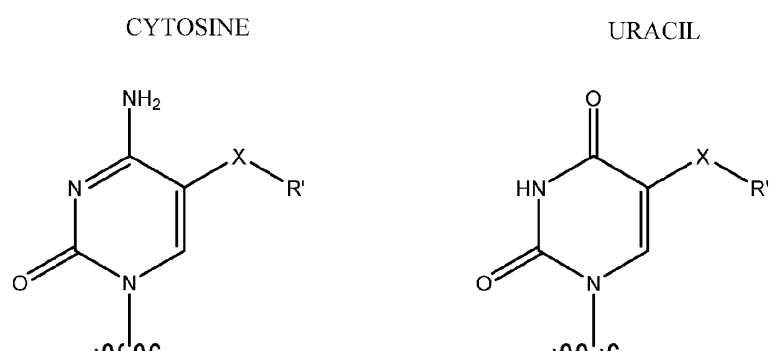




~~~~~ - denotes attachment to backbone of nucleic acid molecules (e.g., phosphate deoxyribose backbone)

X - denotes a linker attached to the 5-position of the pyrimidine molecule (uracil or cytosine)

R' - denotes a moiety attached to the 5-position of the pyrimidine molecule via the linker (X)

**FIG. 1**

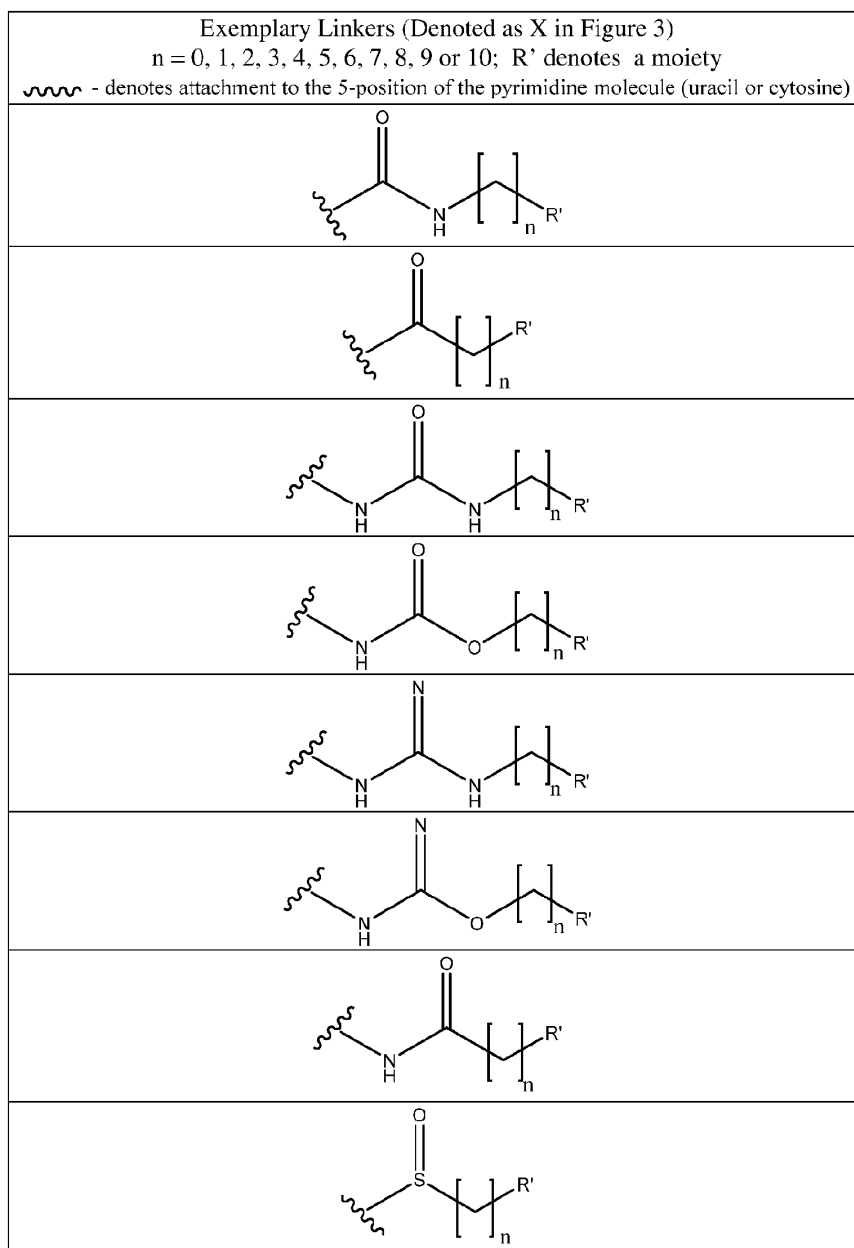


FIG. 1 (cont.)

