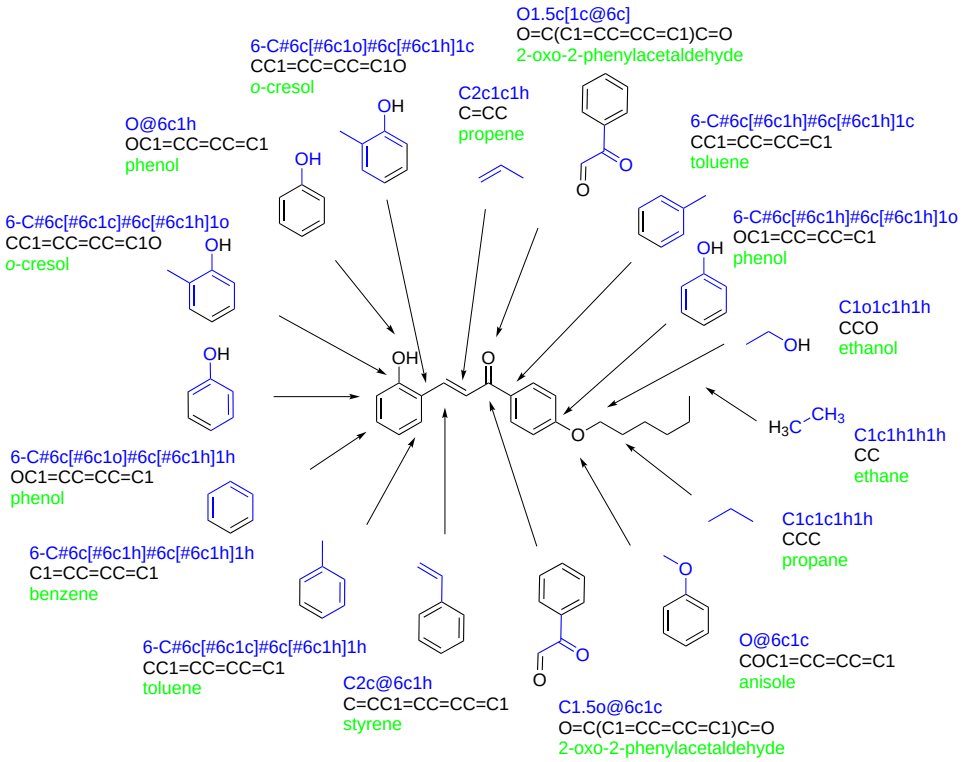

Fig. 1. Holstein-plot of (E)-1-(4-(hexyloxy)phenyl)-3-(2-hydroxyphenyl)prop-2-en-1-one, structure 1.

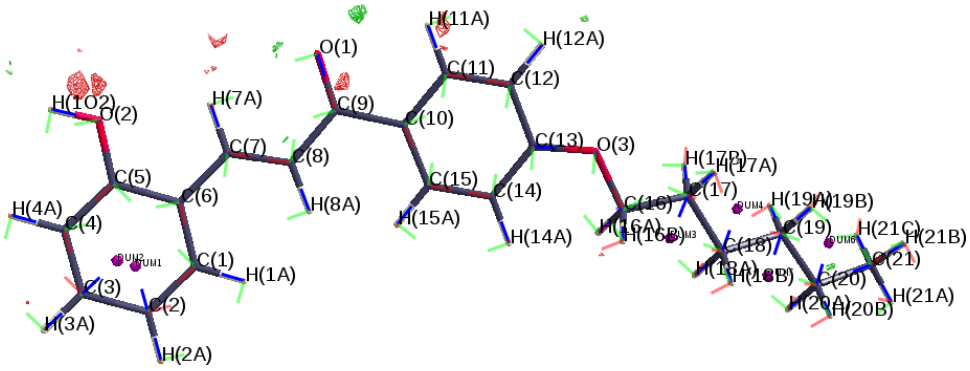

Fig. 2. Residual electron density plot (0.12 e·Å^{-3}) after invariom refinement for structure 1. Local atomic coordinate systems are shown with red=x, green=y and blue=z.

Table 1. *Invariom and the model compounds they were derived from as assigned to the atoms in the structure of (E)-1-(4-(hexyloxy)phenyl)-3-(2-hydroxyphenyl)prop-2-en-1-one, structure 1. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O1.5c[@6c1c]	2-oxo-2-phenylacetaldehyde
O(2)	O@6c1h	phenol
O(3)	O@6c1c	anisole
C(1)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(2,3)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(4,12,14)	6-C#6c[#6c1o]#6c[#6c1h]1h	phenol
C(5)	6-C#6c[#6c1c]#6c[#6c1h]1o	1-methyl-2-hydroxybenzene (o-cresol)
C(6)	6-C#6c[#6c1o]#6c[#6c1h]1c	1-methyl-2-hydroxybenzene (o-cresol)
C(7)	C2c@6c1h	styrene
C(8)	C2c1c1h	propene
C(9)	C1.5o@6c1c	2-oxo-2-phenylacetaldehyde
C(10)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(11,15)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(13)	6-C#6c[#6c1h]#6c[#6c1h]1o	phenol
C(16)	C1o1c1h1h	ethanol
C(17,18,19,20)	C1c1c1h1h	propane
C(21)	C1c1h1h1h	ethane
H(1O2)	H1o[@6c]	phenol
H(1A,2A,3A,4A)	H@6c	benzene
H(7A)	H1c[2c@6c]	styrene
H(8A)	H1c[2c1c]	propene
H(11A,12A,14A,15A)	H@6c	benzene
H(16A,B)	H1c[1o1c1h]	ethanol
H(17-20A,B)	H1c[1c1c1h]	propane
H(21A,B,C)	H1c[1c1h1h]	ethane

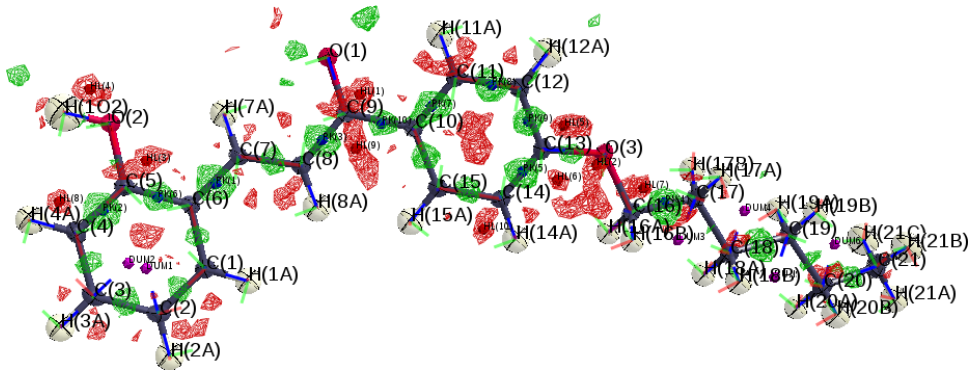

Fig. 3. Residual electron density plot (0.12 e·Å^{-3}) before invariom refinement for structure 1. Atomic displacement parameters are shown as well.

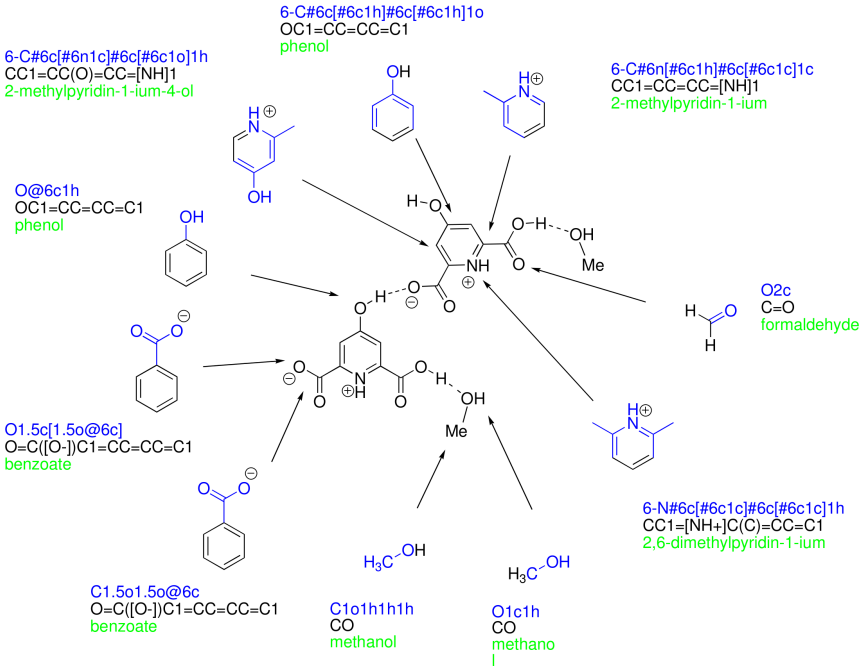

Fig. 4. Holstein-plot of chelidamic acid, structure 2.

Table 2. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of chelidamic acid, structure 2. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(21,22)	O1.5c[1.5o@6c]	benzoic acid anion
O(41)	O@6c1h	phenol
O(61)	O2c	formaldehyde
O(62)	O1c1h	methanol
N(1)	6-N#6c[#6c1c]#6c[#6c1c]1h	2,6-dimethylpyridinium cation
C(2,6)	6-C#6n[#6c1h]#6c[#6c1h]1c	2-methylpyridinium cation
C(3,5)	6-C#6c[#6n1c]#6c[#6c1o]1h	2-methylpyridin-1-ium-4-ol cation
C(4)	6-C#6c[#6c1h]#6c[#6c1h]1o	phenol
C(21)	C1.5o1.5o@6c	benzoic acid anion
C(61)	C2o1o@6c	benzoic acid
C(1M)	C1o1h1h1h	methanol
H(41)	H1o[@6c]	phenol
H(62)	H1o[1c]	methanol
H(1,3,5)	H@6n	pyridinium
H(1M1,2,3)	H1o[1c]	methanol

