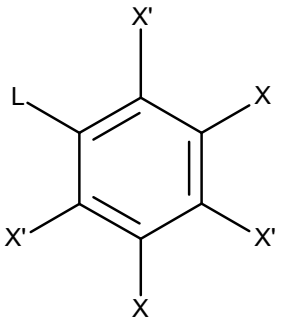
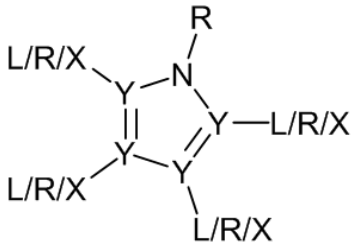
Claims

1. A stationary phase comprising a base material and at least one type of functional groups whereby the functional groups are selected from ---$N(R'_2)^+$-ArX with R' being H or C1-C6 alkyl, C1-C6 alkenyl, C1-C6 alkinyl, C6 aryl and ArX being



I or II



with

L being the bond to the --$N(R'_2)^+$

X and X' being independently of each other H, I, Br or Cl, or another electron withdrawing group like F or NO_2 or C1-C10 alkyl, C1-C10 alkenyl, C1-C10 alkinyl, C6-C12 aryl or an electron donating group,

R being H or C1-C6 alkyl, C1-C6 alkenyl, C1-C6 alkinyl, C6 aryl

Y being independently of each other C or N

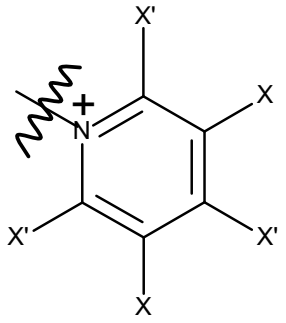
whereby in Formula I at least one X or X' is Cl, Br or I,

whereby in Formula II at least one L is present and

whereby at least one Y is C and whereby for each Y that is N there is no L/R/X at this N;

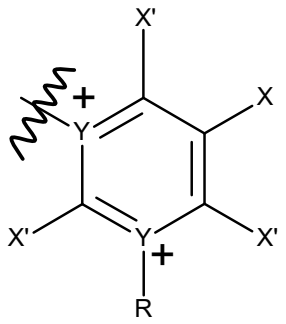
or the functional group is a positively charged heterocyclic aromatic group carrying at least one Cl, Br or I residue.

2. Stationary phase according to claim 1, characterized in that the positively charged heterocyclic aromatic group carrying at least one Cl, Br or I residue has one of the following structures



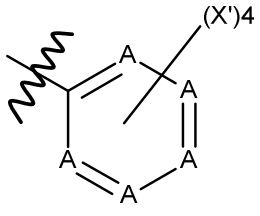
III

with X being independently of each other H, I, Br or Cl, and X' being independently of each other H, I, Br, Cl, F, NO_2, or another electron withdrawing group or C1-C10 alkyl, C1-C10 alkenyl, C1-C10 alkinyl, C6-C12 aryl or an electron donating group, whereby at least one X or X' is Cl, Br or I;



IV

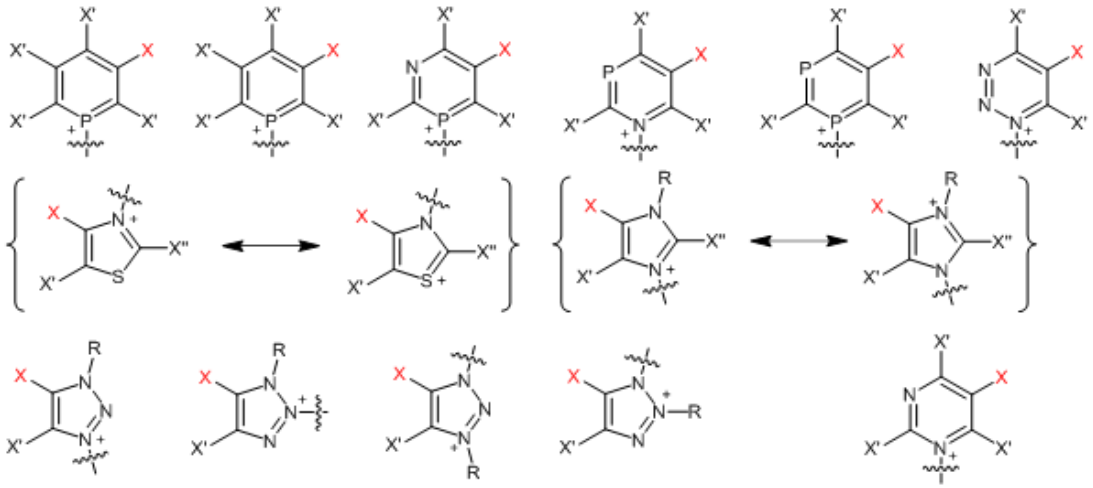
with R being H, C1-C10 alkyl, aryl, C1-C10 alkenyl, C1 -C10 alkinyl or an electron withdrawing group or an electron donating group,
Y being independently of each other N or P,
X being independently of each other H, I, Br or Cl, and X' being independently of each other H, I, Br, Cl, F, NO_2, or another electron withdrawing group or C1-C10 alkyl, C1-C10 alkenyl, C1-C10 alkinyl, C6-C12 aryl or an electron donating group, whereby at least one X or X' is Cl, Br or I;