3/19

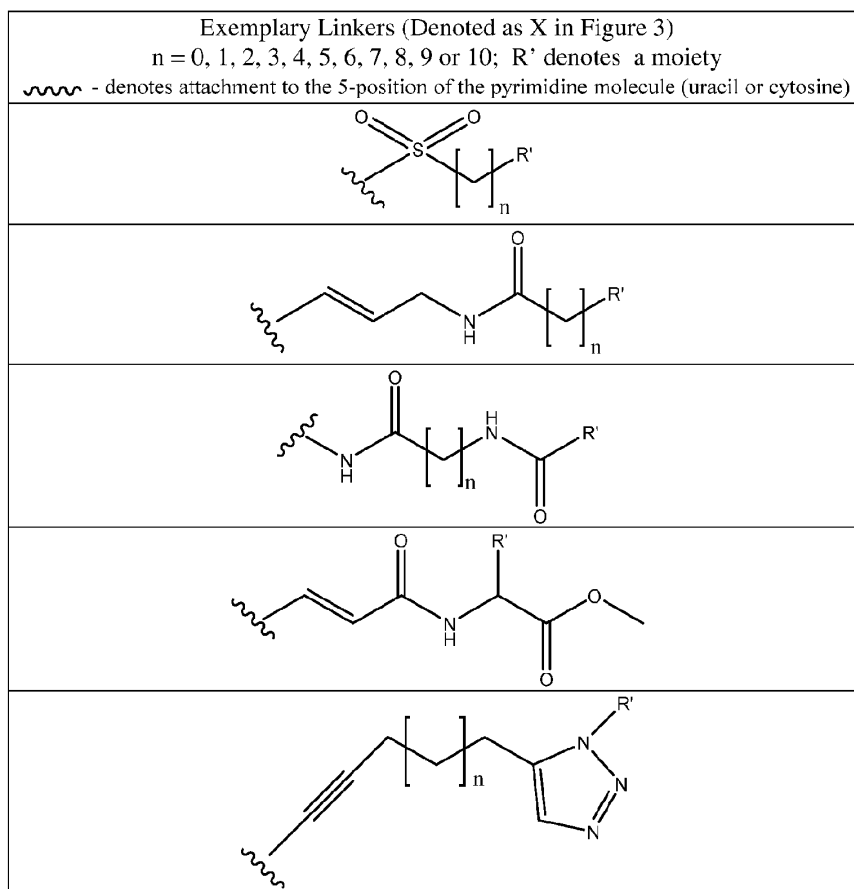


FIG. 1 (cont.)

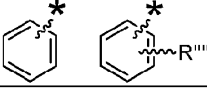
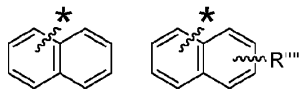
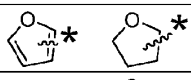
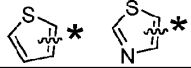
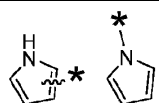
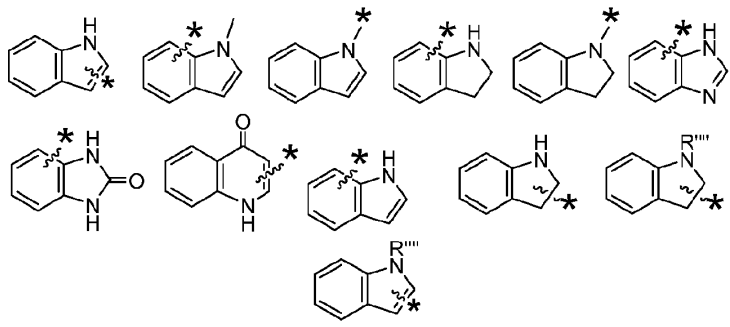
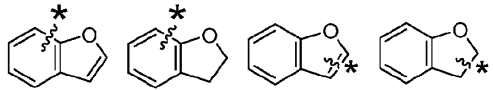
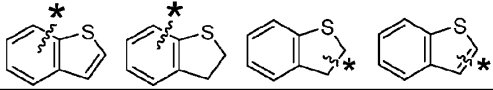
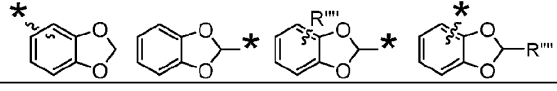
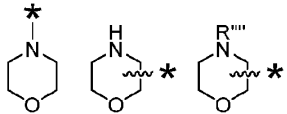
| Group | R' Structures (* denotes the point of attachment of the R' group to X (linker))      |
|-------|--------------------------------------------------------------------------------------|
| I     |     |
| II    |    |
| III   |     |
| IV    |     |
| V     |     |
| VI    |   |
| VII   |  |
| VIII  |  |
| IX    |  |
| X     |  |

FIG. 1 (cont.)