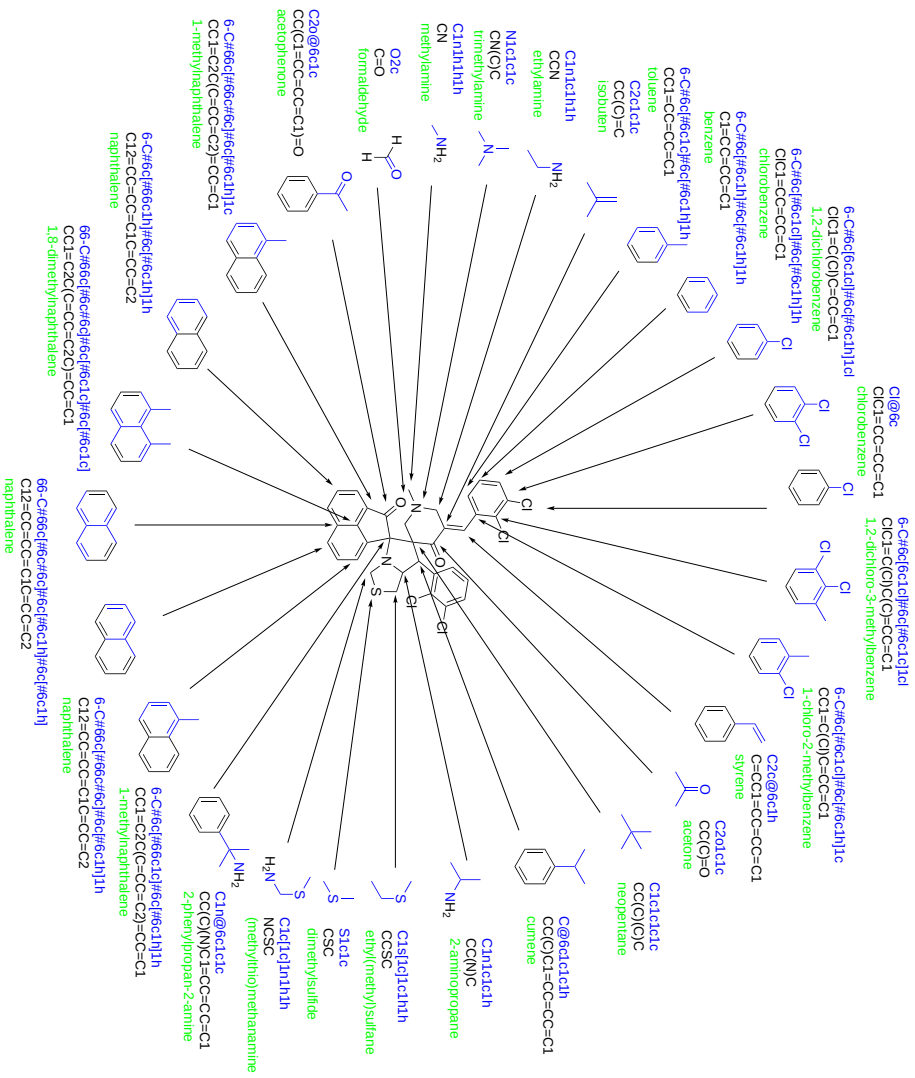

Fig. 5. Holstein-plot of 5”-[(*E*)-2,3-dichloro-benzylidene]-7’-(2,3-dichlorophenyl)-1”-methyldispiro[acenaph-thylene-1,5’-pyrrolo[1,2-*c*][1,3]thiazole-6’,3”-piperidine]-2,4”-dione, structure 3. Structure 4 is chemically similar and shares many invarioms and model compounds.

Table 3. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of 5"-[(E)-2,3-dichloro-benzylidene]-7'-(2,3-dichlorophenyl)-1"-methyldispiro[acenaph-thylene-1,5'-pyrrolo[1,2-c][1,3]thiazole-6',3"-piperidine]-2,4"-dione, structure 3. Structure 4 is similar. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
Cl(1,2,3,4)	Cl@6c	chlorobenzene
S(1)	S1c1c	dimethylsulfide
O(1,2)	O2c	formaldehyde
N(1,2)	N1c1c1c	trimethylamine
C(1)	C1n1h1h1h	methylamine
C(2)	C1n1c1h1h	ethylamine
C(3)	C2c1c1c	isobutene
C(4)	C2o1c1c	acetone
C(5)	C1c1c1c1c	2,2-dimethylpropane
C(6)	C1n1c1h1h	ethylamine
C(7)	C@6c1c1c1h	cumene
C(8)	C1n1c1c1h	2-aminopropane
C(9)	C1s[1c]1c1h1h	ethylmethylsulfane
C(10)	C1s[1c]1n1h1h	methylthiomethanamine
C(11)	C1n@6c1c1c	2-phenylpropan-2-amine
C(12)	C2o@6c1c	acetophenone
C(13)	6-C#66c[#66c#6c]#6c[#6c1h]1c	1-methylnaphtalene
C(14)	6-C#6c[#66c1c]#6c[#6c1h]1h	1-methylnaphtalene
C(15,21)	6-C#6c[#66c1h]#6c[#6c1h]1h	naphthalene
C(16,22)	6-C#66c[#66c#6c]#6c[#6c1h]1h	naphthalene
C(17)	66-C#66c[#6c#6c]#6c[#6c1h]#6c[#6c1h]	naphthalene
C(18)	66-C#66c[#6c#6c]#6c[#6c1c]#6c[#6c1c]	phenalene
C(19)	6-C#66c[#66c#6c]#6c[#6c1h]1c	1-methylnaphtalene
C(20)	6-C#6c[#66c1c]#6c[#6c1h]1h	1-methylnaphtalene
C(31)	C2c@6c1h	styrene
C(32,71)	6-C#6c[#6c1cl]#6c[#6c1h]1c	1-chloro-2-methylbenzene
C(33,72)	6-C#6c[#6c1cl]#6c[#6c1c]1cl	1,2-dichloro-3-methylbenzene
C(34,73)	6-C#6c[#6c1cl]#6c[#6c1h]1cl	1,2-dichloro-3-methylbenzene
C(35,74)	6-C#6c[#6c1cl]#6c[#6c1h]1h	chlorobenzene
C(36,75)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(37,76)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
H(1A,B,C)	H1c[1n1h1h]	methylamine
H(2A,B,6A,B)	H1c[1n1c1h]	ethylamine
H(7)	H1c[@6c1c1c]	cumene
H(8)	H1c[1n1c1c]	2-aminopropane
H(9A,B)	H1c[1s1c1h]	ethanethiol
H(10A,B)	H1c[1s1n1h]	methylthiomethanamine
H(14-16,20-22,35-37,74-76)	H@6c	benzene
H(31)	H1c[2c@6c]	styrene

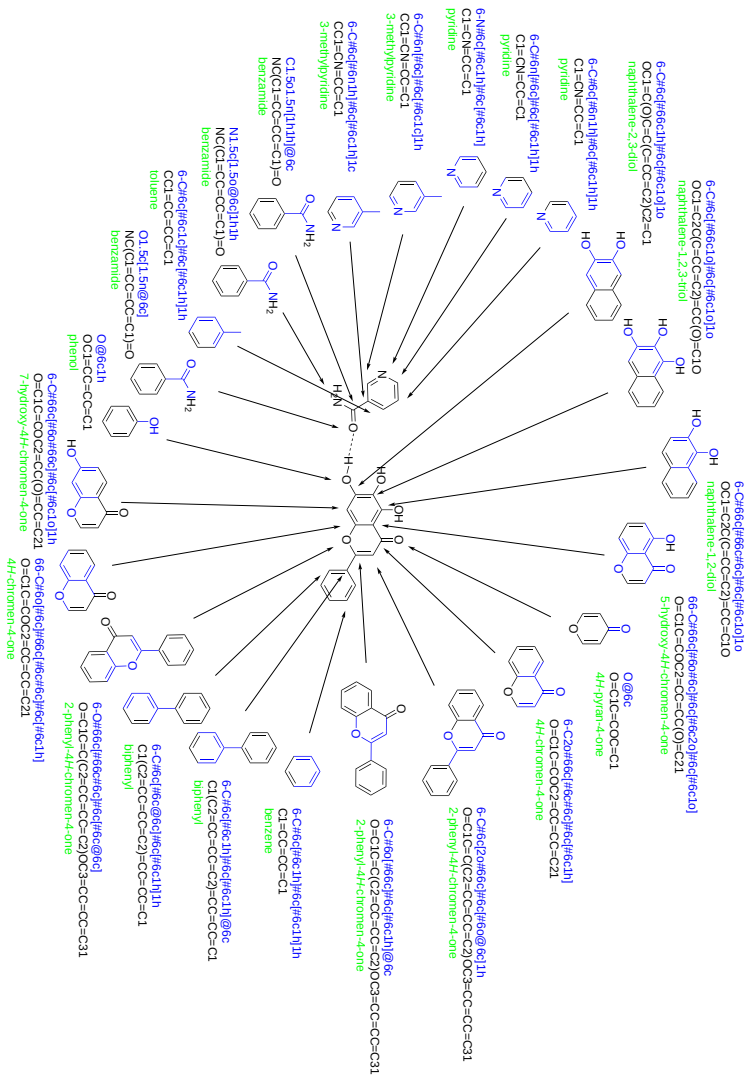

Fig. 6. Holstein-plot of the baicalein nicotinamide (1/1) co-crystal, structure 5.

Table 4. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of the baicalein nicotinamide (1/1) co-crystal, structure 5. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	6-O#66c[#66c#6c]#6c[#6c@6c]	2-phenyl-4H-chromen-4-one
O(4)	O@6c	pyran-4-one (gamma-pyrone)
O(5,6,7)	O@6c1h	phenol
O(1A)	O1.5c[1.5n@6c]	benzamide
N(1A)	6-N#6c[#6c1h]#6c[#6c1h]	pyridine
N(2A)	N1.5c[1.5o@6c]1h1h	benzamide
C(2)	6-C#6o[#66c]#6c[#6c1h]@6c	2-phenyl-4H-chromen-4-one
C(3)	6-C#6c[2o#66c]#6c[#6o@6c]1h	2-phenyl-4H-chromen-4-one
C(4)	6-C2o#66c[#66c#6c]#6c[#6c1h]	chromen-4-one
C(5)	6-C#66c[#66c#6c]#6c[#6c1o]1o	naphthalene-1,2-diol
C(6)	6-C#6c[#66c1o]#6c[#6c1o]1o	naphthalene-1,2,3-triol
C(7)	6-C#6c[#66c1h]#6c[#6c1o]1o	naphthalene-2,3-diol
C(8)	6-C#66c[#6o#66c]#6c[#6c1o]1h	7-hydroxy-4H-chromen-4-one
C(9)	66-C#6o[#6c]#66c[#6c#6c]#6c[#6c1h]	chromen-4-one
C(10)	66-C#66c[#6o#6c]#6c[2o#6c]#6c[#6c1o]	5-hydroxy-4H-chomen-4-one
C(11)	6-C#6c[#6c1h]#6c[#6c1h]@6c	biphenyl
C(12,16)	6-C#6c[#6c@6c]#6c[#6c1h]1h	biphenylene
C(13,14,15)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(2A)	6-C#6n[#6c]#6c[#6c1c]1h	3-methylpyridine
C(3A)	6-C#6c[#6n1h]#6c[#6c1h]1c	3-methylpyridine
C(4A)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(5A)	6-C#6c[#6n1h]#6c[#6c1h]1h	pyridine
C(6A)	6-C#6n[#6c]#6c[#6c1h]1h	pyridine
C(7A)	C1.5o1.5n[1h1h]@6c	benzamide
H(5,6,7)	H1o[@6c]	phenol
H(3,8,12-16)	H@6c	benzene
H(2A1,2)	H1n[1.5c1h]	formamide
H(2A,4A,5A,6A)	H@6c	benzene

N.b.: Biphenylene is indeed the correct model compound for 6-C#6c[#6c@6c]#6c[#6c1h]1h here, since it contains a smaller number of electrons than biphenyl, conforming to one of the rules for selecting the most suitable model compound. The electron density of an invariom taken from biphenyl would be almost identical, though.

