

Electronic Supplementary Information

Potassium batteries for low temperature applications using high energy density organic cathodes

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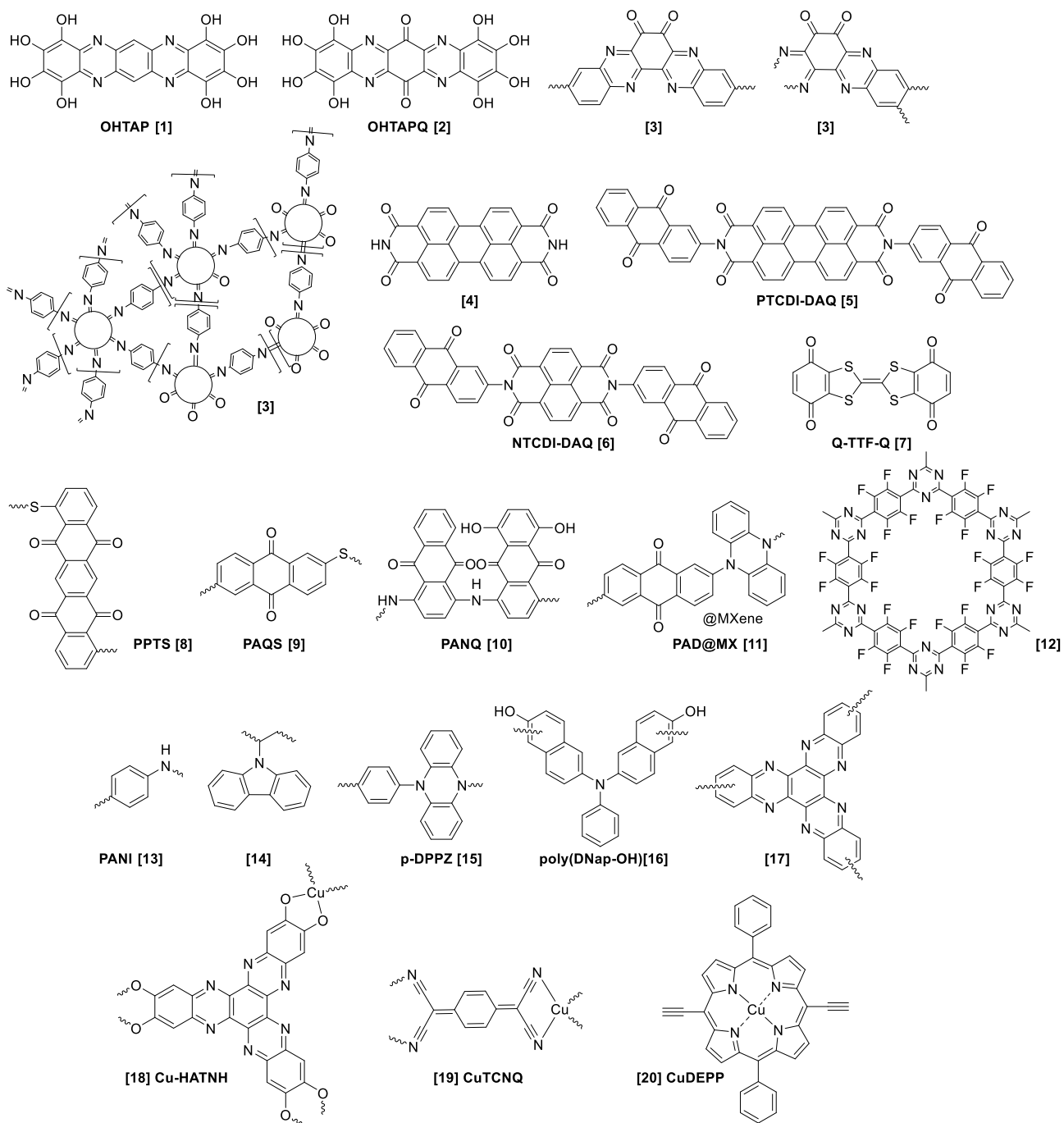


Figure S1. Structures of the promising organic and hybrid cathode materials for PIBs.

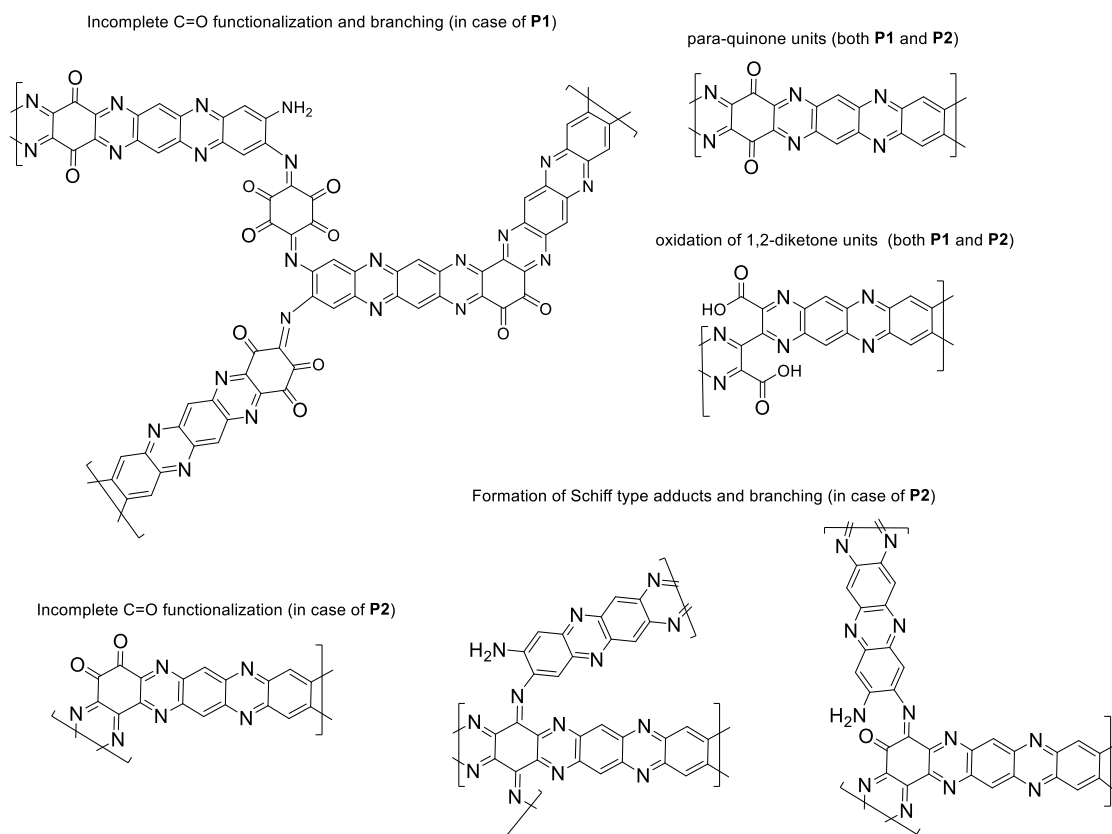


Figure S2. Examples of some types of defects expectedly formed in **P1** and **P2**.

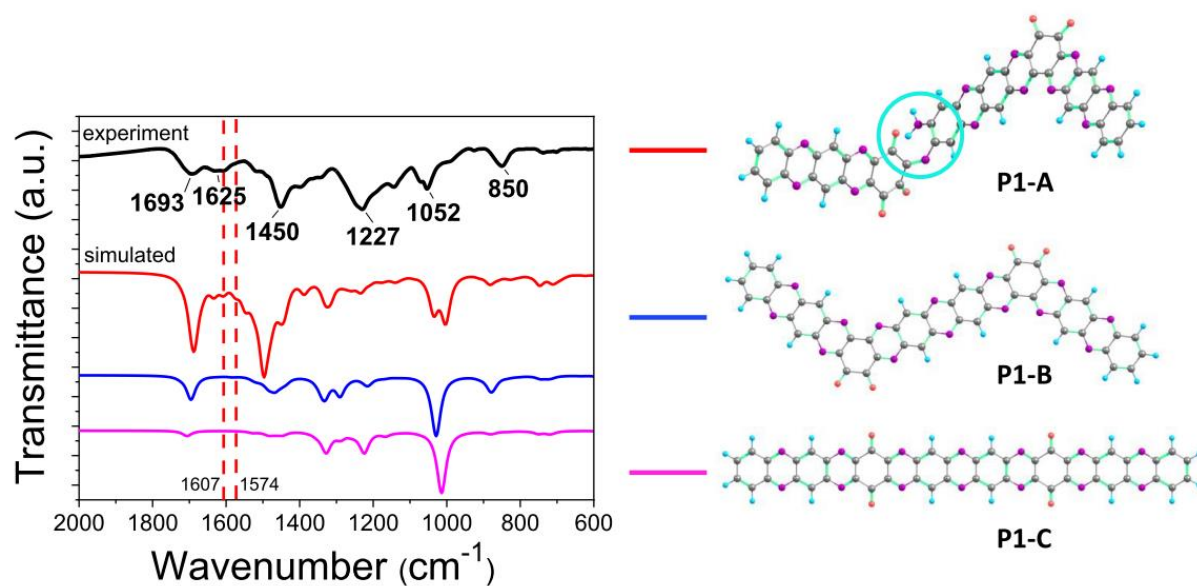


Figure S3. Experimental FTIR spectrum of **P1** and calculated spectra for the model structures **P1-A**, **P1-B**, and **P1-C**.