| Group | R' Structures (* denotes the point of attachment of the R' group to X (linker))                                                                                                                                                                                                                           |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XI    |                                                                                                                                                                                                                                                                                                           |
| XII   |                                                                                                                                                                                                                                                                                                           |
| XIII  | $\text{*}-\text{CH}_3$ $\text{H}_3\text{C}-\underset{\text{CH}_3}{\overset{\text{*}}{\text{C}}}-\text{H}$ $\text{H}_3\text{C}-\underset{\text{H}_3\text{C}-\text{CH}_2}{\overset{\text{*}}{\text{C}}}-\text{H}$ $\text{H}_3\text{C}-\underset{\text{H}_3\text{C}}{\overset{\text{*}}{\text{C}}}-\text{H}$ |
| XIV   | $\text{*}-\underset{\text{H}_2}{\text{C}}-\text{OH}$ $\text{*}-\underset{\text{CH}_3}{\text{C}}-\text{OH}$ $\text{*}-\underset{\text{H}_3\text{C}}{\text{C}}(\text{CH}_3)-\text{OH}$                                                                                                                      |
| XV    | $\text{*}-\underset{\text{H}_2}{\text{C}}-\text{OR}''$ $\text{*}-\underset{\text{CH}_3}{\text{C}}-\text{OR}''$ $\text{*}-\underset{\text{H}_3\text{C}}{\text{C}}(\text{CH}_3)-\text{OR}''$ $\text{*}-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$                                            |
| XVI   | $\text{*}-\text{CH}_2-\text{SR}''$ $\text{*}-\underset{\text{CH}_3}{\text{C}}-\text{SR}''$ $\text{*}-\underset{\text{H}_3\text{C}}{\text{C}}(\text{CH}_3)-\text{SR}''$                                                                                                                                    |
| XVII  | $\text{*}-\underset{\text{H}_2}{\text{C}}-\text{N}^+(\text{R}'')_3$ $\text{*}-\underset{\text{CH}_3}{\text{C}}-\text{N}^+(\text{R}'')_3$ $\text{*}-\underset{\text{H}_3\text{C}}{\text{C}}(\text{CH}_3)-\text{N}^+(\text{R}'')_3$                                                                         |
| XVIII | $\text{*}-\text{C}(=\text{O})\text{OH}$ $\text{*}-\text{C}(=\text{O})\text{OR}''$ $\text{*}-\text{C}(=\text{O})\text{NH}_2$ $\text{*}-\text{C}(=\text{O})\text{NHR}''$ $\text{*}-\text{C}(=\text{O})\text{NR}''\text{R}'''$                                                                               |