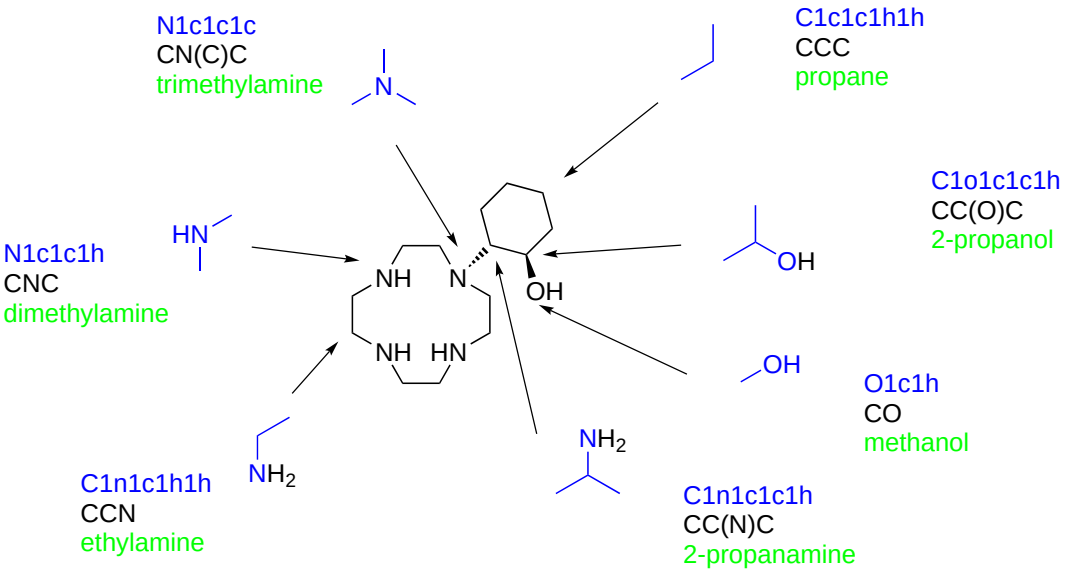

Fig. 7. Holstein-plot of 2-(1,4,7,10-tetraazacyclododecan-1-yl)cyclohexan-1-ol, structure 6.

Table 5. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of 2-(1,4,7,10-tetraazacyclododecan-1-yl)cyclohexan-1-ol, structure 6. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O1c1h	methanol
N(1)	N1c1c1c	trimethylamine
N(2-4)	N1c1c1h	dimethylamine
C(1)	C1n1c1c1h	2-aminopropane
C(2)	C1o1c1c1h	2-propanol
C(3-6)	C1c1c1h1h	propane
C(7-14)	C1n1c1h1h	ethylamine
H(1)	H1c[1n1c1c]	2-aminopropane
H(2)	H1c[1o1c1c]	2-propanol
H(3-6A,B)	H1c[1c1c1h]	propane
H(7-14A,B)	H1c[1n1c1h]	ethylamine
H(2N,3N,4N)	H1n[1c1c]	dimethylamine
H(110)	H1o[1c]	methanol

In the refinement of structure 6 many local atomic coordinate systems had to be manually set up, since half of the tetraazacyclodecan ring was sitting on a special position.

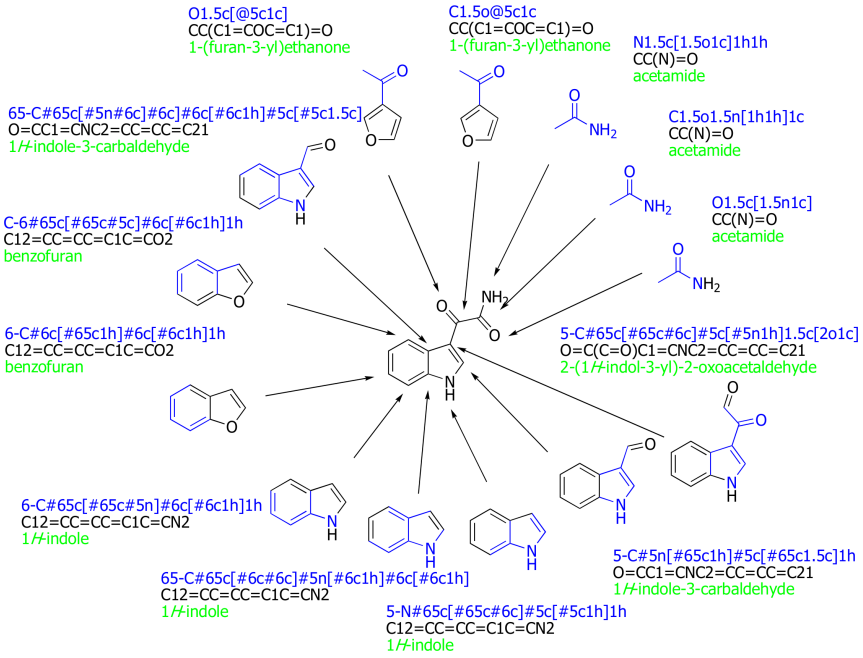

Fig. 8. Holstein-plot of 2-(1*H*-indol-3-yl)-2-oxoacetamide, structure 7.

Table 6. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of 2-(1H-indol-3-yl)-2-oxoacetamide, structure 7. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O1.5c[@5c1c]	1-furan-3-yl-ethanone
O(2)	O1.5c[1.5n1c]	acetamide
N(1)	5-N#65c[#65c#6c]#5c[#5c1h]1h	indole
N(2)	N1.5c[1.5o1c]1h1h	acetamide
C(1)	5-C#5n[#65c1h]#5c[#65c1.5c]1h	1H-indole-3-carbaldehyde
C(2)	65-C#5n[#5c1h]#65c[#6c#5c]#6c[#6c1h]	indole
C(3)	6-C#65c[#5n#65c]#6c[#6c1h]1h	indole
C(4,5)	6-C#6c[#65c1h]#6c[#6c1h]1h	benzofuran
C(6)	6-C#65c[#65c#5c]#6c[#6c1h]1h	benzofuran
C(7)	65-C#65c[#5n#6c]#6c[#6c1h]#5c[#5c1.5c]	indol-3-carbaldehyde
C(8)	5-C#65c[#65c#6c]#5c[#5n1h]1.5c[2o1c]	2-(1H-indol-3-yl)-2-oxoacetaldehyde
C(9)	C1.5o@5c1c	1-furan-3-yl-ethanone
C(10)	C1.5o1.5n[1h1h]1c	acetamide
H(1)	H@5n	pyrrol
H(2A,B)	H1n[1.5c1h]	formamide
H(1A)	H@5c	cyclopentadienyl anion
H(3-6)	H@6c	benzene

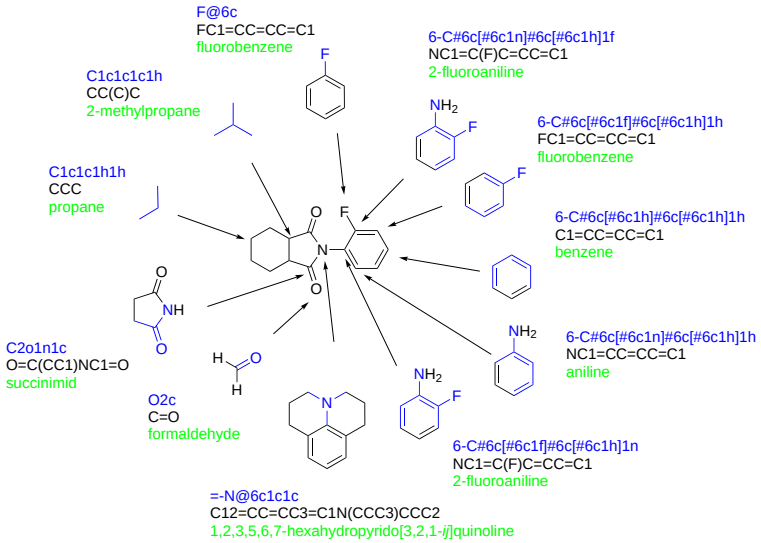

Fig. 9. Holstein-plot of *cis*-2-(2-fluorophenyl)-3a,4,5,6,7,7a-hexahydroisoindole-1,3-dione, structure 8. Structure 9 is similar and shares most invarioms/ model compounds.

Table 7. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of cis-2-(2-fluorophenyl)-3a,4,5,6,7,7a-hexahydroisoindole-1,3-dione, structure 8. Structure 9 is similar. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
F(21)	F@6c	fluorobenzene
O(1,3)	O2c	formaldehyde
N(2)	=-N@6c1c1c	1,2,3,4,5,6,7-hexahydropyrido[3,2,1-ij]quinoline
C(8,9)	C1c1c1c1h	2-methylpropane
C(21)	6-C#6c[#6c1n]#6c[#6c1h]1f	2-fluoroaniline
C(3)	C2o1n1c	succinimide
C(31)	6-C#6c[#6c1f]#6c[#6c1h]1h	fluorobenzene
C(11)	6-C#6c[#6c1f]#6c[#6c1h]1n	2-fluoroaniline
C(4,5,6,7)	C1c1c1h1h	propane
C(41,51)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(61)	6-C#6c[#6c1n]#6c[#6c1h]1h	aniline
C(1)	C2o1n1c	succinimide
H(8,9)	H1c[1c1c1c]	2-methylpropane
H(4-7A&B)	H1c[1c1c1h]	propane
H(31,41,51,61)	H@6c	benzene

N.b.: Succinimide is the correct model compound for C2o1o1c, since due to the differences in the bond order χ acetamide gives the invariom C1.5o1.5n[1h1h]1c.