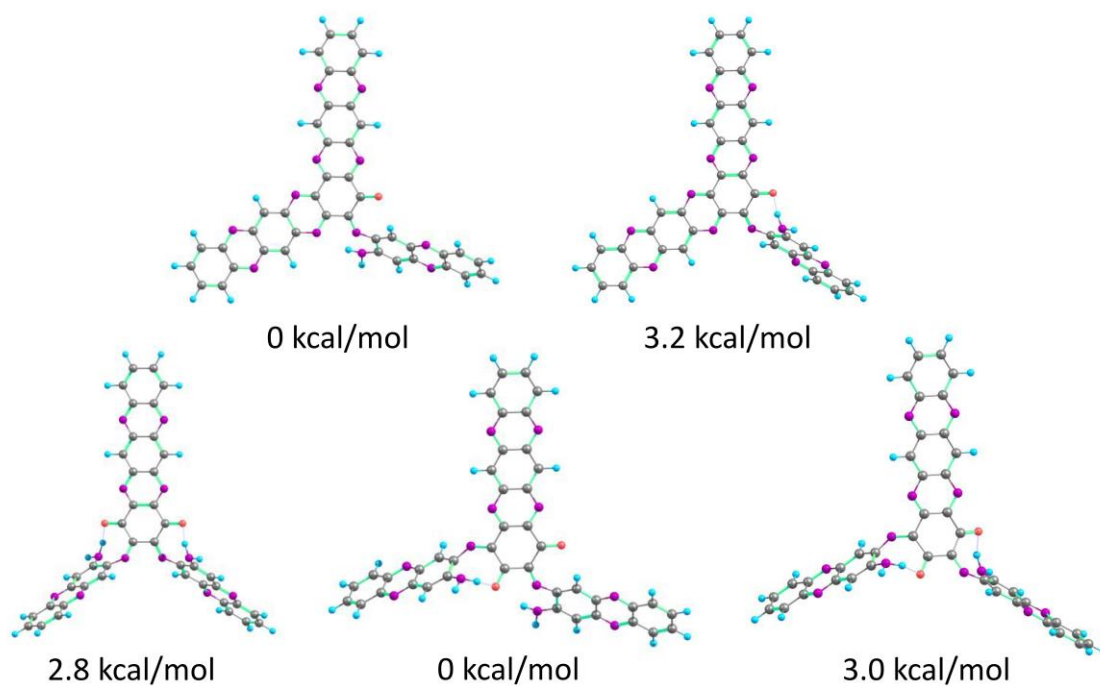


Figure S4. Relative energies of various **P2**-derived defect structures.

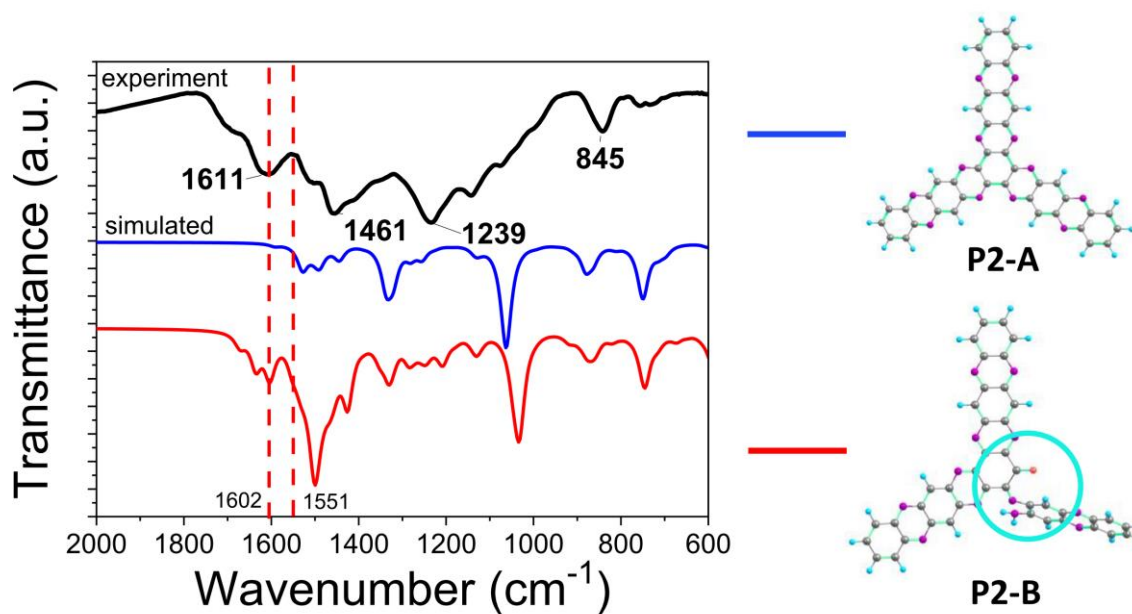


Figure S5. Experimental FTIR spectrum of **P2** and calculated spectra for the model structures **P2-A** and **P2-B**.

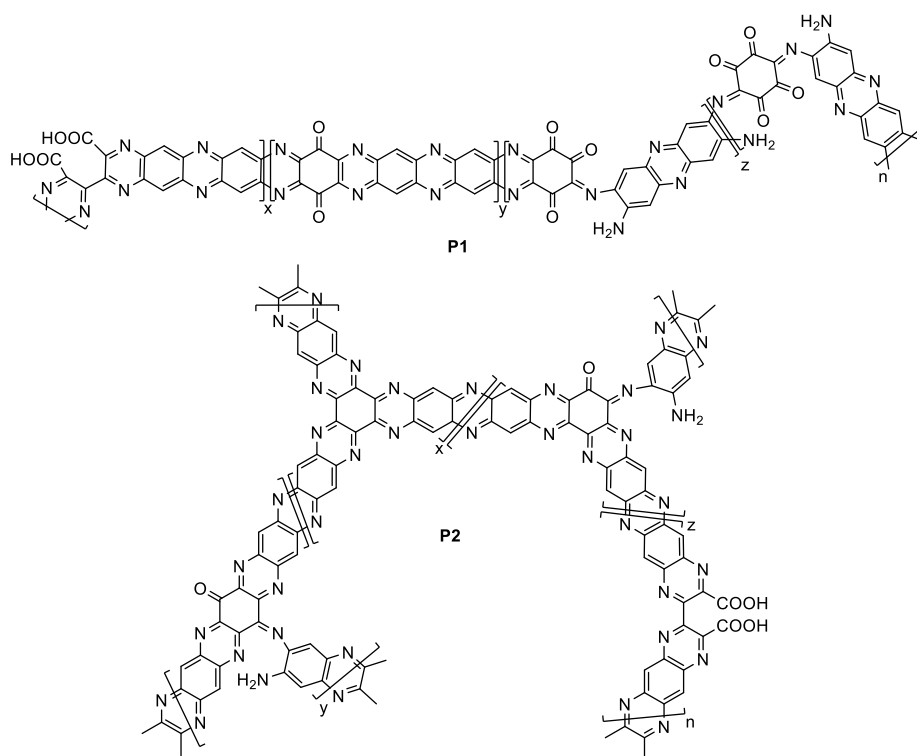


Figure S6. Realistic structures of **P1** and **P2** materials.

Table S1. Chemical analysis data for **P1** and **P2**

Material	C, %	H, %	N, %	O, % = 100% - (C,%+H,%+N, %)
P1 (experimental)	47.14	3.54	20.21	29.11
P1 (calculated for [P1]*6H ₂ O)	48.65	3.63	18.91	28.80
P2 (experimental)	45.49	3.71	20.19	30.61
P2 (calculated for [P2]*8H ₂ O)	51.07	3.93	22.33	22.67

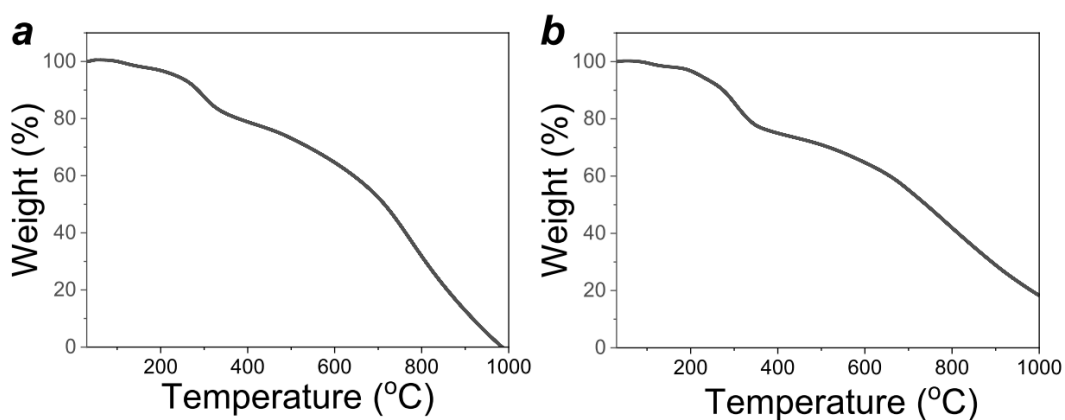


Figure S7. TGA profiles of polymers **P1** (a) and **P2** (b).