| XIX   | $\text{*}-\text{C}(\text{N}=\text{NH}_2)$ $\text{*}-\text{C}(\text{N}=\text{NHR}'')$ $\text{*}-\text{C}(\text{N}=\text{NR}''\text{R}''')$ $\text{*}-\text{C}(\text{N}=\text{NR}'')\text{NHR}''$ $\text{*}-\text{C}(\text{N}=\text{NR}'')\text{NR}''\text{R}'''$                                           |
| XX    | $\text{*}-\text{CH}=\text{O}$ $\text{*}-\text{C}(=\text{O})\text{CH}_3$ $\text{*}-\text{CH}=\text{NOH}$ $\text{*}-\text{C}(\text{NOH})\text{CH}_3$ $\text{*}-\text{CH}=\text{NOR}''$ $\text{*}-\text{C}(\text{NOR}'')\text{CH}_3$                                                                         |

R'' and R''' are, independently, selected from a halogen (-F, -Cl, -Br, -I); nitrile (-CN); -NH<sub>2</sub>; -OH; branched lower alkyl (C1-C20); linear lower alkyl (C1-C20); primary amide; secondary amide; tertiary amide; alkoxy group.

**FIG. 1 (cont.)**

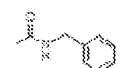
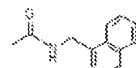
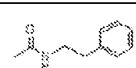
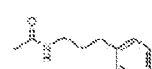
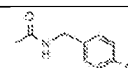
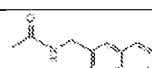
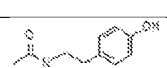
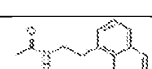
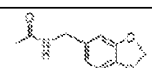
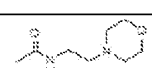
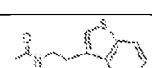