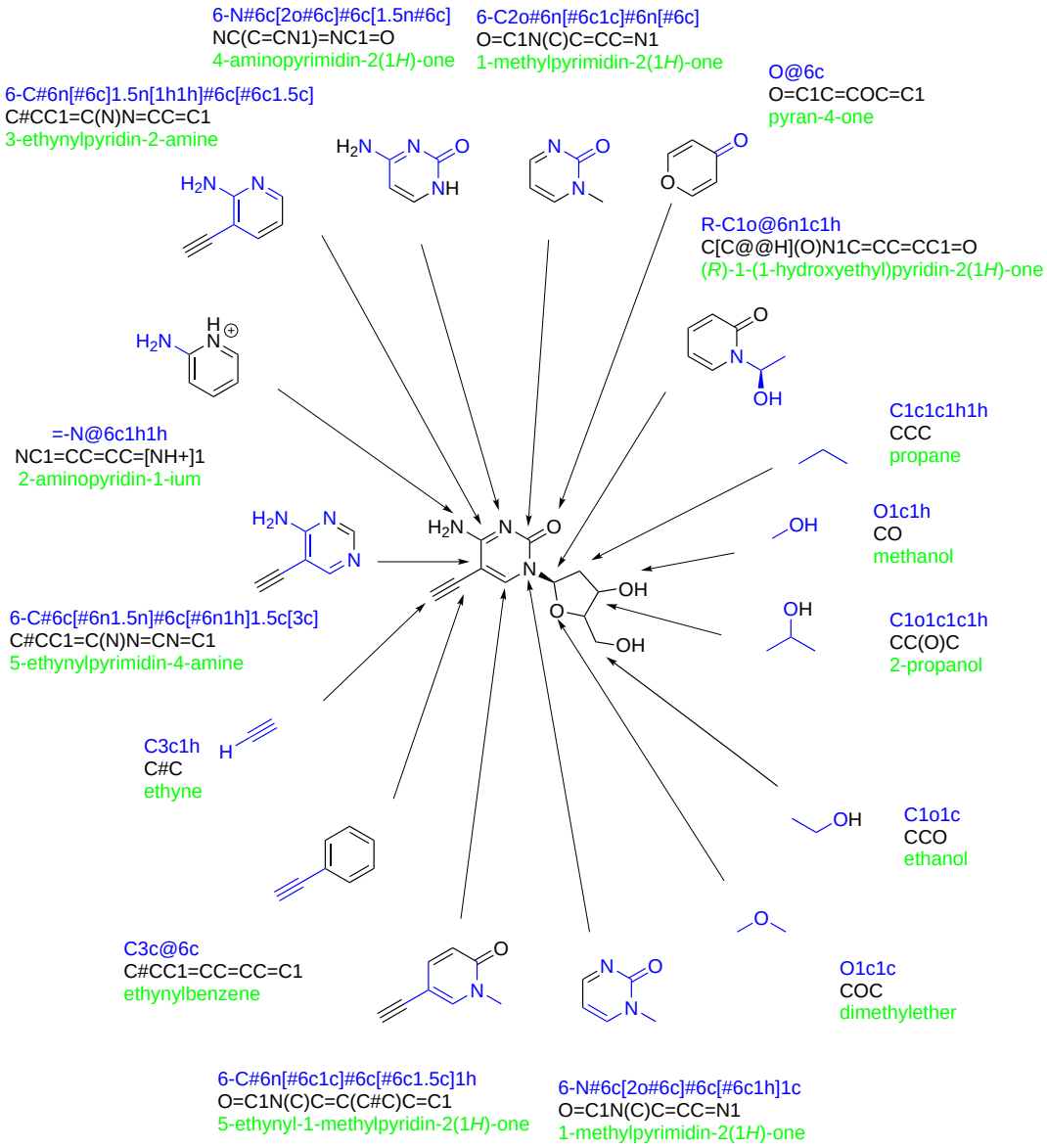

Fig. 10. Holstein-plot of 5-ethynyl-2'-deoxycytidine, structure 10.

Table 8. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of 5-ethynyl-2'-deoxycytidine, structure 10. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(12)	O@6c	pyran-4-one (gamma-pyrone)
O(13',15',23',25')	O1c1h	methanol
O(14',24')	O1c1c	dimethylether
O(22)	O@6c	pyran-4-one (gamma-pyrone)
N(11,21)	6-N#6c[2o#6n]#6c[#6c1h]1c	1-methylpyrimidin-2(1H)-one
N(13,23)	6-N#6c[2o#6n]#6c[1.5n#6c]	4-aminopyrimidin-2(1H)-one
N(14,24)	=-N@6c1h1h	2-aminopyridinuim ion
C(11',21')	R-C1o@6n1c1h	R-1-(1-hydroxyethyl)pyridine-2(1H)-one
C(12,22)	6-C2o#6n[#6c1c]#6n[#6c]	1-methylpyrimidin-2(1H)-one
C(12',22')	C1c1c1h1h	propane
C(13',23')	C1o1c1c1h	2-propanol
C(14,24)	6-C#6n[#6c]1.5n[1h1h]#6c[#6c1.5c]	3-ethynylpyridine-2-amine
C(14',24')	C1o1c1c1h	2-propanol
C(15,25)	6-C#6c[#6n1.5n]#6c[#6n1h]1.5c[3c]	5-ethynylpyrimidin-4-amine
C(15',25')	C1o1c1h1h	ethanol
C(15A,25A)	C3c@6c	1-ethynylbenzene
C(15B,25B)	C3c1h	acetylene
C(16,26)	6-C#6n[#6c1c]#6c[#6c1.5c]1h	5-etynyl-1-methylpyridin-2(1H)-one
H(13O,15O)	H1o[1c]	methanol
H(14A,B)	H1n[@6c1h]	aniline
H(11')	H1c[1o@6n1c]	R-1-1-hydroxyethylpyridine-2(1H)-one
H(12A,B)	H1c[1c1c1h]	propane
H(13',14')	H1c[1o1c1c]	2-propanol
H(15A,B)	H1c[1o1c1h]	ethanol
H(15C)	H1c[3c]	acetylene
H(16)	H@6c	benzene
H(23O,25O)	H1o[1c]	methanol
H(24A,B)	H1n[@6c1h]	aniline
H(6)	H1c[1o@6n1c]	R-1-1-hydroxyethylpyridine-2(1H)-one
H(22A,B)	H1c[1c1c1h]	propane
H(23,24)	H1c[1o1c1c]	2-propanol
H(25A,B)	H1c[1o1c1h]	ethanol
H(25C)	H1c[3c]	acetylene
H(26)	H@6c	benzene

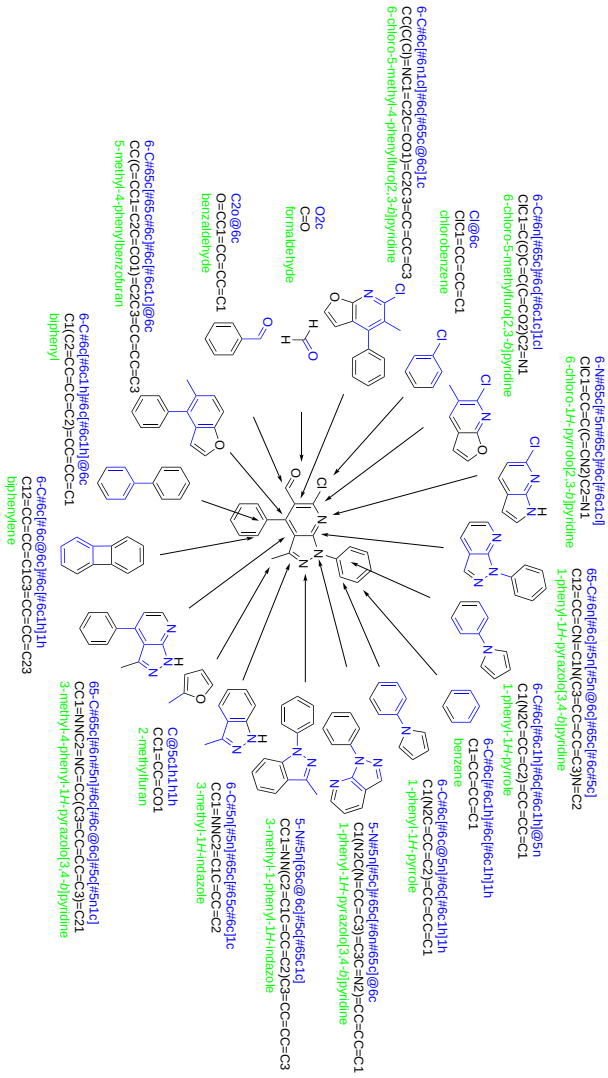

Fig. 11. Holstein-plot of 6-chloro-3-methyl-1,4-diphenylpyrazolo[3,4-*b*]pyridine-5-carbaldehyde, structure 11. Structure 12 is similar and shares most invarioms/ model compounds.

Table 9. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of 6-chloro-3-methyl-1,4-diphenylpyrazolo[3,4-b]pyridine-5-carbaldehyde, structure 11. Structure 12 is similar. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
Cl(61)	Cl@6c	chlorobenzene
O(51)	O2c	formaldehyde
N(1)	5-N#5n[#5c]#65c[#6n#65c]@6c	1-phenyl-1H-pyrazolo[3,4-b]pyridine
N(2)	5-N#5n[#65c@6c]#5c[#65c1c]	3-methyl-1-phenyl-1H-indazole
N(7)	6-N#65c[#5n#65c]#6c[#6c1cl]	6-chloro-1H-pyrrolo[2,3-b]pyridine
C(3)	5-C#5n[#5n]#65c[#65c#6c]1c	3-methyl-1H-indazole
C(3A)	65-C#65c[#6n#5n]#6c[#6c@6c]#5c[#5n1c]	3-methyl-4-phenyl-1H-pyrazolo[3,4-b]pyridine
C(4)	6-C#65c[#65c#5c]#6c[#6c1c]@6c	5-methyl-4-phenylbenzofuran
C(5)	6-C#6c[#6n1cl]#6c[#65c@6c]1c	6-chloro-5-methyl-4-phenylfuro[2,3-b]pyridine
C(6)	6-C#6n[#65c]#6c[#6c1c]1cl	6-chloro-5-methylfuro[2.3-b]pyridine
C(7A)	65-C#6n[#6c]#5n[#5n@6c]#65c[#6c#5c]	1-phenyl-1H-pyrazolo[3,4-b]pyridine
C(11)	6-C#6c[#6c1h]#6c[#6c1h]@5n	1-phenyl-1H-pyrrole
C(12)	6-C#6c[#6c@5n]#6c[#6c1h]1h	1-phenyl-1H-pyrrole
C(13-15,43-45)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(16)	6-C#6c[#6c@5n]#6c[#6c1h]1h	1-phenyl-1H-pyrrole
C(31)	C@5c1h1h1h	2-methylfuran
C(41)	6-C#6c[#6c1h]#6c[#6c1h]@6c	biphenyl
C(42,46)	6-C#6c[#6c@6c]#6c[#6c1h]1h	biphenylene
C(51)	C2o@6c1h	benzaldehyde
H(12-16,42-46)	H@6c	benzene
H(31A-C)	H1c[@5c1h1h]	2-methylfuran
H(51)	H1c[2o@6c]	benzaldehyde

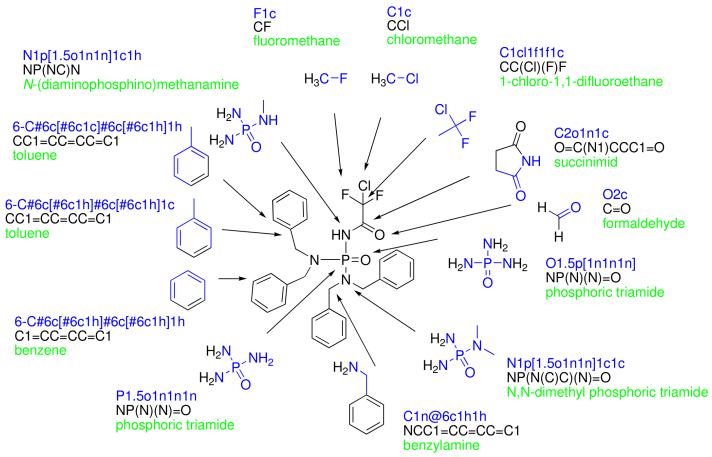

Fig. 12. Holstein-plot of *N*,*N*,*N*',*N*'-tetrabenzyl-*N*"-(2-chloro-2,2-difluoroacetyl)phosphoric triamide, structure 13.