Table S2. Surface properties of **P1-P2**

Compound	S_{BET} (m^2/g)	V pore $P/P_0=0.99$ (cm^3/g)	V (cm^3/g)	d (nm)
P1	75.6	0.26	0.26	3.42
P2	25.5	0.15	0.14	3.42

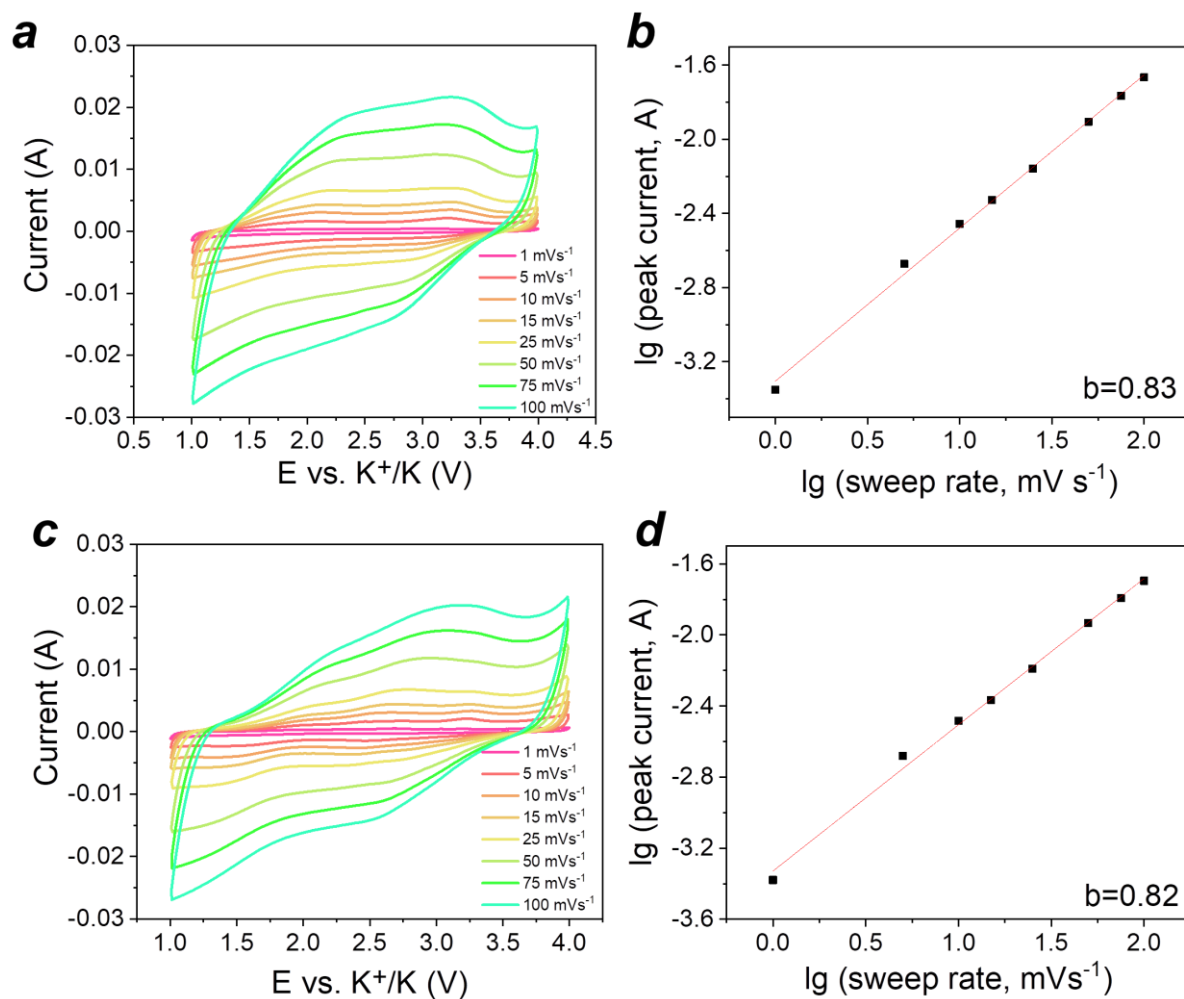


Figure S8. Cyclic voltammograms at different scan rates for potassium half-cells based on **P1** (a) **P2** (c); the dependence of $\lg(i)$ (current) vs. $\lg(v)$ (sweep rate) used for parameter b estimation rates for half-cells based on **P1** (b) **P2** (d).

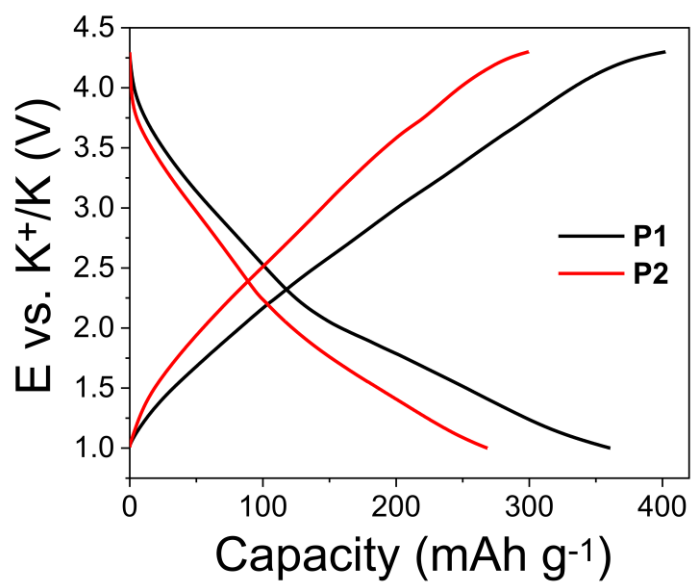


Figure S9. Charge/discharge profiles of the batteries based on **P1** or **P2** and cycled at 200 mA g^{-1} (50^{th} cycles).

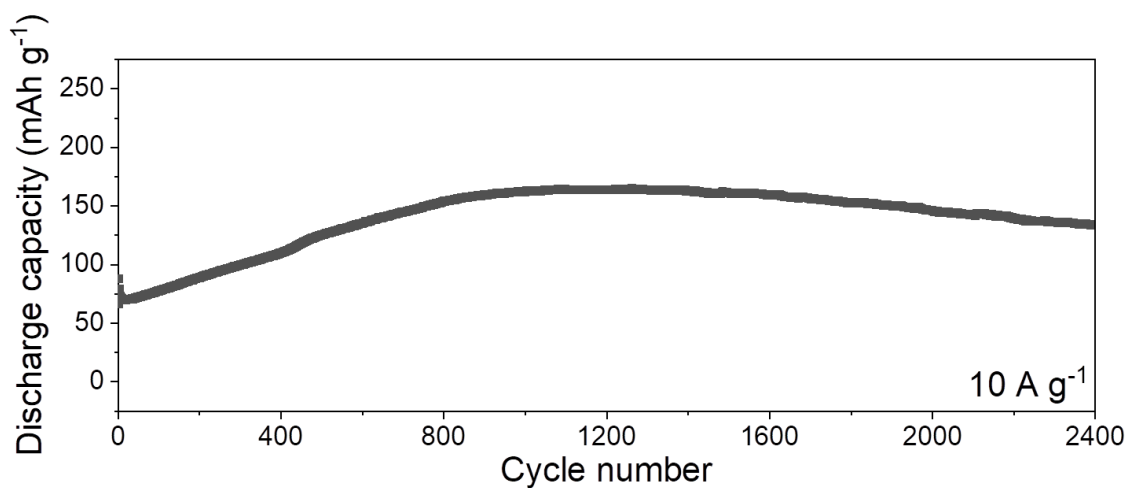


Figure S10. Long-term charge-discharge cycling of the cells with the **P1** cathode at 10 A g^{-1} .

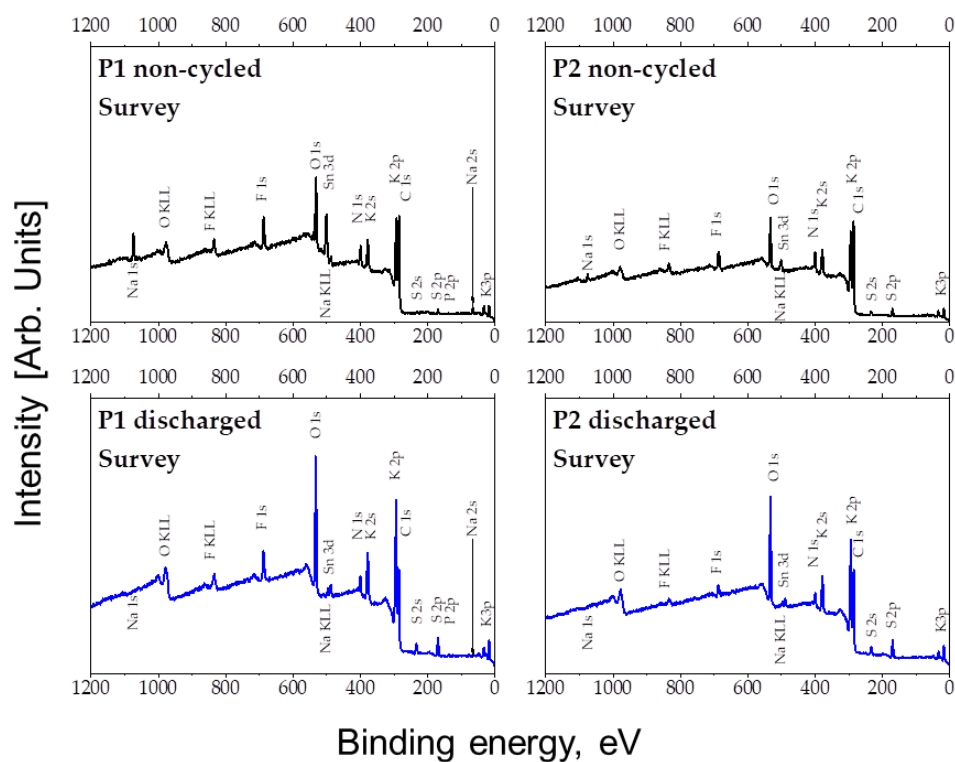


Figure S11. Survey XPS spectra of the non-charged and discharged electrodes based on **P1** and **P2**.