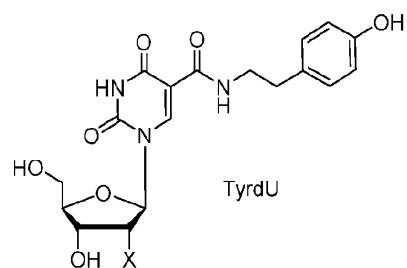
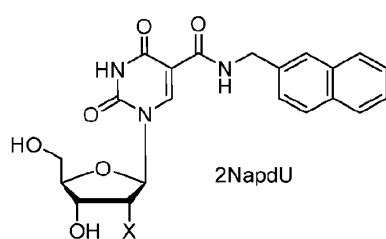
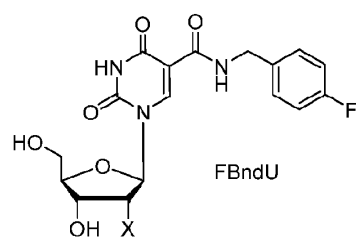
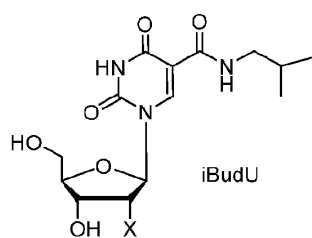
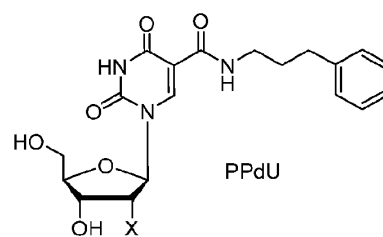
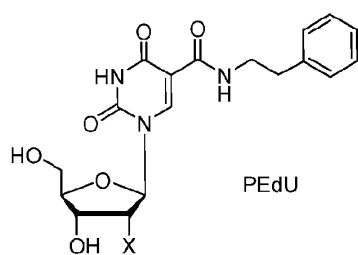
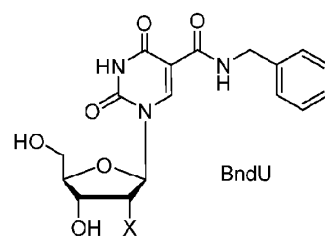
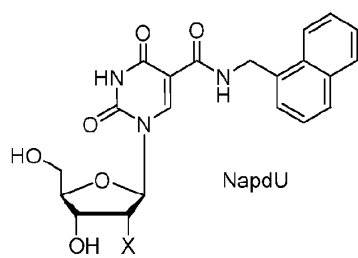
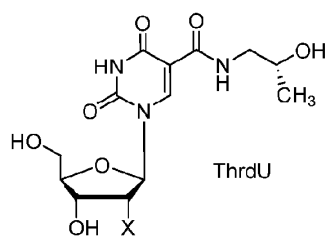
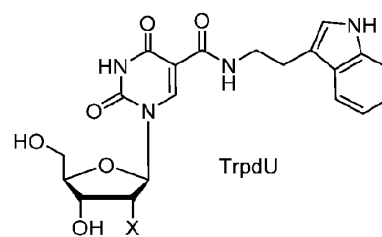
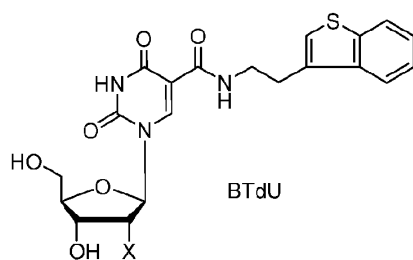
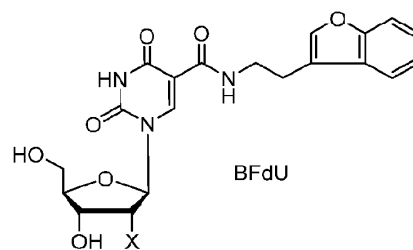
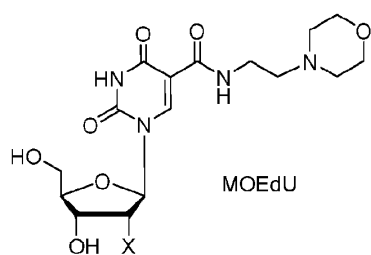
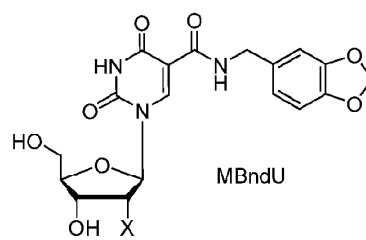
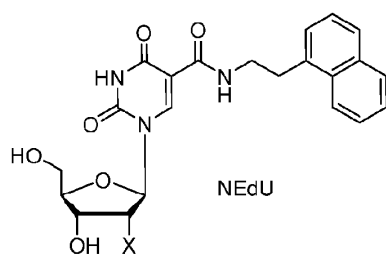
| Abbreviation | 5-dU Modification Attached via Amide Linkage | Chemical Structure                                                                    |
|--------------|----------------------------------------------|---------------------------------------------------------------------------------------|
| Bn           | benzylmethyl                                 |    |
| Nap          | 1-naphthylmethyl                             |    |
| PE           | 2-phenylethyl                                |    |
| PP           | 3-phenylpropyl                               |    |
| iBu          | iso-butyl                                    |    |
| FBn          | 4-fluorobenzylmethyl                         |    |
| 2Nap         | 2-naphthylmethyl                             |    |