Table 10. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of N,N,N',N'-tetrabenzyl-N"-(2-chloro-2,2-difluoroacetyl)phosphoric triamide, structure 13. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
Cl(1)	Cl1c	chloromethane
P(1)	P1.5o1n1n1n	phosphoric triamide
F(2,3)	F1c	fluoromethane
O(1)	O2c	formaldehyde
O(2)	O1.5p[1n1n1n]	phosphoric triamide
N(1)	N1p[1.5o1n1n]1c1h	N-(diaminophosphino)methanamine
N(2,3)	N1p[1.5o1n1n]1c1c	N,N-dimetylphosphoric triamide
C(1,8,15,22)	C1n@6c1h1h	benzylamine
C(2,9,16,23)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(3,7,10,14,17,21,24,28)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(4-6,11-13,18-20,25-27)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(29)	C2o1n1c	succinimide
C(30)	C1cl1f1f1c	1-chloro-1,1-difluoroethane
H(1N)	H1n[1p1c]	N-(diaminophosphino)methanamine
H(1,8,15,22A&B)	H1c[1n@6c1h]	benzylamine
H(3-7,10-14,17-21,24-28)	H@6c	benzene

N.b.: Here the atoms connected to phosphorus do not contain next nearest neighbors, since they are not hypervalent themselves. On the other hand, P1si[1c1c1c]1si[1c1c1c]@6c in phenylbis(trimethylsilyl)phosphine (Fig. 24) requires next-nearest neighbors for Si.

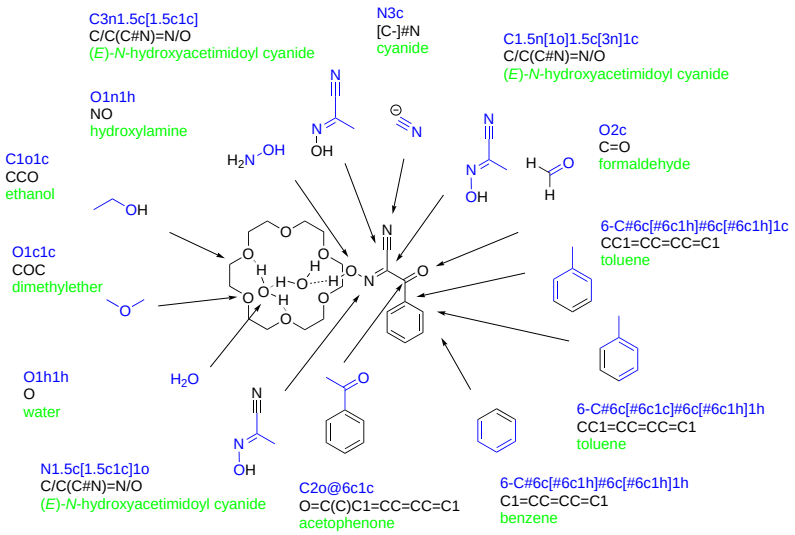

Fig. 13. Holstein-plot of the benzoyl(hydroxyimino)acetonitrile 18-crown-6 complex, structure 14.

Table 11. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of the benzoyl(hydroxyimino)acetonitrile 18-crown-6 complex, structure 14. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(3-5)	O1c1c	dimethylether
O(1)	O1n1h	hydroxylamine
O(2)	O2c	formaldehyde
N(1)	N1.5c[1.5c1c]1o	(E)-N-hydroxyacetimidoyl cyanide
N(2)	N3c	cyanide
C(10-15)	C1o1c1h1h	ethanol
C(1)	C1.5n[1o]1.5c[3n]1c	(E)-N-hydroxyacetimidoyl cyanide
C(2)	C2o@6c1c	acetophenone
C(3)	C3n1.5c[1.5n1c]	(E)-N-hydroxyacetimidoyl cyanide
C(4)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(5,9)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(6-8)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
H(10-15A,B)	H1c[1o1c1h]	ethanol
H(1)	H1o[1n]	hydroxylamine
H(5-9)	H@6c	benzene

Table 12. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of N,N-dibenzyl-N'-(furan-2-carbonyl)thiourea, structure 15. A Holstein-plot is not given for this structure. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
S(1)	S1.5c[1.5n1n]	1-formylthiourea
O(1)	O1.5c[1.5n@5c]	furan-3-carboxamide
O(2)	5-O#5c[#5c1c]#5c[#5c1h]	2-methylfuran
N(1)	N1.5c[1.5o@5c]1c1h	N-methylfuran-3-carboxamide
N(2)	N1.5c[1.5s1.5n]1c1c	1,1-dimethylthiourea
C(1)	C1.5o1.5n[1c1h]@5c	N-methylfuran-3-carboxamide
C(2)	C1.5s1.5n[1c1c]1.5n[1c1h]	1,1,3-trimethylthiourea
C(3)	5-C#5o[#5c]#5c[#5c1h]1c	2-methylfuran
C(4)	5-C#5c[#5o1c]#5c[#5c1h]1h	2-methylfuran
C(5)	5-C#5c[#5o1h]#5c[#5c1h]1h	furan
C(6)	5-C#5o[#5c]#5c[#5c1h]1h	furan
C(7)	C1n@6c1h1h	benzylamine
C(8,15)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(9,13,16,20)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(10-12,17-19)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(14)	C1n@6c1h1h	benzylamine
H(4-6)	H@5c	cyclopentadienyl anion
H(7A,B)	H1c[1n@6c1h]	benzylamine
H(9-13,16-20)	H@6c	benzene
H(14A,B)	H1c[1n@6c1h]	benzylamine
H(1)	H1n[1.5c1c]	N-methyformamide

Table 13. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of N,N-dibenzyl-N'-(furan-2-carbonyl)thiourea, structure 16. A Holstein-plot is not given for this structure. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	6-O#66c[#66c#6c]#6c[2o#6c]	3-methyl-2H-chromen-2-one
O(2)	O@6c	pyran-4-one (gamma-pyrone)
C(1,5)	6-C#6c[#6c@6c]#6c[#6c1h]1h	biphenylene
C(2-4)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(6)	6-C#6c[#6c1h]#6c[#6c1h]@6c	biphenyl
C(7)	6-C#6c[2o#6o]#6c[#66c1h]@6c	3-phenyl-2H-chromen-2-one
C(8)	6-C#66c[#66c#6c]#6c[#6c@6c]1h	2-phenylnaphthalene
C(9)	66-C#66c[#6o#6c]#6c[#6c1h]#6c[#6c1h]	pyrano[3,4-b]pyran
C(10)	6-C#66c[#66c#6c]#6c[#6c1h]1h	naphthalene
C(11,12)	6-C#6c[#66c1h]#6c[#6c1h]1h	naphthalene
C(13)	6-C#66c[#6o#66c]#6c[#6c1h]1h	chromen-4-one
C(14)	66-C#6o[#6c]#66c[#6c#6c]#6c[#6c1h]	chromen-4-one
C(15)	6-C2o#6o[#66c]#6c[#6c@6c]	3-phenyl-2H-chromen-2-one
H(1-5,8,10-13)	H@6c	benzene

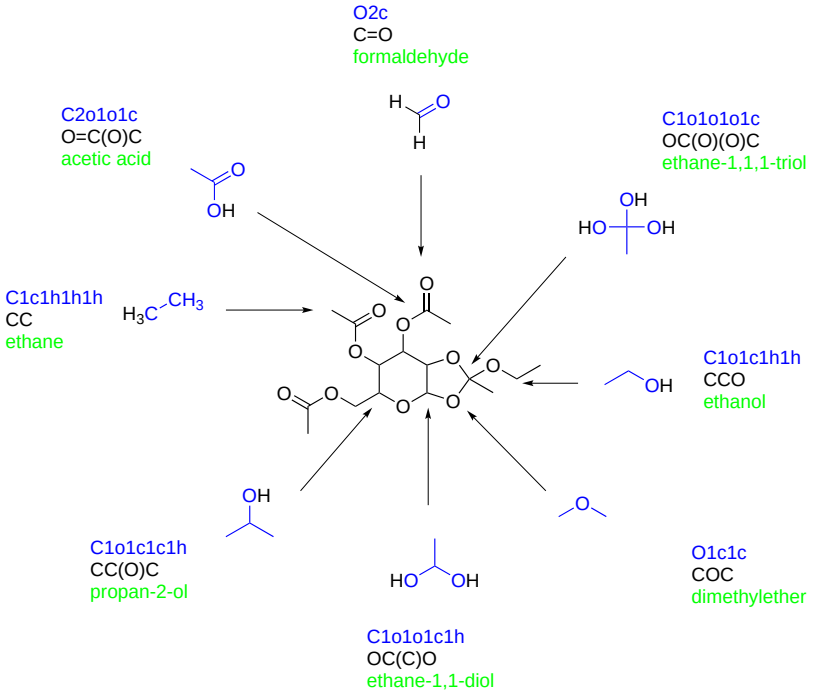

Fig. 14. Holstein-plot of 3,4,6-Tri-*O*-acetyl-1,2-*O*-[1-(*exo*-ethoxy)ethylidene]-β-D-manno-pyranose, structure 17.