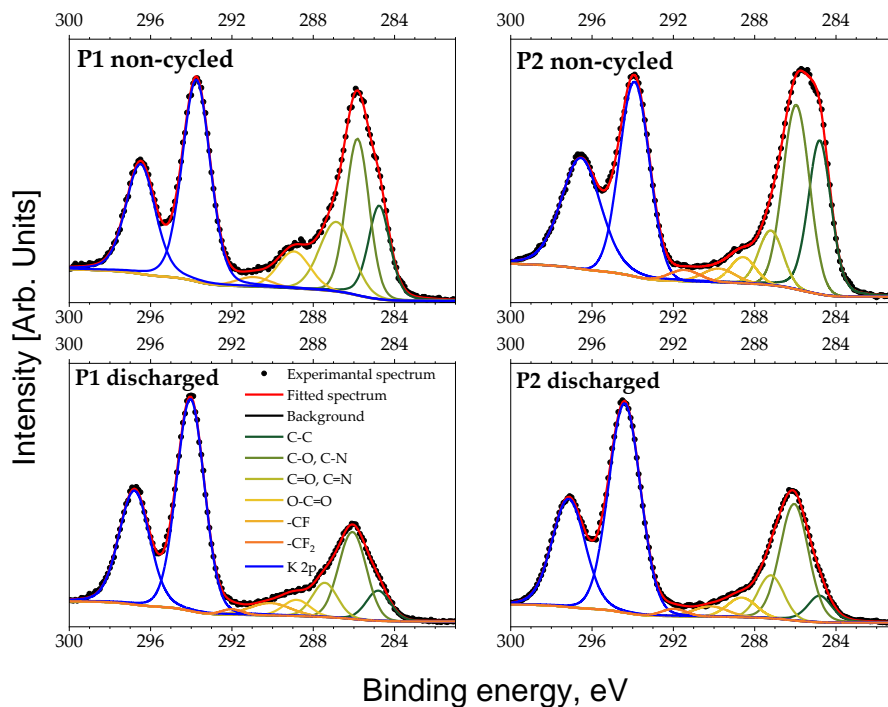


Figure S12. High-resolution core-level XPS C1s and K2p spectra of the non-charged and discharged electrodes based on **P1** and **P2**.

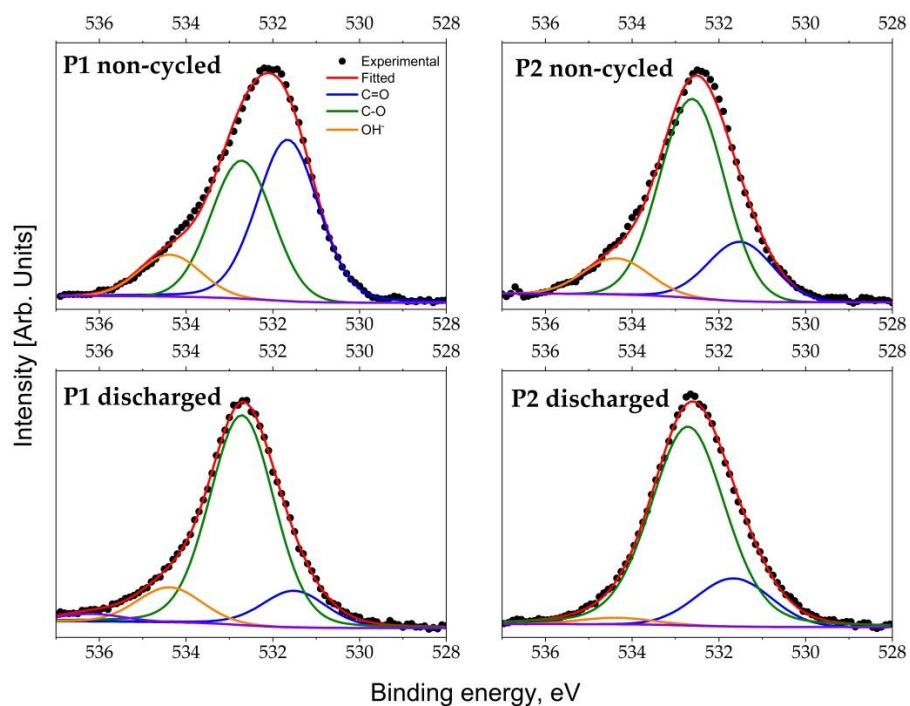


Figure S13. High-resolution XPS O1s spectra of the non-charged and discharged electrodes based on **P1** and **P2**.

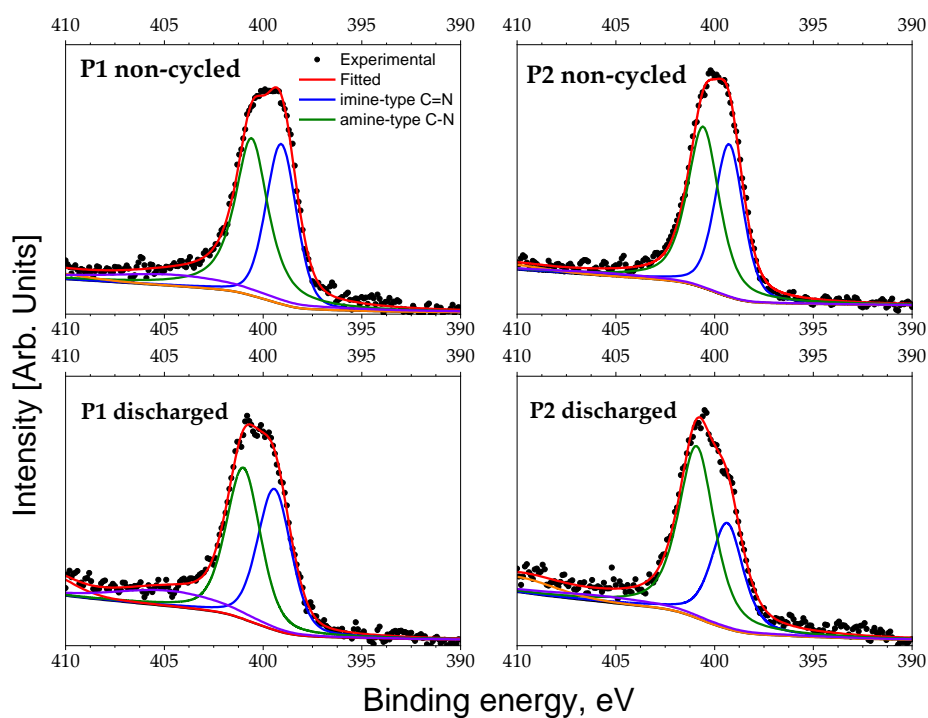


Figure S14. High-resolution XPS N1s spectra of the non-charged and discharged electrodes based on **P1** and **P2**.

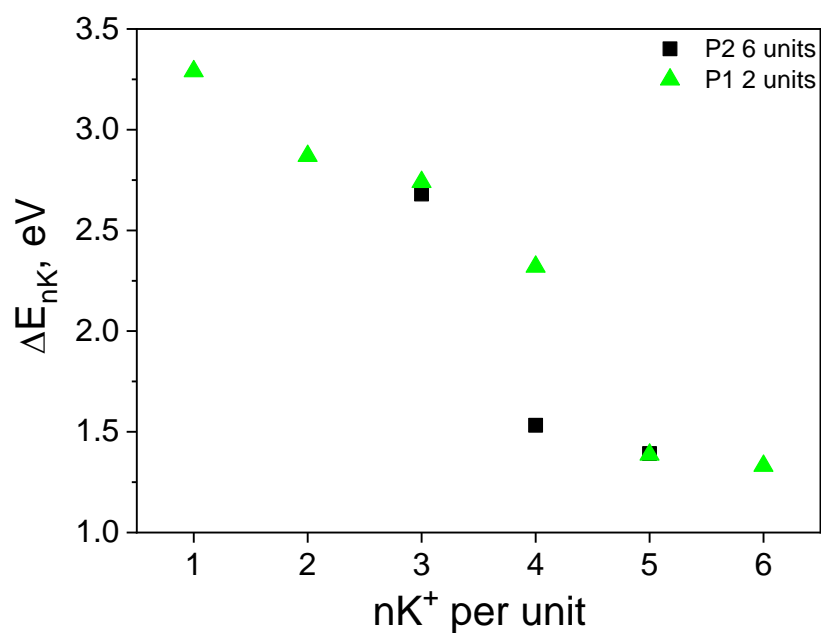


Figure S15. The metalation energies calculated for the stepwise introduction of potassium atoms into the repeating units of polymers **P1** and **P2**.