| Tyr          | tyrosyl                                      |   |
| NE           | 1-naphthylethyl                              |  |
| MBn          | 3,4-methylenedioxy benzyl                    |  |
| MOE          | morpholinoethyl                              |  |
| BF           | 3-benzofuranylethyl                          |  |
| BT           | 3-benzothiophenylethyl                       |  |
| Trp          | 3-indole-2-ethyl                             |                                                                                       |
| Thr          | (R)-2-hydroxypropyl                          |                                                                                       |

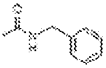
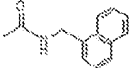
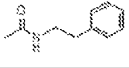
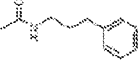
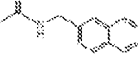
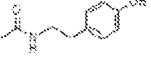
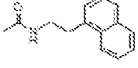
FIG. 2

**FIG. 2 (cont.)**

8/19

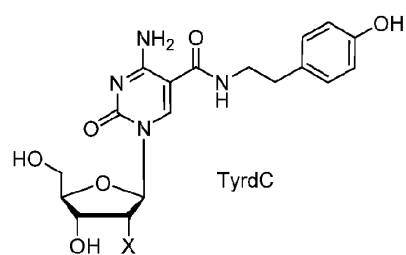
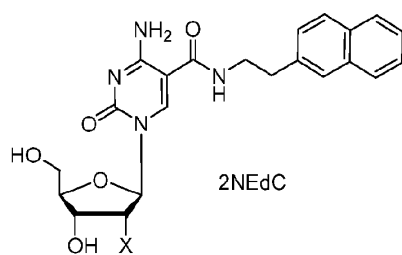
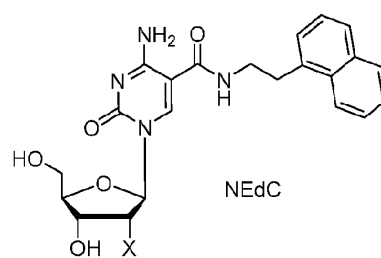
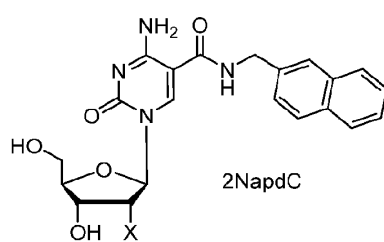
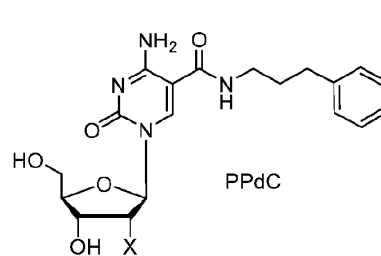
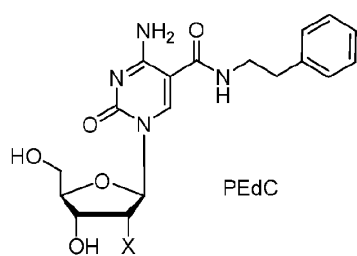
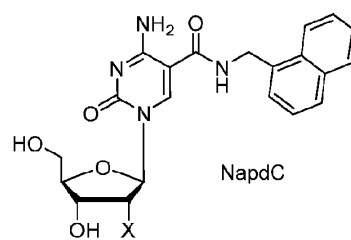
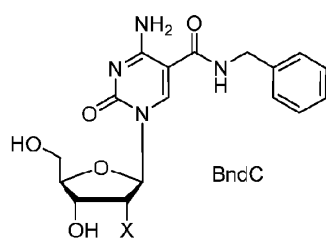