Table 14. *Invariom and the model compounds they were derived from, as assigned to the atoms (naming scheme like in the original paper) in the structure of 3,4,6-Tri-O-acetyl-1,2-O-[1-(exo-ethoxy)ethylidene]-β-D-manno-pyranose, structure 17. Only the invariom of one of the two molecules in the asymmetric unit are given.*

Atom	Invariom	Model compound
O(1-6,9)	O1c1c	dimethylether
O(32,42,62)	O2c	formaldehyde
C(1)	C1o1o1c1h	1,1-dihydroxyethane
C(2-5)	C1o1c1c1h	2-propanol
C(6)	C1o1c1h1h	ethanol
C(7)	C1o1o1o1c	ethane-1,1.1-triol
C(8,11,32,42,62)	C1c1h1h1h	ethane
C(10)	C1o1c1h1h	ethanol
C(31,41,61)	C2o1o1c	acetic acid
H(1)	H1c[1o1o1c]	1,1-dihydroxyethane
H(2,3,4,5)	H1c[1o1c1c]	2-propanol
H(6A,B,10A,B)	H1c[1o1c1h]	ethanol
H(8A-C,11A-C,32A-C,42A-C,62A-C)	H1c[1c1h1h]	ethane

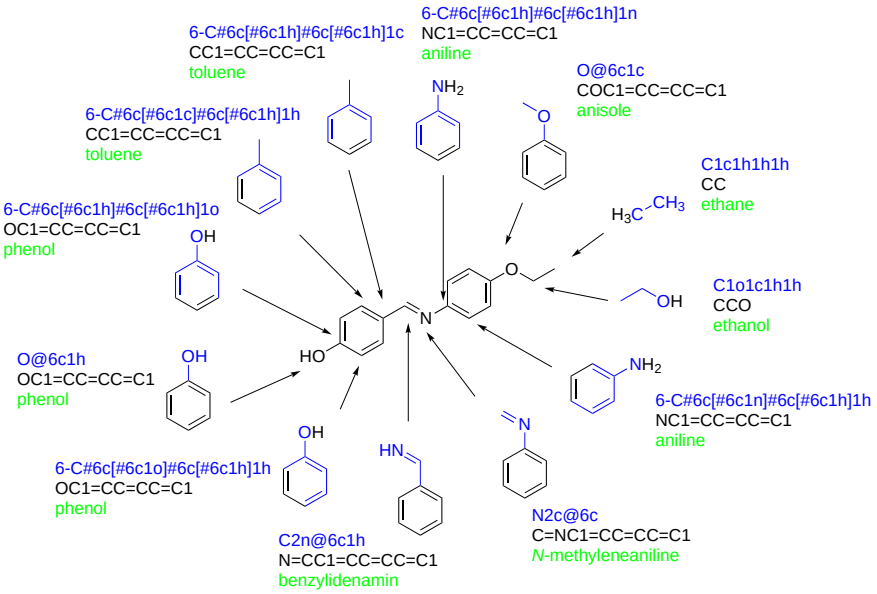

Fig. 15. Holstein-plot of 4-[(*E*)-(4-Ethoxyphenyl)iminomethyl]-phenol, structure 18.

Table 15. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of 4-[(E)-(4-Ethoxyphenyl)iminomethyl]-phenol, structure 18. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O@6c1c	anisole
O(2)	O@6c1h	phenol
N(1)	N2c@6c	methylphenylimin (N-methyleneaniline)
C(1)	6-C#6c[#6c1h]#6c[#6c1h]1n	aniline
C(2,6)	6-C#6c[#6c1n]#6c[#6c1h]1h	aniline
C(3,5,11,13)	6-C#6c[#6c1o]#6c[#6c1h]1h	phenol
C(4,12)	6-C#6c[#6c1h]#6c[#6c1h]1o	phenol
C(7)	C1o1c1h1h	ethanol
C(8)	C1c1h1h1h	ethane
C(9)	C2n@6c1h	benzylidenamine
C(10,14)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(15)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
H(2O)	H1o[@6c]	phenol
H(2-6,10-14)	H@6c	benzene
H(7A,B)	H1c[1o1c1h]	ethanol
H(8A-C)	H1c[1c1h1h]	ethane
H(9)	H1c[2n@6c]	benzylidenamine

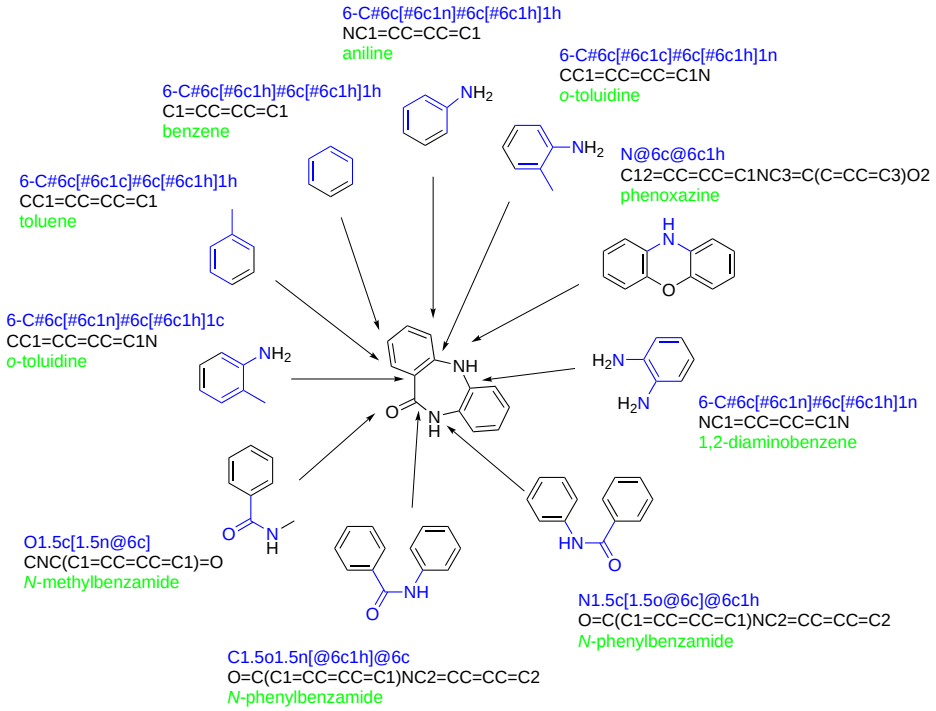

Fig. 16. Holstein-plot of 5*H*-dibenzo[*b*,*e*]diazepin-11(10*H*)-one, structure 19.

Table 16. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of 5H-dibenzo[b,e]diazepin-11(10H)-one, structure 19. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O1.5c[1.5n@6c]	N-methylbenzamide
N(1)	N1.5c[1.5o@6c]@6c1h	N-phenylbenzamide
N(2)	N@6c@6c1h	phenoxazine
C(1)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(2,8,9)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(4,7,10)	6-C#6c[#6c1n]#6c[#6c1h]1h	aniline
C(5)	6-C#6c[#6c1c]#6c[#6c1h]1n	o-methylaniline
C(6,11)	6-C#6c[#6c1n]#6c[#6c1h]1n	1,2-diaminobenzene
C(12)	C1.5o1.5n[@6c1h]@6c	N-phenylbenzamide
C(13)	6-C#6c[#6c1n]#6c[#6c1h]1c	o-methylaniline (o-toluidine)
H(1N)	H1n[1.5c@6c]	N-phenylacetamide
H(1-4,7-10)	H@6c	benzene
H(2N)	H1n[@6c@6c]	phenoxazine

Table 17. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of N,N'-bis(2-methylphenyl)-2,2'-thiodibenzamide, structure 20. A Holstein plot is not given for this structure. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
S(1)	S@6c@6c	diphenylsulfane
O(1,2)	O1.5c[1.5n@6c]	benzamide
N(1,2)	N1.5c[1.5o@6c]@6c1h	N-phenylbenzamide
C(1)	6-C#6c[#6c1c]#6c[#6c1h]1n	o-methylaniline
C(2)	6-C#6c[#6c1n]#6c[#6c1h]1c	o-methylaniline
C(3,13,16,23)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(4,5,11,12,17,18,24,25)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(6,26)	6-C#6c[#6c1n]#6c[#6c1h]1h	aniline
C(7)	C1.5o1.5n[@6c1h]@6c	N-phenylbenzamide
C(8)	6-C#6c[#6c1s]#6c[#6c1h]1c	1,3-dimethyl-2-thiolbenzene
C(9,14)	6-C#6c[#6c1c]#6c[#6c1h]1s[@6c]	phenyl(o-tolyl)sulfane
C(10)	6-C#6c[#6c1s]#6c[#6c1h]1h	thiolbenzene
C(15)	6-C#6c[#6c1s]#6c[#6c1h]1c	1,3-dimethyl-2-thiolbenzene
C(19)	6-C#6c[#6c1s]#6c[#6c1h]1h	thiolbenzene
C(20)	C1.5o1.5n[@6c1h]@6c	N-phenylbenzamide
C(21)	6-C#6c[#6c1c]#6c[#6c1h]1n	o-methylaniline
C(22)	6-C#6c[#6c1n]#6c[#6c1h]1c	o-methylaniline
C(27,28)	C@6c1h1h1h	toluene
H(1N,2N)	H1n[1.5c@6c]	N-phenylacetamide
H(3-6,10-13,16-19,23-26)	H@6c	benzene
H(27A-C,28A-C)	H1c[@6c1h1h]	toluene

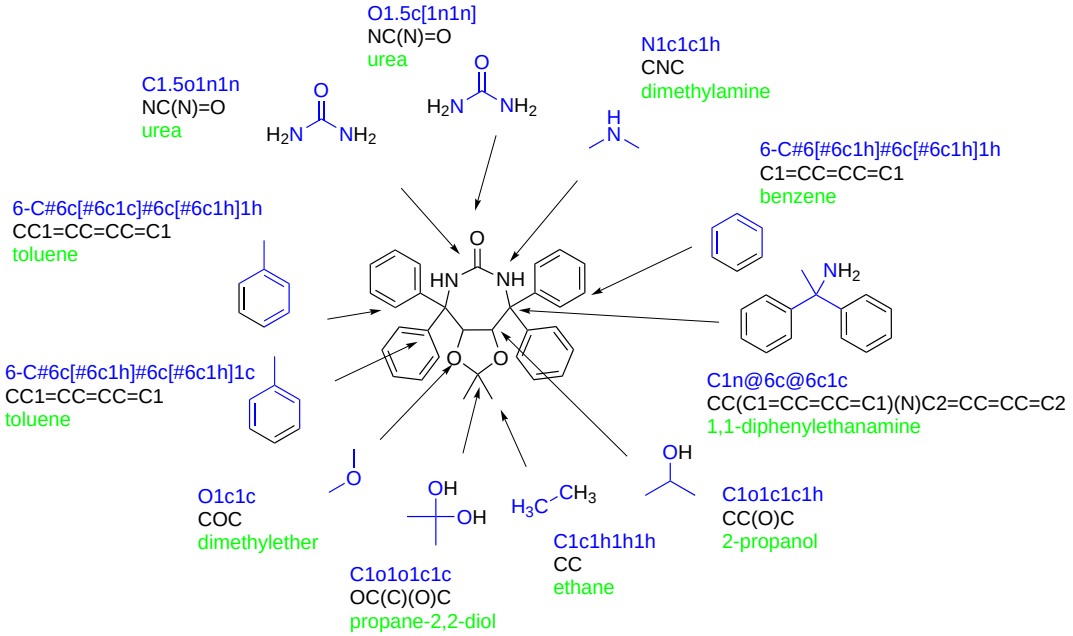

Fig. 17. Holstein-plot of (3a*R*,8a*R*)-2,2-dimethyl-4,4,8,8-tetraphenyl-4,5,6,7,8,8a-hexahydro-3a*H*-1,3-dioxolo[4,5-*e*][1,3]diazepin-6-one, structure 21. Structure 22 is similar.