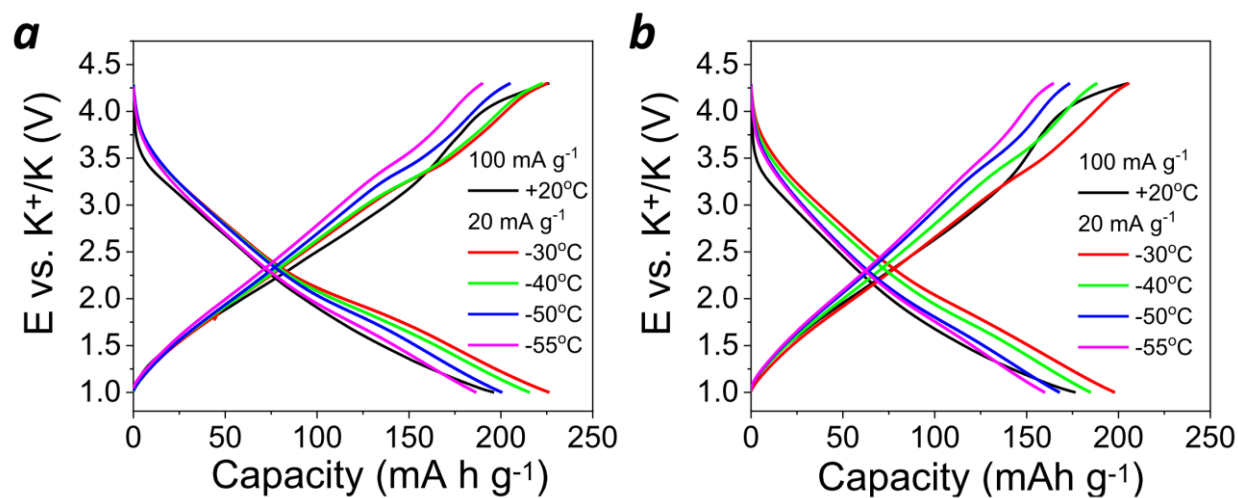
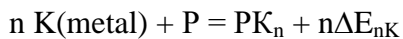


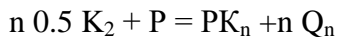
Figure S16. Charge/discharge profiles for the batteries based on **P1** (a) and **P2** (b) at different temperatures and current densities.

Details of metallation energy calculation

The calculation of the specific metallation energies ΔE_{nK} (eV) of the oligomer P



was performed based on the data for the theoretical energy of the reaction with diatomic molecules K_2



taking into account the semi-empirical correction

$$E_{nK} = Q_n - 0.66 \text{ eV}$$

based on the experimental values of the thermal effect of atomization of metallic potassium and the binding energy in the diatomic molecule K_2 . Pristine and metallated structures of the oligomers **P1** and **P2** are shown in Figures S17-S18.

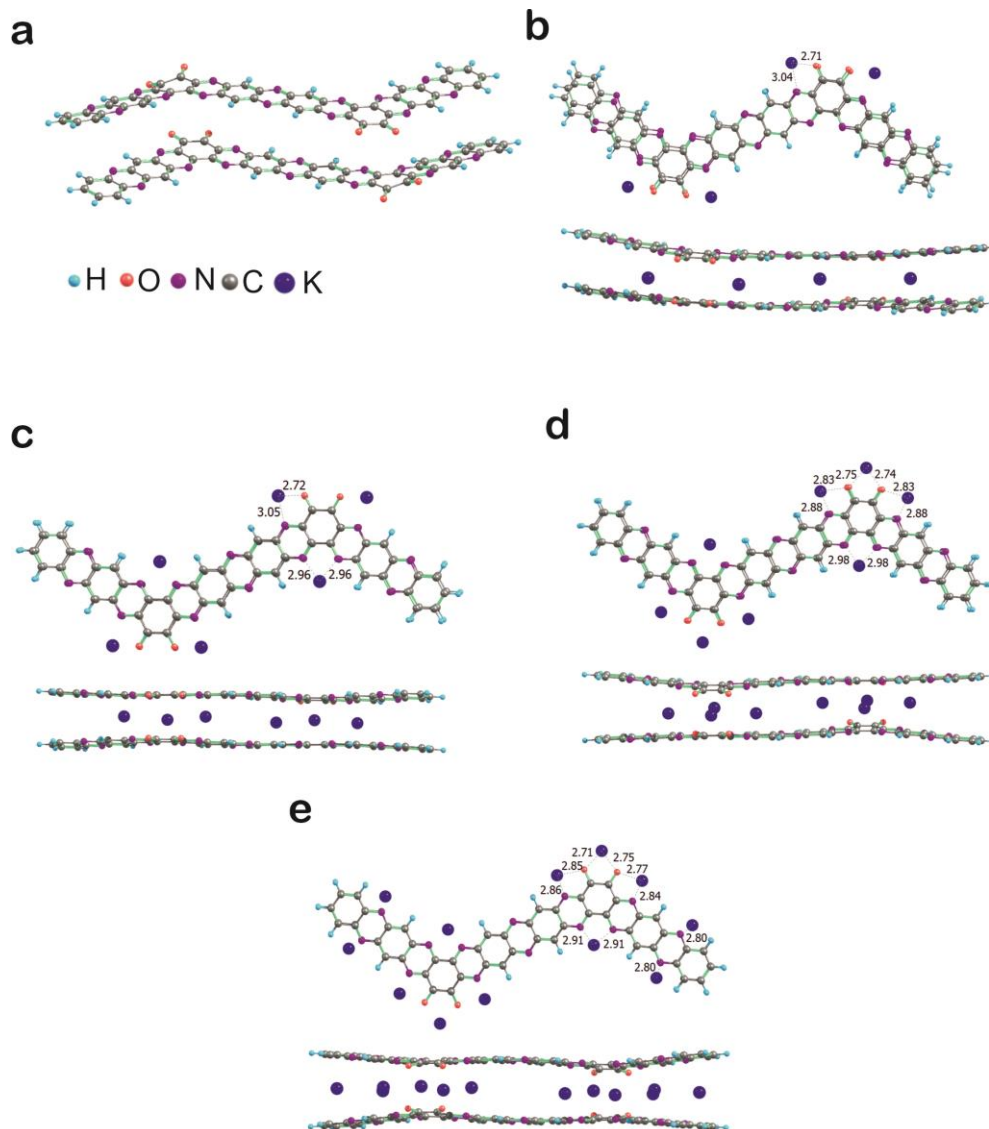


Figure S17. Geometry of the initial stack of two dimers of **P1** (a) and its metalated forms **P1K_n** (top view and side view): for n=2 per unit (b), n=3 (c), n=4 (d), n=6 (e). Bond lengths are given in Å.