**FIG. 2 (cont.)**

9/19

| Abbreviation | 5-dC Modification Attached via Amide Linkage | Chemical Structure                                                                  |
|--------------|----------------------------------------------|-------------------------------------------------------------------------------------|
| Bn           | benzylmethyl                                 |  |
| Nap          | <i>1</i> -naphthylmethyl                     |  |
| PE           | 2-phenylethyl                                |  |
| PP           | 3-phenylpropyl                               |  |
| 2Nap         | 2-naphthylmethyl                             |  |
| Tyr          | tyrosyl                                      |  |
| NE           | <i>1</i> -naphthylethyl                      |  |
| 2NE          | 2-naphthyl-2-ethyl                           |                                                                                     |

**FIG. 3**

10/19

**FIG. 3 (cont.)**

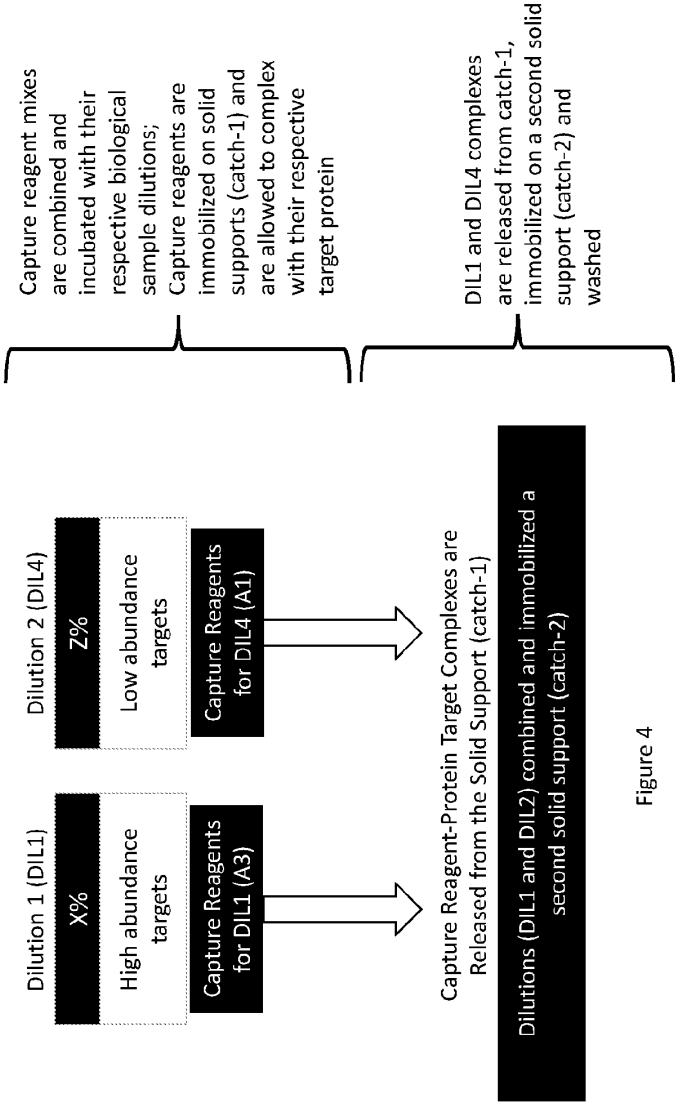


Figure 4

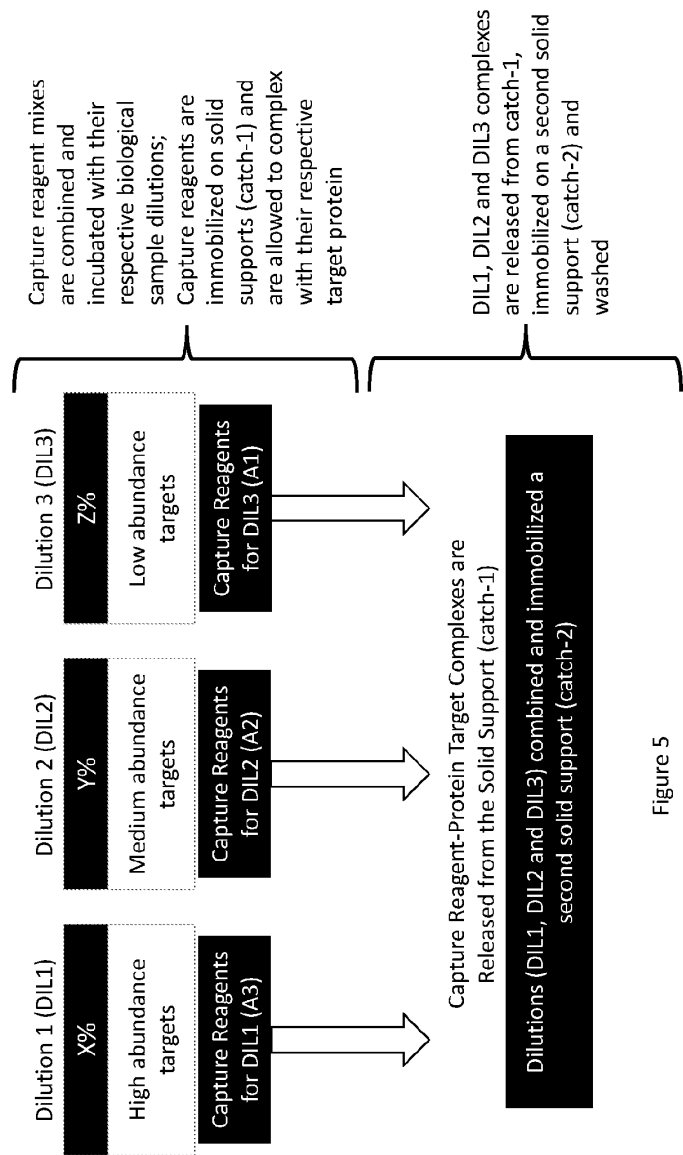


Figure 5

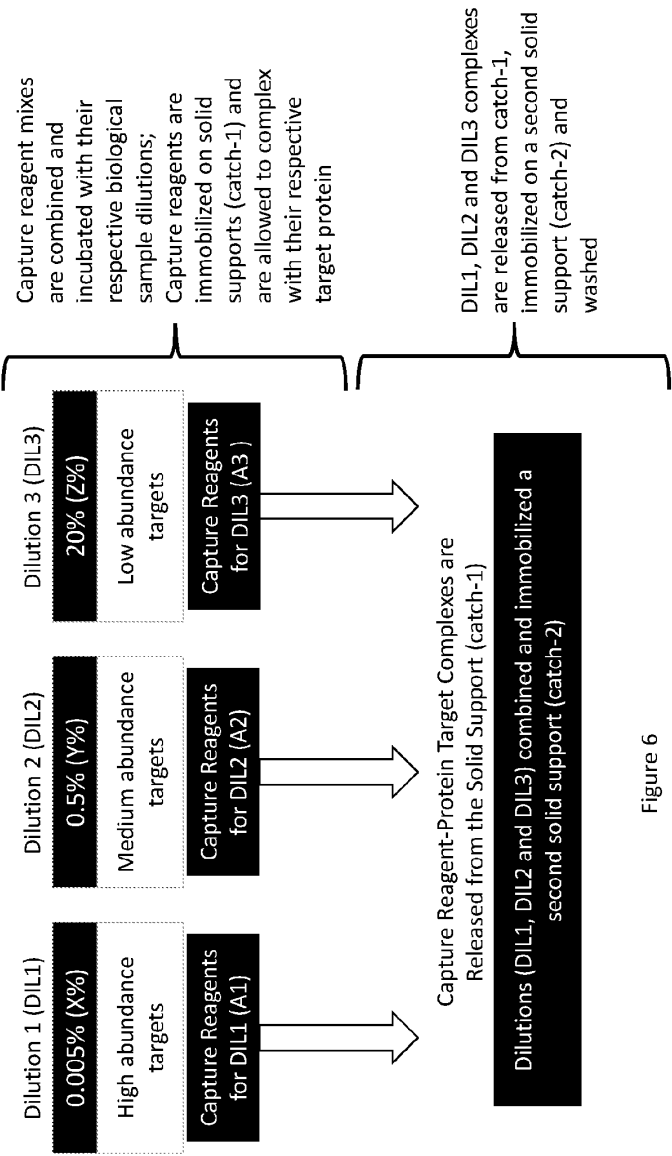


Figure 6

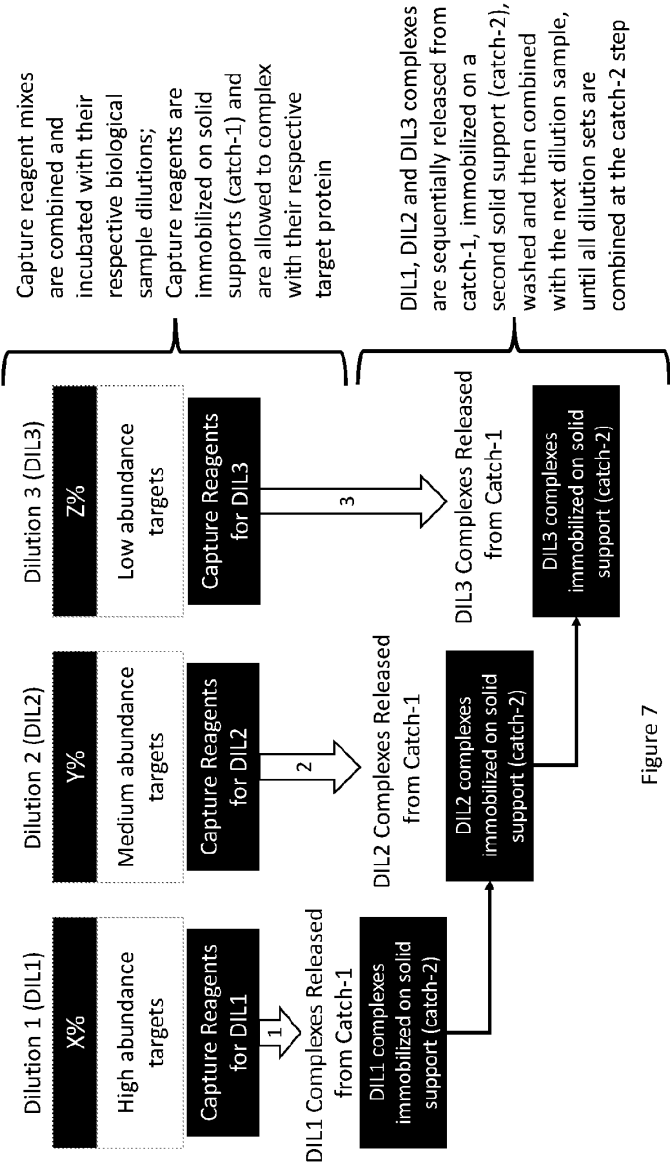
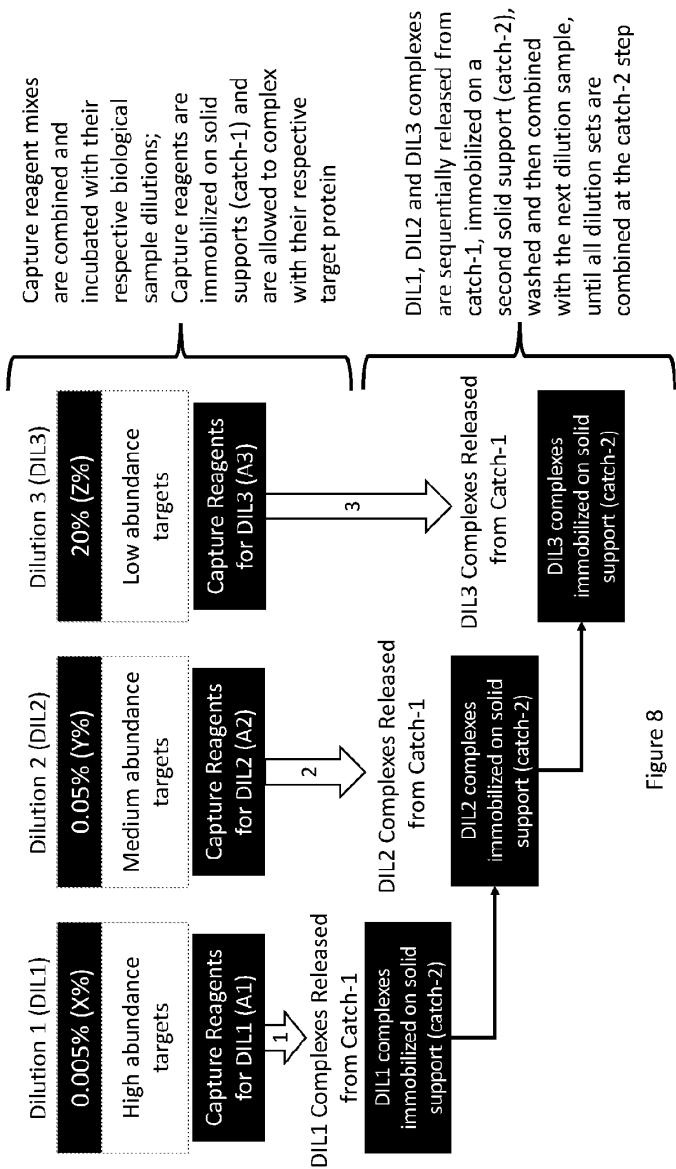


Figure 7



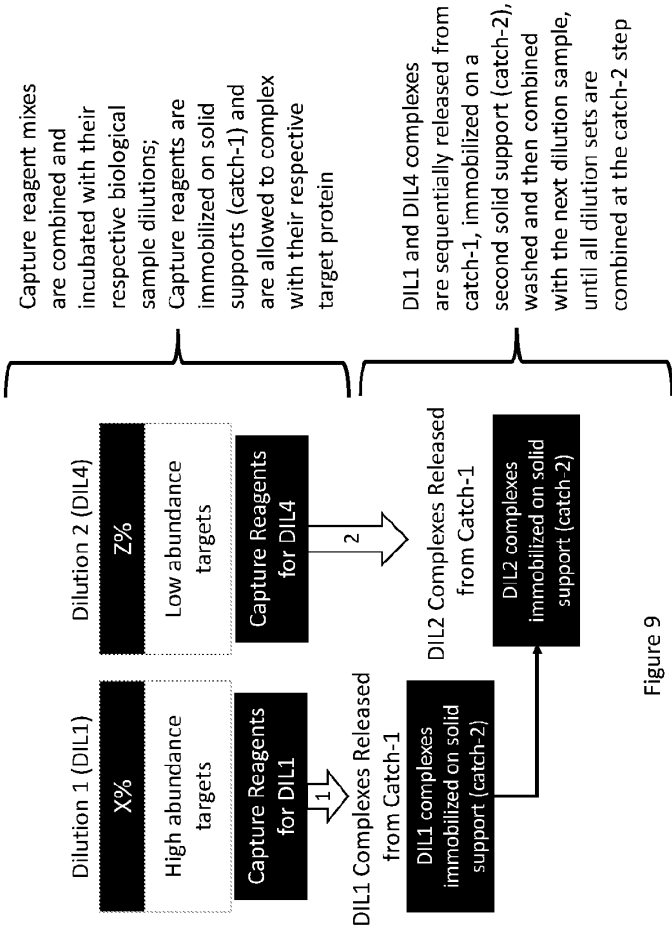
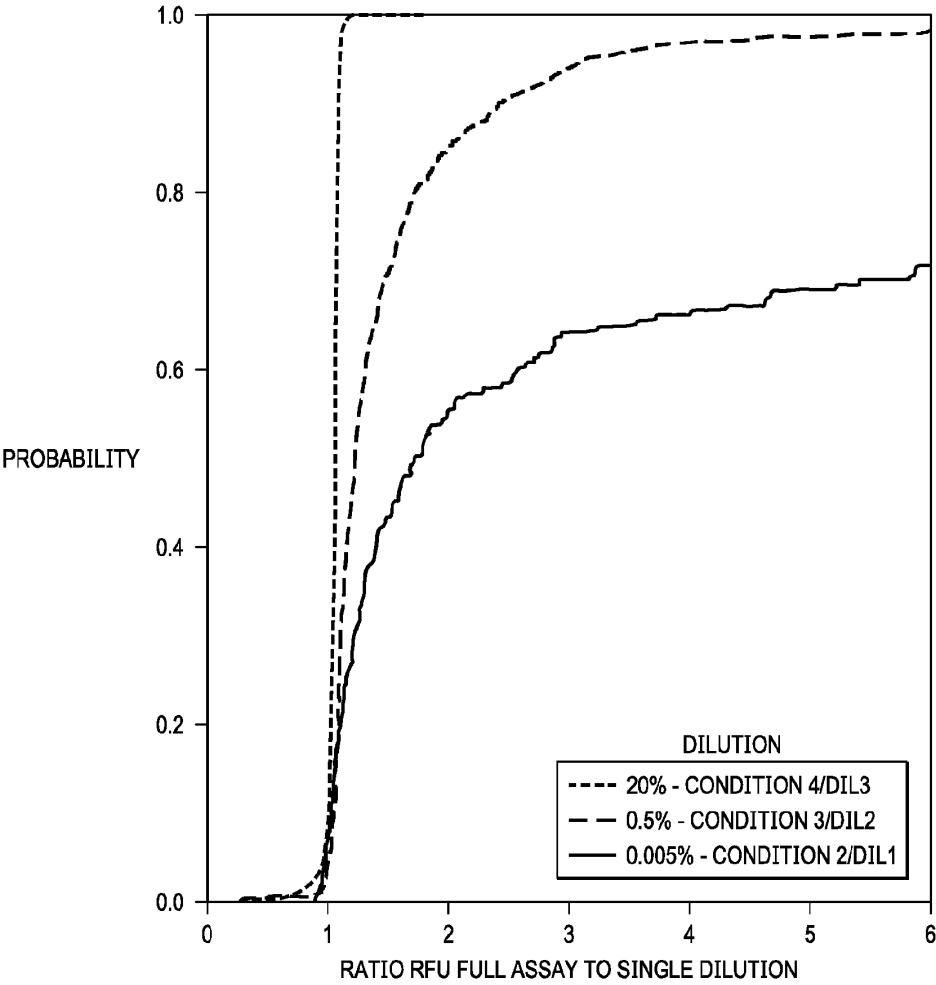
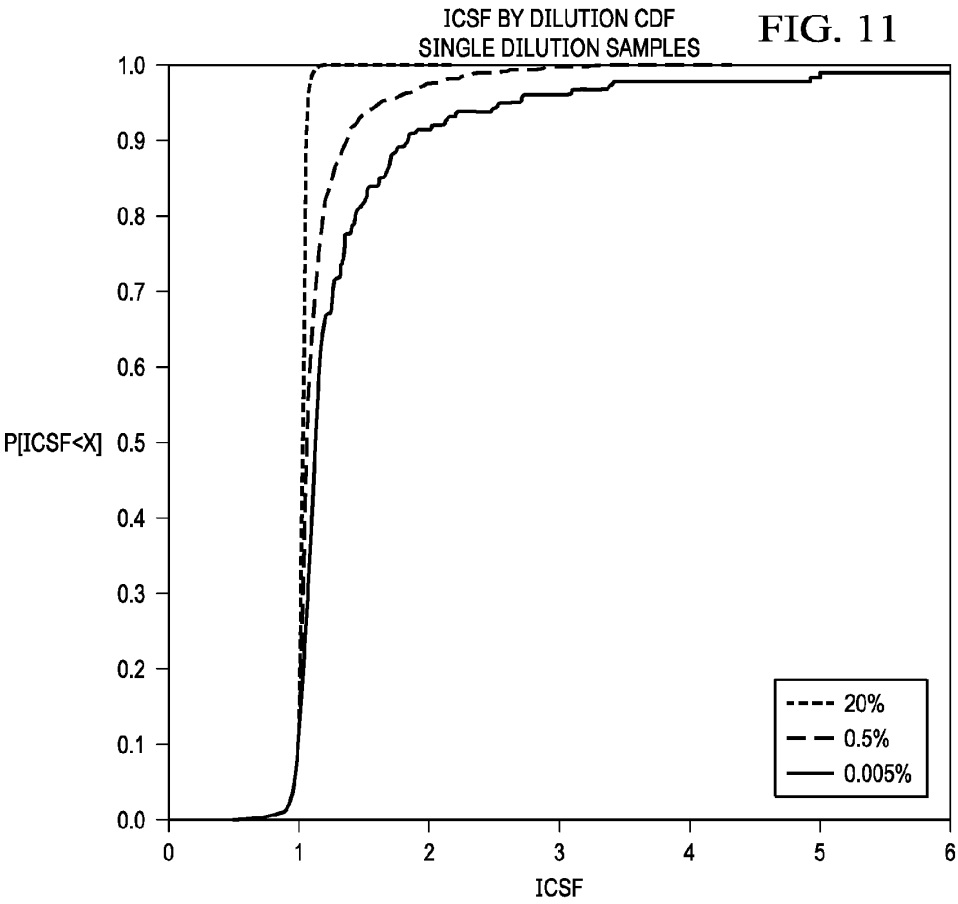


Figure 9

FIG. 10





19/19