Table 18. *Invarioms and the model compounds they were derived from, as assigned to the atoms in the structure of (3aR,8aR)-2,2-dimethyl-4,4,8,8-tetraphenyl-4,5,6,7,8,8a-hexahydro-3aH-1,3-dioxolo[4,5-e][1,3]diazepin-6-one, structure 21. Structure 22 is similar. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1)	O1.5c[1n1n]	urea
O(2)	O1c1c	dimethylether
O(3)	O1c1c	dimethylether
O(4)	O1h1h	water
N(1)	N1c1c1h	dimethylamine
N(2)	N1c1c1h	dimethylamine
C(1)	C1o1c1c1h	2-propanol
C(2)	C1o1c1c1h	2-propanol
C(3)	C1n@6c@6c1c	1,1-diphenylethanamine
C(4)	C1.5o1n1n	urea
C(5)	C1n@6c@6c1c	1,1-diphenylethanamine
C(6)	C1o1o1c1c	2,2-dihydroxypropane (propane-2,2-diol)
C(7)	C1c1h1h1h	ethane
C(8)	C1c1h1h1h	ethane
C(9,15,21,26,28)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(10,14,16,20,22,27,32)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(11,12,13,17-19,23-25,29-31)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
H(1,2)	H1c[1o1c1c]	2-propanol
H(7A,B,C,8A,B,C)	H1c[1c1h1h]	ethane
H(10-20)	H@6c	benzene
H(22-32)	H@6c	benzene
H(1N,2N)	H1n[1c1c]	dimethylamine

Holstein plots for structure 23 to 26 are not given. 25 and 26 mainly contain single bonded systems, for which Holstein plots are not really required. Structure 27, loperamine hydrochloride, is described in the main article, where its Holstein plot is also given.

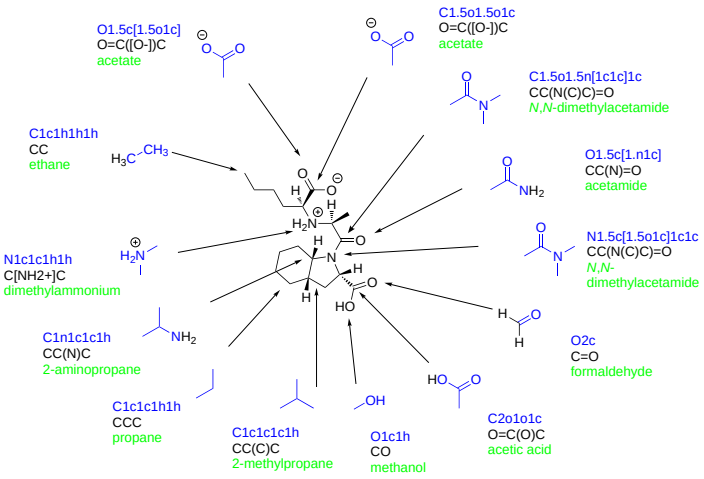

Fig. 18. Holstein-plot of perindoprilate, structure 28.

Table 19. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of perindoprilate, structure 28. Invaroms are listed only for one of the two main molecules in the asymmetric unit since the same scattering factors were used. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(1A)	O1.5c[1.5n1c]	acetamide
O(2A,3A)	O1.5c[1.5o1c]	acetic acid anion (acetate)
O(4A)	O2c	formaldehyde
O(5A)	O1c1h	methanol
N(1A)	N1.5c[1.5o1c]1c1c	N,N-dimethylacetamide
N(2A)	N1c1c1h1h	dimethylammonium
C(1A,8A,10A,11A)	C1n1c1c1h	2-aminopropane
C(2A,12A,13A)	C1c1c1h1h	propane
C(3A)	C1c1c1c1h	2-methylpropane
C(4-7A)	C1c1c1h1h	propane
C(9A)	C1.5o1.5n[1c1c]1c	N,N-dimethylacetamide
C(14A,16A)	C1c1h1h1h	ethane
C(15A)	C2o1o1c	acetic acid
C(17A)	C1.5o1.5o1c	acetic acid anion (acetate)
H(5OA)	H1o[1c]	methanol
H(2NA,NB)	H1n[1c1c1h]	dimethylammonium
H(1A,8A,10A,11A)	H1c[1n1c1c]	2-aminopropane
H(2,4-7,12,13A&B)	H1c[1c1c1h]	propane
H(3A)	H1c[1c1c1c]	2-methylpropane
H(14,16A-C)	H1c[1c1h1h]	ethane

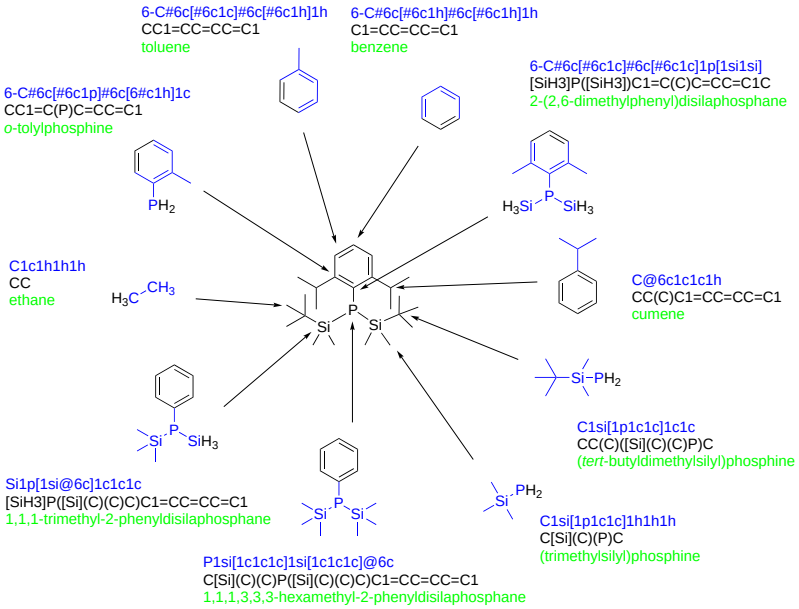

Fig. 19. Holstein-plot of bis(tert-butyldimethylsilyl)(2,6-diiso-propylphenyl)-phosphane, structure 29.

Table 20. *Invariom and the model compounds they were derived from, as assigned to the atoms in structure 29, bis(tert-butyldimethylsilyl)(2,6-diiso-propylphenyl)phosphane. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
P(1)	P1si[1c1c1c]1si[1c1c1c]@6c	phenylbis(trimethylsilyl)phosphine
Si(1,2)	Si1p[1si@6c]1c1c1c	phenyl(silyl)(trimethylsilyl)phosphine
C(1)	6-C#6c[#6c1c]#6c[#6c1c]1p[1si1si]	(2,6-dimethylphenyl)disilylphosphine
C(2,9)	6-C#6c[#6c1p]#6c[#6c1h]1c	o-tolylphosphine
C(3,10)	C@6c1c1c1h	cumene
C(4,5)	C1c1h1h1h	ethane
C(6,8)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(7)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
C(11,12)	C1c1h1h1h	ethane
C(13,14,19,20)	C1si[1p1c1c]1h1h1h	(trimethylsilyl)phosphine
C(15,21)	C1si[1p1c1c]1c1c1c	(tert-butyldimethylsilyl)phosphine
C(16-18,22-24)	C1c1h1h1h	ethane
H(3)	H1c[@6c1c1c]	cumene
H(4;5;11;12;16-18A-C;22-24A-C)	H1c[1c1h1h]	ethane
H(6-8)	H@6c	benzene
H(10)	H1c[@6c1c1c]	cumene
H(13A-C,14A-C,19A-C,20A-C)	H1c[1si1h1h]	methylsilane

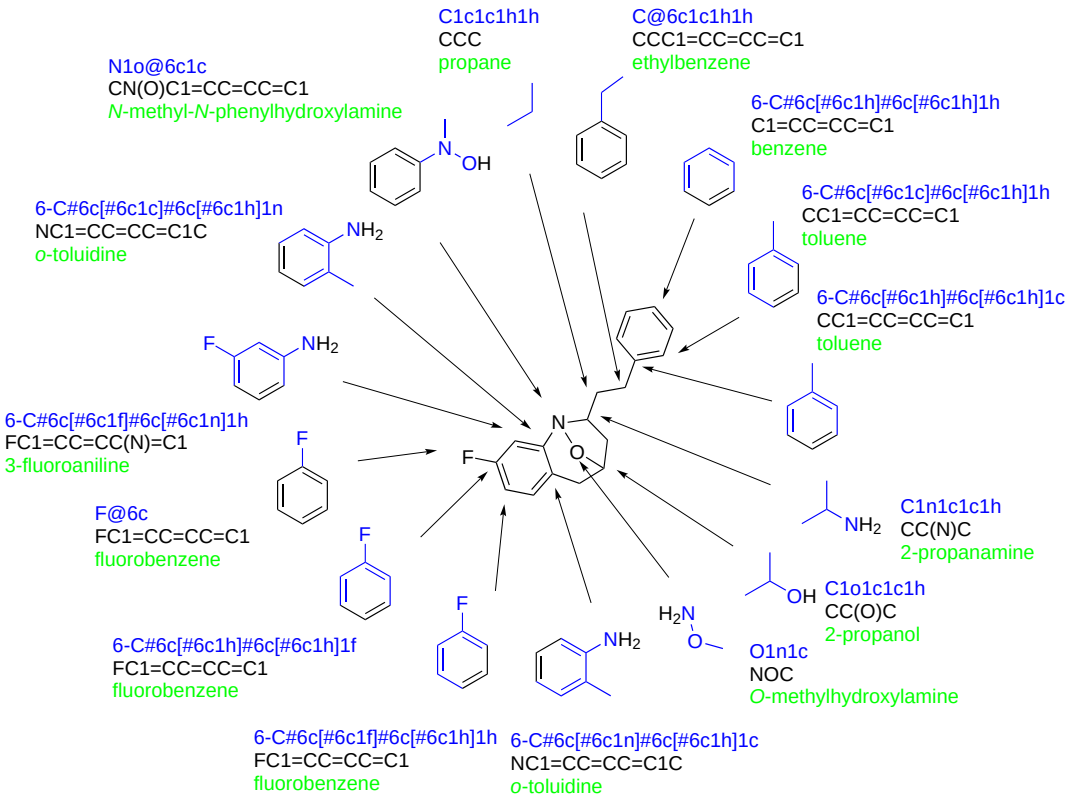

Fig. 20. Holstein-plot of (2*RS*,4*RS*)-7-Fluoro-2-(2-phenylethyl)-2,3,4,5-tetrahydro-1*H*-1,4-epoxy-1-benzazepine, structure 30.