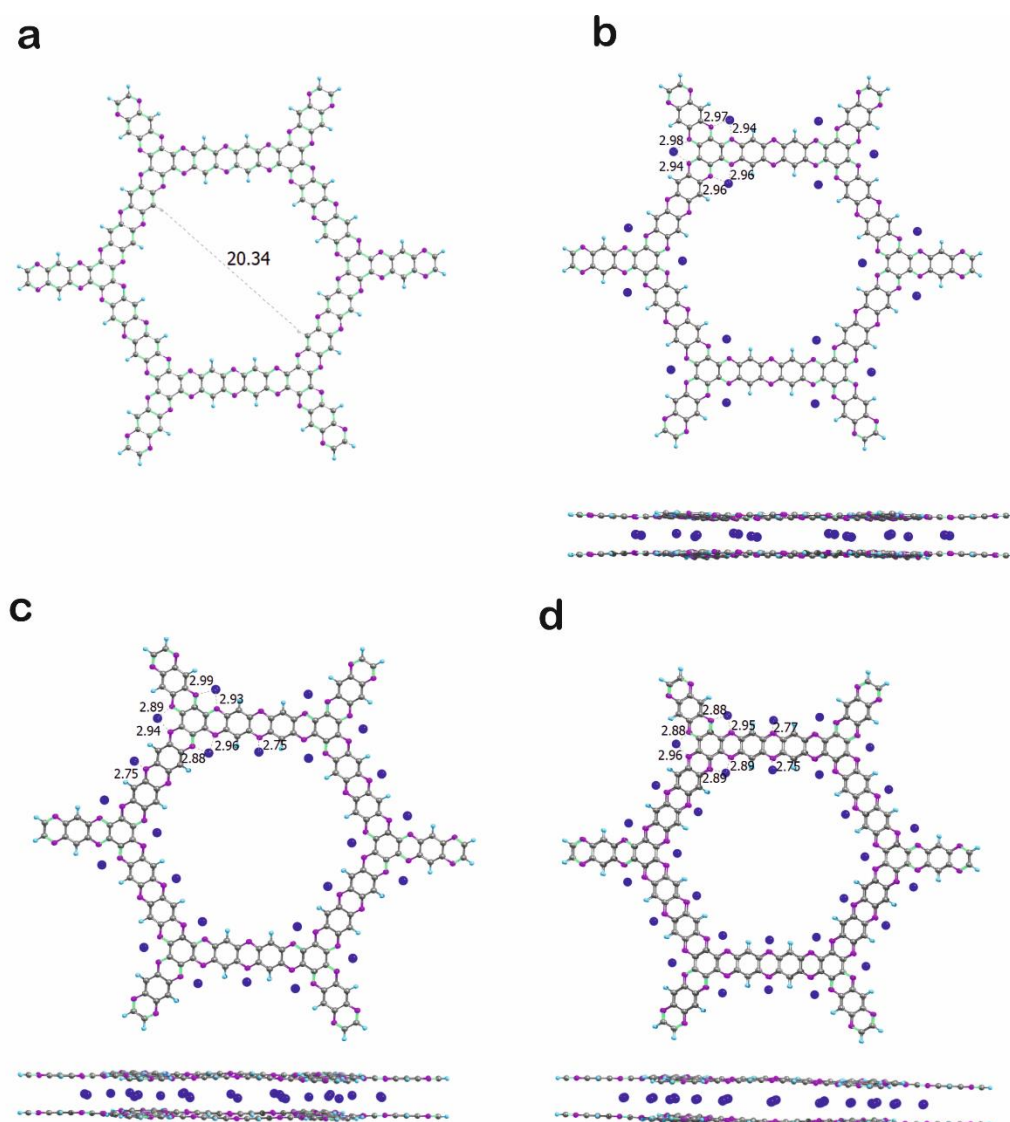


Figure S18. Geometry of the initial stack of two hexamers of **P2** (a) and its metalated forms **P2K_n** (top view and side view): for n=3 per unit (b), n=4 (c), n=5 (d). Bond lengths are given in Å.

Cartesian coordinates for the calculated structures

Coordinates of the metalated stack of two **PI** dimers (n=6 K⁺ per unit)

6	-14.480708110	5.449092180	2.175117570
6	-15.405494610	4.396465330	2.306807000
1	-12.378838120	5.976346430	2.067550480
6	-13.114357680	5.167281500	2.116679300
6	-12.632658090	3.837452000	2.178544900
6	-13.578185960	2.757997190	2.317793400
6	-14.959144520	3.076092190	2.380681020
1	-15.666979650	2.256295370	2.536810250
7	-13.173549860	1.449663700	2.346761490
7	-11.284624590	3.591953050	2.064734380
6	-10.874729410	2.306577330	2.158220350
6	-11.834733860	1.204418810	2.306993440
6	-3.630828490	-0.280918420	2.337772780
6	-3.130941600	-1.642039880	2.492610390
7	-4.982505770	-0.046001260	2.244279270
7	-7.674225310	0.439835610	2.124566610
7	-9.530813710	-1.695823380	2.355868940
6	-9.966246500	-0.415647820	2.306902600
6	-9.018323610	0.682736420	2.167400680
8	-5.816548100	-4.759608650	2.277152730
6	-9.496452710	1.997034820	2.076095610
7	-3.987104490	-2.691080120	2.512229560
8	-8.513014890	-4.271300640	2.224601090
1	-8.776735150	2.818700440	2.024083870
6	-5.315308920	-2.434590480	2.449899450
6	-6.231005060	-3.565143280	2.370725040
6	-8.187039850	-1.912414740	2.363360700
6	-7.711571370	-3.296331320	2.336959380
6	-7.265122200	-0.827887010	2.278959300
6	-5.805435590	-1.087050620	2.337865250
1	-3.106167570	1.805070430	2.152986630
6	-2.735090040	0.782893310	2.252369120

6	-1.331064640	0.579473460	2.301278810
6	-0.826646000	-0.786005220	2.470016440
6	-1.738750390	-1.847540320	2.570791860
1	-1.346899100	-2.856971910	2.714162570
7	0.510038780	-1.036934520	2.519742750
6	9.968249060	0.969333710	2.131341100
6	9.018579630	-0.127454670	2.272292740
7	9.534332960	2.222395190	1.861893410
8	8.519359120	4.684862560	1.097080280
8	5.824027880	5.178576000	1.032146020
7	4.984918550	0.605975550	2.175379730
7	7.674514700	0.099949060	2.176478340
7	3.991286990	3.235086820	1.777207100
6	3.134165220	2.214512670	2.017965150
6	3.633487470	0.857426460	2.206050880
6	7.267638980	1.367204170	2.011713960
6	5.808925210	1.636824740	2.007272490
6	6.236666750	4.044119090	1.418581220
6	5.319256770	2.970209650	1.780113230
6	7.716632940	3.769920990	1.449529280
6	8.190944580	2.436087230	1.819423550
1	12.059773090	1.517543220	2.212074690
6	11.347489330	0.688139740	2.253052440
6	11.835312810	-0.603663500	2.522479690
6	10.873941200	-1.706784570	2.654491160
6	9.495431950	-1.424563450	2.506069850
1	8.775132180	-2.232557910	2.661341910
7	11.282717650	-2.976634080	2.877656830
7	13.174351130	-0.833801130	2.615346200
6	13.577655810	-2.109312160	2.909403100
1	3.108175610	-1.209427870	2.541521320
6	2.737398760	-0.194423610	2.384351370
6	1.333478960	0.014611640	2.376933250
6	0.829226510	1.379339890	2.201677470
6	1.741843830	2.433040340	2.040067680

1	1.350170100	3.446523590	1.928158100
7	-0.507599600	1.634168160	2.183232000
6	-11.345737040	-0.114017960	2.361009660
1	-12.056018370	-0.928300540	2.533160330
6	15.404423640	-3.702769070	3.296794610
6	14.958745360	-2.404086860	3.045120590
6	14.478631380	-4.754157220	3.430155130
1	15.666944530	-1.571181380	2.995111360
1	14.825356840	-5.766159770	3.644084350
6	13.112106510	-4.493479310	3.308326930
1	12.376078210	-5.288846970	3.462300650
6	12.631017720	-3.188651900	3.043124900
1	16.472338750	-3.899005290	3.406321450
6	-14.478638740	4.768634540	-3.404880130
6	-15.404759380	3.716731200	-3.277069940
1	-12.375878370	5.302449970	-3.435148710
6	-13.112279510	4.506598290	-3.285562330
6	-12.631858230	3.199886640	-3.028472130
6	-13.578818190	2.120205580	-2.901101020
6	-14.959727330	2.416395840	-3.033731490
1	-15.668853920	1.584262580	-2.986446910
7	-13.175484410	0.842521210	-2.616152930
7	-11.283564820	2.986641570	-2.863953700
6	-10.875261020	1.715704570	-2.647116670
6	-11.836709860	0.611800880	-2.522681710
6	-3.634050760	-0.848527600	-2.210130140
6	-3.135551620	-2.206841930	-2.028627110
7	-4.985449070	-0.596476760	-2.176607450
7	-7.676319390	-0.092991640	-2.174861490
7	-9.535364410	-2.218057730	-1.875180670
6	-9.969612070	-0.963555980	-2.137145340
6	-9.020340620	0.134377090	-2.270906250
8	-5.822397150	-5.174449680	-1.058544840
6	-9.496970360	1.432575240	-2.498355690
7	-3.992697680	-3.228271930	-1.793089550

8	-8.518698760	-4.685827670	-1.122836450
1	-8.776478870	2.241345910	-2.648648590
6	-5.320493940	-2.962743300	-1.794176740
6	-6.236665660	-4.038769850	-1.440409100
6	-8.191737810	-2.431981020	-1.832905500
6	-7.717052380	-3.768396500	-1.471031160
6	-7.268746260	-1.360769530	-2.017278950
6	-5.809416910	-1.628095640	-2.013291940
1	-3.106684680	1.218992410	-2.539137870
6	-2.737010750	0.202951070	-2.386083460
6	-1.333240430	-0.007841950	-2.382083190
6	-0.830208880	-1.373495280	-2.210698370
6	-1.743598250	-2.426709650	-2.052157950
1	-1.352980730	-3.441049960	-1.944447910
7	0.506194370	-1.630058350	-2.192856910
6	9.966633660	0.406028650	-2.311950260
6	9.016928190	-0.690419800	-2.169334040
7	9.533073620	1.686710990	-2.366683350
8	8.519423630	4.263890820	-2.244800920
8	5.823059130	4.756314310	-2.300507670
7	4.982702160	0.044165810	-2.251939420
7	7.673179100	-0.445473650	-2.129217470
7	3.991099920	2.689924400	-2.525920560
6	3.133319690	1.642362380	-2.503205640
6	3.631471380	0.280828690	-2.346481760
6	7.266231430	0.822378790	-2.288480200
6	5.807178770	1.083725330	-2.348451470
6	6.236152740	3.561106390	-2.389566590
6	5.318904930	2.431591230	-2.464266040
6	7.716391850	3.290065380	-2.354384930
6	8.189808740	1.905185810	-2.376036090
1	12.058005600	0.915125900	-2.532719220
6	11.345660560	0.102502490	-2.361980580
6	11.832860620	-1.215879220	-2.299300270
6	10.871163800	-2.316304800	-2.148518200