V

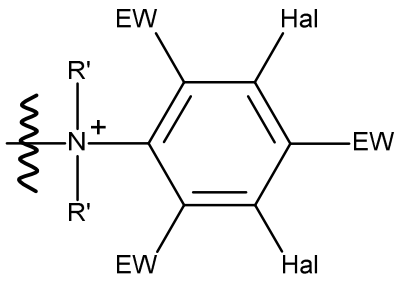
whereby one atom A of the aromatic ring, which is not the one providing for connection to the base material, is O^+ or S^+ and the other ring atoms A are C-X' with X' being independently of each other H, I, Br, Cl, or another electron

withdrawing or C1-C10 alkyl, C1-C10 alkenyl, C1-C10 alkinyl, C6-C12 aryl or an electron donating group, whereby at least one X' is Cl, Br or I;
or one of the following structures



with X being independently of each other H, a C1 to C6 alkyl group, I, Br or Cl, and X' and X'' being independently of each other H, a C1 to C6 alkyl group, I, Br, Cl, or another electron withdrawing or donating group, R being H, C1-C6 alkyl, C6 aryl, C1-C6 alkenyl, C1-C6 alkinyl or an electron withdrawing or donating group and whereby at least one X or X' is Cl, Br or I.

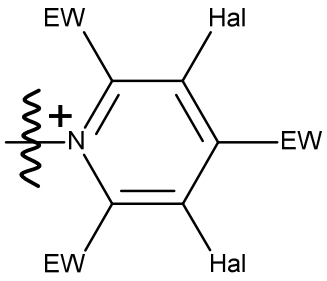
3. Stationary phase according to claim 1 or claim 2, characterized in that the functional group has one heterocyclic ring.
4. Stationary phase according to one or more of claims 1 to 3, characterized in that functional group is selected from one or more of the following



VI

with R' being H or C1-C6 alkyl, preferably methyl, ethyl, propyl, isopropyl, EW being independent of each other H, CH_3 or an electron withdrawing group

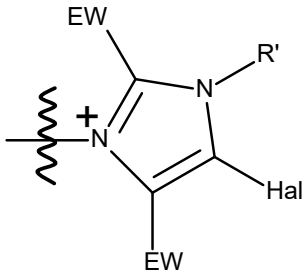
and Hal being independent of each other H, CH_3, Cl, Br or I, whereby at least one Hal is Cl, Br or I;



VII

with EW being independently of each other H, CH_3, an electron withdrawing group

and Hal being independent of each other H, CH_3, Cl, Br or I, whereby at least one Hal is Cl, Br or I;

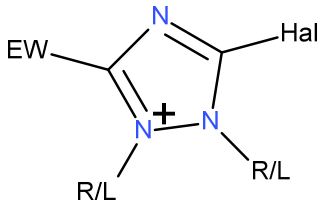


VIII

with R' being H or C1-C6 alkyl, preferably methyl, ethyl, propyl, isopropyl,

EW being independent of each other H, CH_3 or an electron withdrawing group

and Hal being Cl, Br or I.



IX

with one R/L being H or C1-C6 alkyl and the other R/L being the connection to the base material,

EW being H, CH_3 or an electron withdrawing group

and Hal being Cl, Br or I.

5. Stationary phase according to one or more of claims 1 to 4, characterized in that the functional group is covalently bonded to the base material.

6. Stationary phase according to one or more of claims 1 to 5, characterized in that the base material is a bead or a membrane.

7. Stationary phase according to one or more of claims 1 to 6, characterized in that the functional groups are bonded to the base material via a linker.

8. Stationary phase according to one or more of claims 1 to 6, characterized in that the functional groups are endgroups of polymer chains grafted onto the base material.

9. Stationary phase according to one or more of claims 1 to 8, characterized in that the base material is an organic polymer.

10. A chromatography column comprising a stationary phase according to one or more of claims 1 to 9.

11. A process for the separation of a target molecule from at least one other compound whereby a stationary phase according to one or more of claims 1 to 9 is contacted with a liquid comprising the target molecule and the at least one other compound and whereby the target molecule shows an interaction with the stationary phase that is different from the interaction of the other compound.

12. A process according to claim 11 characterized in that the process is a process for chromatographic separation of a target molecule from at least one other compound whereby a stationary phase according to one or more of claims 1 to 9 is present in a chromatography column and the liquid comprising the target molecule and the at least one other

compound is run through the column whereby the target molecule and the other compounds present in the liquid are eluted from the column depending on their interaction with the stationary phase.

13. A process according to one or more of claims 11 to 12 characterized in that the target molecule is a protein.

14. A process according to one or more of claims 11 to 13 characterized in that the process is performed by loading the stationary phase according to the present invention with an aqueous loading buffer of a certain pH and a certain ionic strength and eluting the target molecule with an aqueous elution buffer of the same pH but another ionic strength.