Table 21. *Invarioms and the model compounds they were derived from, as assigned to the atoms in structure 30, (2RS,4RS)-7-Fluoro-2-(2-phenylethyl)-2,3,4,5-tetrahydro-1H-1,4-epoxy-1-benzazepine. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
F(7)	F@6c	fluorobenzene
O(14)	O1n1c	O-methylhydroxylamine
N(1)	N1o@6c1c	N-hydroxy-N-methylbenzenamine
C(2)	C1n1c1c1h	2-aminopropane
C(3)	C1c1c1h1h	propane
C(4)	C1o1c1c1h	2-propanol
C(5)	C@6c1c1h1h	ethylbenzene
C(5A)	6-C#6c[#6c1n]#6c[#6c1h]1c	o-methylaniline
C(6)	6-C#6c[#6c1f]#6c[#6c1c]1h	1-fluoro-3-methylbenzene
C(7)	6-C#6c[#6c1h]#6c[#6c1h]1f	fluorobenzene
C(8)	6-C#6c[#6c1f]#6c[#6c1h]1h	fluorobenzene
C(9)	6-C#6c[#6c1n]#6c[#6c1h]1h	aniline
C(9A)	6-C#6c[#6c1c]#6c[#6c1h]1n	o-methylaniline
C(21)	C1c1c1h1h	propane
C(22)	C@6c1c1h1h	ethylbenzene
C(221)	6-C#6c[#6c1h]#6c[#6c1h]1c	toluene
C(222,226)	6-C#6c[#6c1c]#6c[#6c1h]1h	toluene
C(223,224,225)	6-C#6c[#6c1h]#6c[#6c1h]1h	benzene
H(2)	H1c[1n1c1c]	2-aminopropane
H(3A,B)	H1c[1c1c1h]	propane
H(4)	H1c[1o1c1c]	2-propanol
H(5A,B)	H1c[@6c1c1h]	ethylbenzene
H(6,8,9)	H@6c	benzene
H(21A,B)	H1c[1c1c1h]	propane
H(22A,B)	H1c[@6c1c1h]	ethylbenzene
H(222,223,224,225,226)	H@6c	benzene

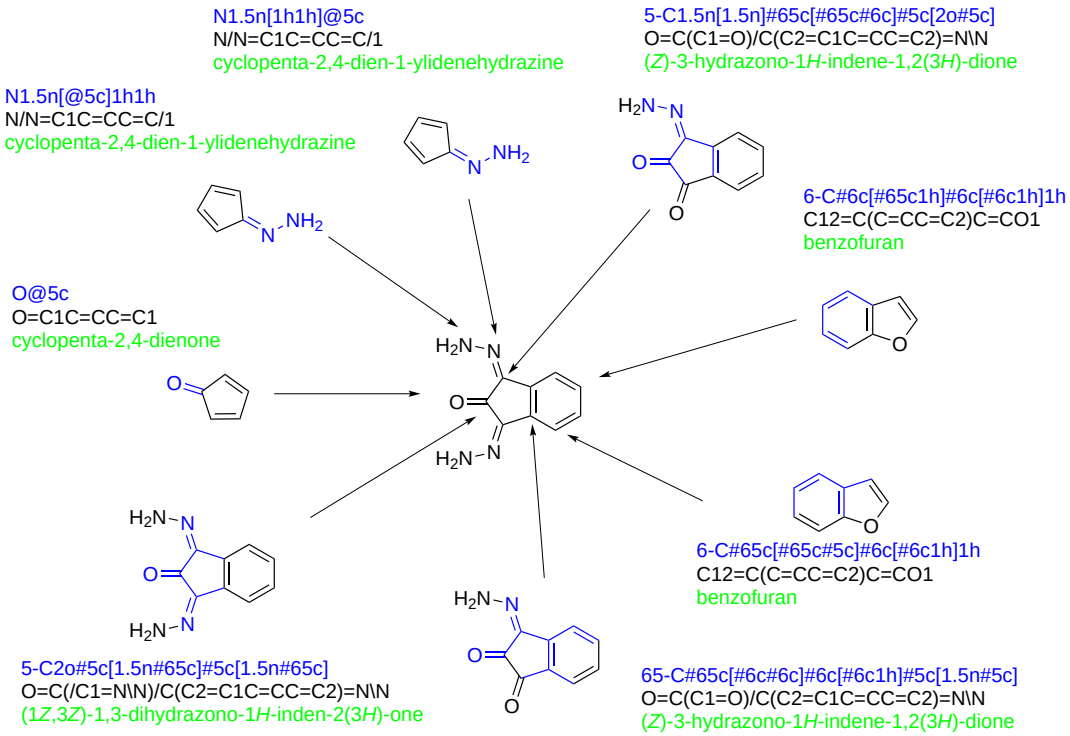

Fig. 21. Holstein-plot of 1,3-ninhydrindihydrazone, structure 31.

Table 22. *Invariom and the model compounds they were derived from, as assigned to the atoms in the structure of 1,3-ninhydrindihydrazone, structure 31. Atomic naming scheme like in the original paper.*

Atom	Invariom	Model compound
O(2)	O@5c	cyclopenta-2,4-dienone
N(10,12)	N1.5n[1h1h]@5c	cyclopenta-2,4-dien-1-ylidenehydrazine
N(11,13)	N1.5n[@5c]1h1h	cyclopenta-2,4-dien-1-ylidenehydrazine
C(1,3)	5-C1.5n[1.5n]#65c[#65c#6c]#5c[2o#5c]	(Z)-3-hydrazono-1H-indene-1,2(3H)-dione
C(2)	5-C2o#5c[1.5n#65c]#5c[1.5n#65c]	(1E,3E)-1,3-bis(hydroxyimino)-1H-inden-2(3H)-one
C(4,5)	65-C#65c[#6c#5c]#6c[#6c1h]#5c[1.5n#5c]	(Z)-3-hydrazono-1H-indene-1,2(3H)-dione
C(6,9)	6-C#65c[#65c#5c]#6c[#6c1h]1h	benzofuran
C(7,8)	6-C#6c[#65c1h]#6c[#6c1h]1h	benzofuran
H(11,13A&B)	H1n[1.5n1h]	azimethylene
H(6-9)	H@6c	benzene

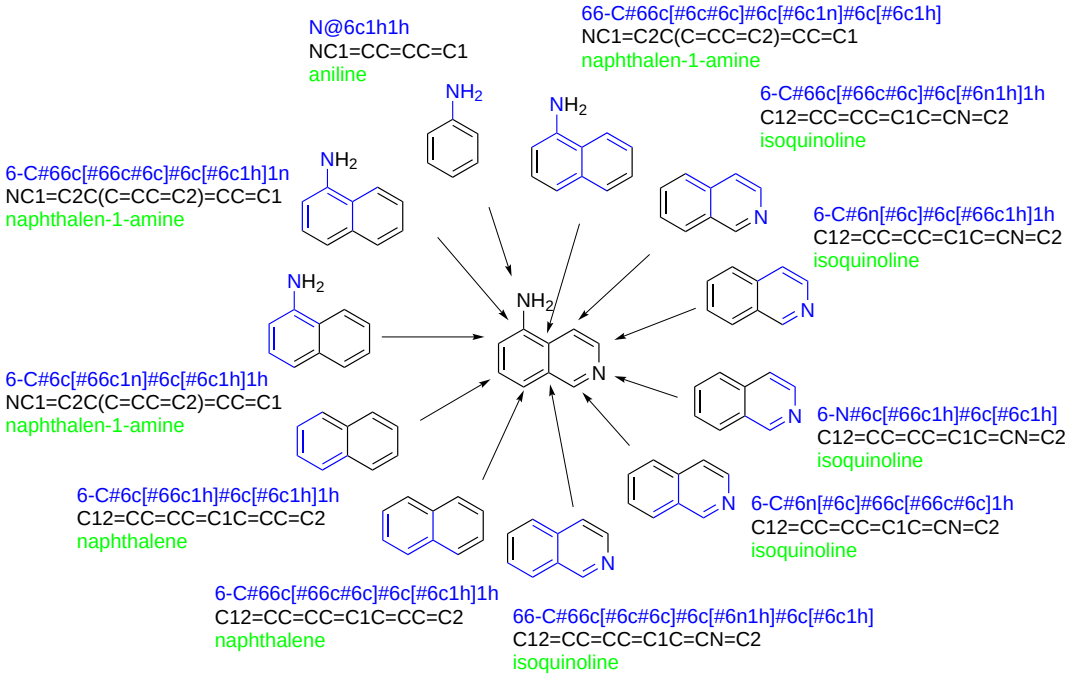

Fig. 22. Holstein-plot of isoquinolin-5-amine, structure 32.

Table 23. *Invariums and the model compounds they were derived from, as assigned to the atoms in the structure of isoquinolin-5-amine, structure 32. Only invariums for one of the two molecules in the asymmetric unit are given. Atomic naming scheme like in the original paper.*

Atom	Invarium	Model compound
N(11)	6-N#6c[#66c1h]#6c[#6c1h]	isoquinoline
N(21)	N@6c1h1h	aniline
C(11)	6-C#6n[#6c]#66c[#66c#6c]1h	isoquinoline
C(21)	66-C#66c[#6c#6c]#6c[#6n1h]#6c[#6c1h]	isoquinoline
C(31)	6-C#66c[#66c#6c]#6c[#6c1h]1h	naphthalene
C(41)	6-C#6c[#66c1h]#6c[#6c1h]1h	naphthalene
C(51)	6-C#6c[#66c1n]#6c[#6c1h]1h	naphthalene-1-amine
C(61)	6-C#66c[#66c#6c]#6c[#6c1h]1n	naphthalene-1-amine
C(71)	66-C#66c[#6c#6c]#6c[#6c1n]#6c[#6c1h]	naphthalene-1-amine
C(81)	6-C#66c[#66c#6c]#6c[#6n1h]1h	isoquinoline
C(91)	6-C#6n[#6c]#6c[#66c1h]1h	isoquinoline
H(11,31,41,51,81,91)	H@6c	benzene
H(21A,B)	H1n[@6c1h]	aniline