6	9.493143540	-2.004942490	-2.071489610
1	8.772394600	-2.825518750	-2.016976620
7	11.279102080	-3.601943150	-2.048157130
7	13.171679210	-1.462892270	-2.333856840
6	13.574144200	-2.771689310	-2.300358560
1	3.104120840	-1.804250800	-2.160117150
6	2.734424780	-0.781676750	-2.260380970
6	1.330792460	-0.576270030	-2.309828660
6	0.827866140	0.789843580	-2.477611930
6	1.741446330	1.850071670	-2.579670020
1	1.350900940	2.859903690	-2.723814890
7	-0.508561900	1.042766660	-2.524728070
6	-11.349015620	-0.681560260	-2.258565240
1	-12.060690930	-1.512032120	-2.226410840
6	15.399739140	-4.412888320	-2.280664290
6	14.954884380	-3.092138050	-2.360249920
6	14.473442360	-5.463713630	-2.146116720
1	15.663558180	-2.273680270	-2.520521980
1	14.819333400	-6.497377960	-2.101537240
6	13.107276800	-5.179493890	-2.090779630
1	12.370643470	-5.987505460	-2.039947180
6	12.626965370	-3.849540780	-2.158602200
1	16.467444430	-4.630859660	-2.339402770
1	-14.825126030	5.782076560	-3.612278320
1	-16.472728560	3.914201250	-3.383753610
1	-16.473420360	4.612903530	2.367067250
1	-14.828225900	6.482403830	2.134724890
19	3.533813420	4.748460580	-0.601693790
19	-3.530517890	-4.744507860	0.581106670
19	10.510853490	3.536463840	-0.454042530
19	-10.503445570	-3.543461820	0.437247130
19	-5.948912600	1.276025830	-0.163864630
19	5.948364040	-1.268680330	0.163035690
19	7.441637790	6.341229610	-0.809119640
19	-7.434206770	-6.343020380	0.780952850

19	10.828033740	-4.520084630	0.571370440
19	14.309876370	-0.581113510	0.067763500
19	-14.261603530	0.526174450	-0.058239180
19	-10.828835460	4.518663580	-0.550143800

Coordinates of the metalated stack of two **P2** hexamers (n=5 K⁺ per unit)

6	-14.858906920	-3.973907390	-9.633650370
7	-13.598678720	-3.446750970	-9.645526160
7	-11.083488070	-2.324076970	-9.653534190
7	-9.805932930	-1.715842580	-7.198113110
6	-9.212435380	-1.410058260	-8.381311820
6	-9.870859520	-1.720707890	-9.641487640
6	-15.527975750	-4.256797780	-8.375416260
7	-13.670289150	-3.406453060	-4.797883230
6	-7.938967380	-0.803894780	-8.408165930
6	-9.215222550	-1.401951360	-10.850803380
7	-14.906871650	-3.998169880	-7.186501060
7	-11.083661010	-2.248235190	-4.800594580
6	-11.743236480	-2.465898420	-3.633001980
6	-13.072233640	-3.059118250	-3.633280370
1	-9.748904320	-1.566133690	-11.792112400
1	-7.478227940	-0.508606340	-7.460376890
6	-13.695495930	-3.424231730	-7.217623940
6	-13.032572240	-3.110482820	-5.953018050
6	-11.048359940	-2.241697880	-7.227356370
6	-11.726448820	-2.524795710	-5.954660890
6	-11.693093670	-2.549922470	-8.467734480
6	-13.028731820	-3.144116090	-8.470174770
6	-7.285154040	-0.483626370	-9.613057840
6	-7.947079220	-0.796474640	-10.881800780
7	-6.039036710	0.066038040	-9.589963350
6	-9.213194660	-1.409898280	8.383461050
6	-9.872046040	-1.719666080	9.643630210
7	-9.806861010	-1.715259510	7.200230930
7	-11.085204280	-2.245421460	4.802610790
7	-13.671671890	-3.403860760	4.799451170
6	-13.073426360	-3.056720130	3.634928750
6	-11.744481550	-2.463382080	3.634858120
7	-13.599454590	-3.447746160	9.646862420
6	-13.719698620	-3.284305910	2.400302720

6	-11.143564340	-2.136952850	2.400847180
7	-11.084961020	-2.322648560	9.655699390
7	-14.908526810	-3.995676980	7.187585300
6	-15.529132200	-4.256159800	8.376344590
6	-14.859340810	-3.975669800	9.634711410
1	-10.176388800	-1.624524780	2.407835360
1	-14.747896690	-3.658980350	2.411171530
6	-11.694677330	-2.548165370	8.469916070
6	-13.029826820	-3.143354220	8.471715090
6	-13.034070560	-3.107958100	5.954654040
6	-13.696849610	-3.422399300	7.219092830
6	-11.728022810	-2.522201220	5.956620960
6	-11.049711440	-2.239911540	7.229441840
1	-7.478236910	-0.510444120	7.462278520
6	-7.939229410	-0.804874710	8.410221240
6	-7.285340690	-0.484492060	9.615005300
6	-7.947967210	-0.795560410	10.883803380
6	-9.216420430	-1.400545360	10.852904250
1	-9.750490230	-1.563535590	11.794201700
7	-7.333371030	-0.547381150	12.073533890
1	-15.027624880	-4.041663130	11.796261700
6	-15.508117170	-4.271482220	10.843400880
6	-16.797550080	-4.833828890	10.855576420
6	-17.465779220	-5.113499690	9.600114350
6	-16.814807870	-4.818418420	8.388435170
1	-17.340348420	-5.009897380	7.451035110
7	-18.723817380	-5.656415670	9.575995890
7	-17.405005880	-5.104498640	12.053821180
6	-18.614748070	-5.639083350	11.986669920
6	-19.270653830	-5.913567670	10.754366560
1	-19.114786120	-5.864033160	12.934549090
1	-20.275142190	-6.349590040	10.754466110
1	-17.338549620	-5.012683660	-7.450573780
6	-16.813461870	-4.819484700	-8.387890260
6	-17.465207340	-5.112051850	-9.599758870

6	-16.797721810	-4.829834680	-10.855061310
6	-15.508218560	-4.267671500	-10.842529010
1	-15.028000480	-4.036589170	-11.795221740
7	-17.405775270	-5.098331150	-12.053490290
7	-18.723289280	-5.654902730	-9.575960000
6	-19.270772800	-5.909663160	-10.754537420
6	-18.615523420	-5.632918820	-11.986656650
1	-20.275414080	-6.345341170	-10.754946090
1	-19.116076460	-5.856072740	-12.934690830
1	-10.175608350	-1.626155870	-2.406107490
6	-11.142668690	-2.138814100	-2.398980700
6	-11.787481750	-2.361950380	-1.167182570
6	-13.124478280	-2.960615510	-1.167353650
6	-13.718829010	-3.286073720	-2.398687760
1	-14.747098300	-3.660570240	-2.409582310
7	-13.766464010	-3.239830830	0.000794440
7	-11.151795370	-2.067263300	0.000910140
6	-11.787922360	-2.361035870	1.168970050
6	-13.124931140	-2.959683850	1.168972270
6	11.347777230	7.165837460	3.634726290
7	12.014119580	7.350102120	4.799452200
7	13.302435100	7.817594650	7.188448630
7	11.989272880	7.277568950	9.647269140
6	13.249456050	7.804815790	9.635556320
6	13.921692390	8.080388330	8.377437770
6	9.993941890	6.631685870	3.634410390
7	8.098961750	5.779505950	7.199401070
6	13.913282040	8.063294290	10.844636340
6	15.225007270	8.600443030	8.390230750
7	9.376142670	6.314411630	4.802025500
7	9.426117690	6.268923950	9.655193870
6	8.146104430	5.826427340	9.642730650
6	7.463967780	5.572448450	8.382420200
1	15.732206300	8.837031060	7.453004360
1	13.410171430	7.886262790	11.797108900

6	10.022768540	6.581369470	5.956168720
6	9.344644680	6.297893350	7.228786150
6	11.374882490	7.080902820	8.471698580
6	10.015192790	6.544238760	8.469175940
6	12.043443730	7.357237200	7.219187650
6	11.355670370	7.103226050	5.954537480
6	15.219255930	8.586075230	10.857467860
6	15.890054930	8.860755680	9.602267160
7	15.836354130	8.832488020	12.056004220
7	17.160210830	9.374639390	9.578740520
6	17.725260930	9.587170210	10.757449980
6	17.066817360	9.317566650	11.989453020
6	-0.134413810	2.198310730	18.005131960
6	-1.475425040	1.639254770	18.005686940
7	0.505331950	2.464379580	16.827767360
7	1.754524190	3.060158900	14.447724080
7	0.417932280	2.579390170	11.995500490
6	1.650685450	3.150382140	12.011355420
6	2.334863020	3.398883830	13.271610870
7	-3.417228010	0.896242880	14.449186860
6	2.297952090	3.493109060	10.805410650
6	3.621942680	3.978299720	13.247729290
7	-2.115579910	1.371572260	16.828935500
7	-2.136562550	1.508316920	11.996369100
6	-3.408237960	1.030468620	12.012732340
6	-4.065652810	0.719022790	13.273269260
1	4.101003550	4.227061270	14.199488180
1	1.750520110	3.374522790	9.864875630
6	-1.496444400	1.695765070	15.684644490
6	-2.181607070	1.444666750	14.417861950
6	-0.179164910	2.322861840	13.178579640
6	-1.534737570	1.755148710	13.179142760
6	0.496951880	2.564976200	14.416977760
6	-0.161780860	2.252705070	15.684169530
1	17.576395020	9.518711190	12.937601210

1	18.741200220	9.995790430	10.758002080
1	1.508518650	2.889356020	19.241336680
6	0.511507220	2.445132050	19.226275420
6	-0.120046060	2.161637030	20.450895740
6	-1.457850980	1.603777220	20.451393060
6	-2.104628440	1.354484550	19.227297150
1	-3.122024110	0.959169010	19.243026050
7	-2.103713550	1.320374500	21.626418580
7	0.536508830	2.421590670	21.625389450
6	-0.117497520	2.123036120	22.737499090
6	-1.430615290	1.575306540	22.737991270
1	0.392568210	2.322259060	23.685789730
1	-1.930407730	1.353199940	23.686675420
1	-5.896939590	0.049050040	14.201663290
6	-5.382102180	0.209102390	13.249329560
6	-6.081539410	-0.011637310	12.050499820
6	-5.420013350	0.301235910	10.781484710
6	-4.106361840	0.808677290	10.806910850
1	-3.637420460	1.114902440	9.866327100
7	-6.038658720	0.063813410	9.591734290
1	8.297967590	6.097523580	2.407298210
6	9.340851580	6.429897080	2.400287690
6	9.951948580	6.733333370	1.168523140
6	11.314422390	7.271560700	1.168681830
6	11.962483240	7.469047120	2.400125330
1	12.949259850	7.942164400	2.411115090
7	11.962867940	7.535556160	0.000531620
7	9.297579090	6.483489220	0.000397220
1	7.946980200	5.856892150	11.792443430
6	7.457901290	5.584057670	10.851907310
6	6.136874630	5.103465890	10.882913750
6	5.450752800	4.849341120	9.613718740
6	6.138812430	5.089382680	8.409148400
1	5.605872530	4.967243090	7.461032390
7	4.184988490	4.346852500	9.590360890

7	5.529371430	4.838326680	12.072271880
6	4.269074570	4.322359000	12.049162950
6	3.581454630	4.072618000	10.780220150
6	11.348142840	7.166077050	-3.633817410
7	12.014485710	7.350532240	-4.798589040
7	13.302213300	7.818202590	-7.188074810
7	11.987906700	7.279785610	-9.646635270
6	13.248042270	7.807111730	-9.635166080
6	13.920959630	8.081592470	-8.377166030
6	9.994426900	6.631691770	-3.633453090
7	8.099208910	5.778963970	-7.198108590
6	13.911193590	8.066672780	-10.844392570
6	15.224384000	8.601384940	-8.390245640
7	9.376581470	6.314328840	-4.801024680
7	9.425895140	6.268784730	-9.654068120
6	8.146152220	5.825582210	-9.641454740
6	7.464180940	5.571550600	-8.381063310
1	15.732178410	8.837037890	-7.453108060
1	13.407520430	7.890582230	-11.796744260
6	10.022988510	6.581528760	-5.955117740
6	9.344715980	6.297851660	-7.227648050
6	11.374224250	7.081938970	-8.470892500
6	10.014898540	6.544478930	-8.468143090
6	12.043186210	7.357665630	-7.218537590
6	11.355985290	7.103722170	-5.953626230
6	15.217279150	8.589193670	-10.857489990
6	15.888845410	8.862541470	-9.602410530
7	15.833758960	8.836639420	-12.056129540
7	17.159189550	9.375981780	-9.579077990
6	17.723541610	9.589711740	-10.757899930
6	17.064339780	9.321481630	-11.989792330
6	-0.134218810	2.197118940	-18.003988260
6	-1.474776230	1.636983340	-18.004497220
7	0.505515470	2.463327090	-16.826654390
7	1.755347590	3.057923940	-14.446562140

7	0.418234230	2.578368730	-11.994371330
6	1.651088260	3.149082090	-12.010199320
6	2.335575110	3.396870010	-13.270437060
7	-3.416085350	0.893237500	-14.447650440
6	2.298138950	3.492073450	-10.804201690
6	3.622816300	3.975836880	-13.246409420
7	-2.114691970	1.368903830	-16.827708770
7	-2.136380450	1.508397200	-11.995067090
6	-3.408252160	1.031101060	-12.011334300
6	-4.064857540	0.717325250	-13.271738900
1	4.102142820	4.224138750	-14.198156220
1	1.750488220	3.373742910	-9.863763900
6	-1.495756400	1.693539430	-15.683399930
6	-2.180904710	1.442639260	-14.416577270
6	-0.178692980	2.321575770	-13.177478510
6	-1.534363890	1.754168180	-13.177957610
6	0.497565210	2.563240900	-14.415862160
6	-0.161303350	2.251029470	-15.682998690
1	17.573412400	9.523496590	-12.938024500
1	18.739549790	9.998163900	-10.758627570
1	1.508028210	2.889703550	-19.240223760
6	0.511386550	2.444645750	-19.225149050
6	-0.120035890	2.160765200	-20.449747340
6	-1.457332940	1.601691210	-20.450236510
6	-2.103802620	1.351755900	-19.226100550
1	-3.120866730	0.955587530	-19.241824290
7	-2.103036580	1.317778310	-21.625220390
7	0.536176550	2.421388430	-21.624285680
6	-0.117621930	2.122251080	-22.736377060
6	-1.430220880	1.573302350	-22.736826350
1	0.392212450	2.321959490	-23.684689790
1	-1.929862890	1.350761610	-23.685486630
1	-5.895074770	0.044155100	-14.199861500
6	-5.380840510	0.206316880	-13.247558220
6	-6.080709960	-0.012960830	-12.048736730

6	-5.420168590	0.302517860	-10.779823980
6	-4.106761610	0.810631450	-10.805450350
1	-3.638105590	1.117903820	-9.865070880
7	-7.332107350	-0.549597060	-12.071578320
1	8.298558860	6.096903820	-2.406581980
6	9.341314510	6.429642520	-2.399419450
6	9.952175480	6.733248130	-1.167637800
6	11.314580660	7.271606850	-1.167723930
6	11.962722840	7.469256560	-2.399138620
1	12.949459970	7.942462620	-2.410001360
1	7.947197950	5.855368800	-11.791128200
6	7.458129540	5.582656430	-10.850558760
6	6.137370560	5.101511630	-10.881522990
6	5.451137590	4.847763880	-9.612343760
6	6.139113270	5.088206170	-8.407773520
1	5.606093720	4.966271860	-7.459673570
7	4.185273350	4.345492470	-9.588973830
7	5.530160860	4.835780890	-12.070866220
6	4.269767730	4.320144470	-12.047811260
6	3.581839450	4.071096310	-10.778874580
6	-13.248907010	-7.805846770	-9.635401610
7	-11.989723080	-7.276182320	-9.647250230
7	-9.426533940	-6.267904340	-9.655113410
7	-8.098088640	-5.781077030	-7.199514160
6	-7.463823540	-5.572338400	-8.382691150
6	-8.146488120	-5.825197650	-9.642903210
6	-13.919225490	-8.086017260	-8.377250470
7	-12.011760680	-7.354771540	-4.799595200
6	-6.138984540	-5.088550050	-8.409557540
6	-7.459323660	-5.581610430	-10.852183710
7	-13.299698000	-7.823882240	-7.188257890
7	-9.373540030	-6.319714910	-4.802156320
6	-9.991136340	-6.637515840	-3.634561650
6	-11.345286450	-7.170783810	-3.634883030
1	-7.949991510	-5.848578030	-11.793359530

1	-5.605690330	-4.966441400	-7.461675020
6	-12.041796980	-7.360680360	-7.219359850
6	-11.353680510	-7.107186230	-5.954710910
6	-9.343522770	-6.299806210	-7.228888680
6	-10.020835590	-6.585208920	-5.956276440
6	-10.014859380	-6.544488600	-8.469329680
6	-11.374558930	-7.081350760	-8.471858720
6	-5.451852780	-4.847684550	-9.614433750
6	-6.138579180	-5.101565040	-10.883154650
7	-4.186368800	-4.344132940	-9.591415010
6	-7.464234590	-5.571054110	8.381295300
6	-8.146981610	-5.823838000	9.641487240
7	-8.098417990	-5.779948580	7.198092950
7	-9.373776390	-6.319128710	4.800758640
7	-12.012202260	-7.353742210	4.798278520
6	-11.345678830	-7.169946820	3.633557270
6	-9.991399370	-6.636963640	3.633195250
7	-11.989455510	-7.276410260	9.645988010
6	-11.960803290	-7.472052740	2.398947940
6	-9.337648700	-6.436723070	2.399141210
7	-9.426922630	-6.266798750	9.653682460
7	-13.299722050	-7.823755840	7.187082190
6	-13.918958170	-8.086410390	8.376107350
6	-13.248323690	-7.806818270	9.634227450
1	-8.294503330	-6.105271370	2.406124200
1	-12.948223060	-7.943857590	2.409936030
6	-10.015195410	-6.543435070	8.467910400
6	-11.374670130	-7.080828390	8.470525540
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