Figure captions

Figure 1: Schematic diagram of the laboratory-scale forward osmosis (FO) system.

Figure 2: Schematic diagram of the laboratory-scale (NF) nanofiltration system.

Figure 3: Zeta potential of the HTI and NF90 membranes as a function of pH. The background electrolyte solution was 1 mM KCl.

Figure 4: Water flux as a function of time at different draw solution (NaCl) concentrations in (a) PRO mode and (b) FO mode. Both feed and draw solution temperatures were 22.5 ± 1 ºC and the cross-flow velocity at both sides of the membrane was 9 cm/s. Milli-Q water was used as the feed solution (pH 6).

Figure 5: Water and reverse salt flux at different draw solution (NaCl) concentrations in PRO and FO modes. Experimental conditions are as described in Figure 4.

Figure 6: The rejection of charged TrOCs by the HTI and NF90 membranes as a function of molecular weight at different draw solution (NaCl) concentrations in (a) PRO, (b) FO and (c) RO modes. Compounds not detectable in the permeate samples are denoted by *, #, and & corresponding to the PRO, FO, and RO modes, respectively. Experiments conducted in RO mode were in recirculation configuration, with a feed temperature of 22.5 ± 1ºC, cross-flow velocity of 30.4 cm/s, and permeate flux of approximately 14.6 L/m^2h. Other experimental conditions are as described in Figure 4.

Figure 7: The rejection of neutral TrOCs by the HTI and NF90 membranes as a function of molecular weight at different draw solution (NaCl) concentrations in (a) PRO, (b) FO and (c) RO modes. Compounds not detectable in the permeate samples are denoted by *, #, and & corresponding to the PRO, FO, and RO modes respectively. Experimental conditions are as described in Figure 6.

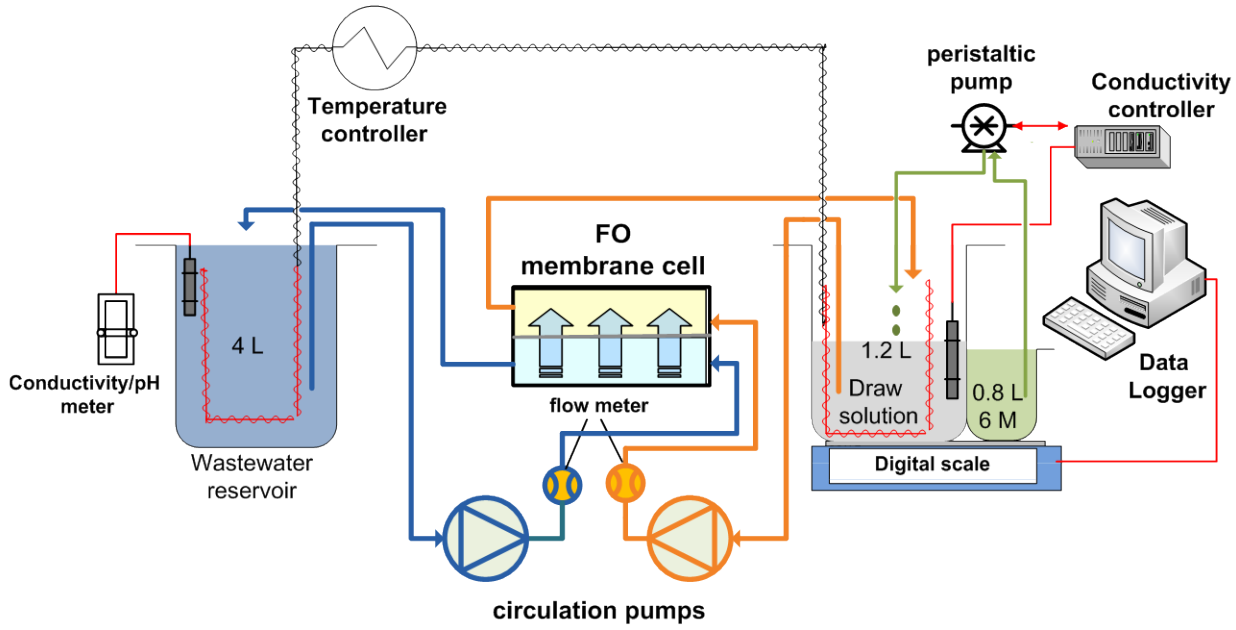
Temperature controller
peristaltic pump
Conductivity controller
FO membrane cell
4 L
Conductivity/pH meter
Wastewater reservoir
flow meter
1.2 L
Draw solution
0.8 L
6 M
Digital scale
Data Logger
circulation pumps

Figure 1

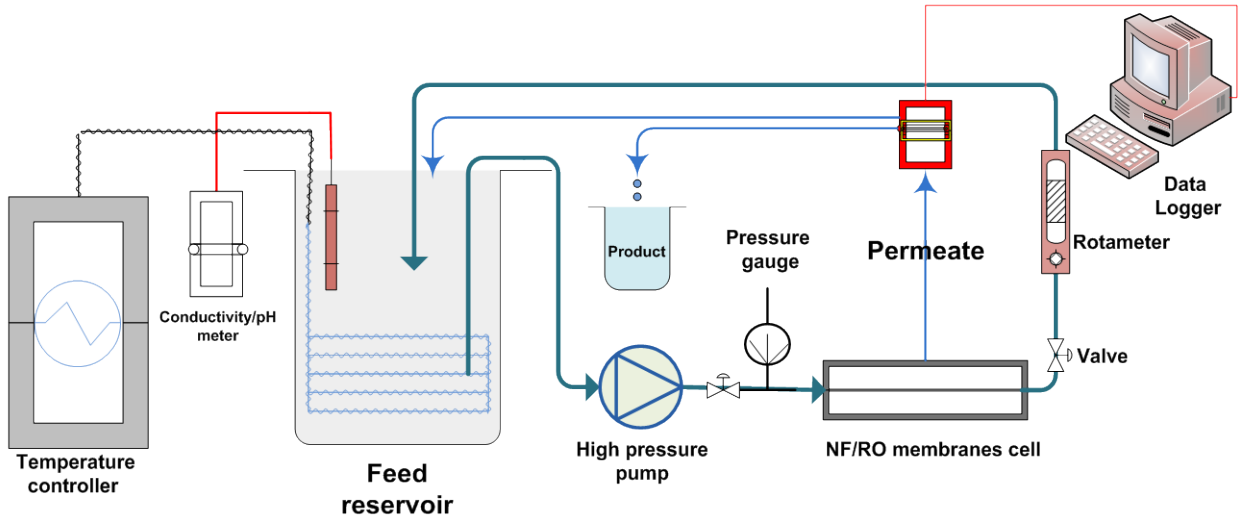
Temperature controller
Conductivity/pH meter
Feed reservoir
Product
High pressure pump
Pressure gauge
Permeate
NF/RO membranes cell
Rotameter
Valve
Data Logger

Figure 2

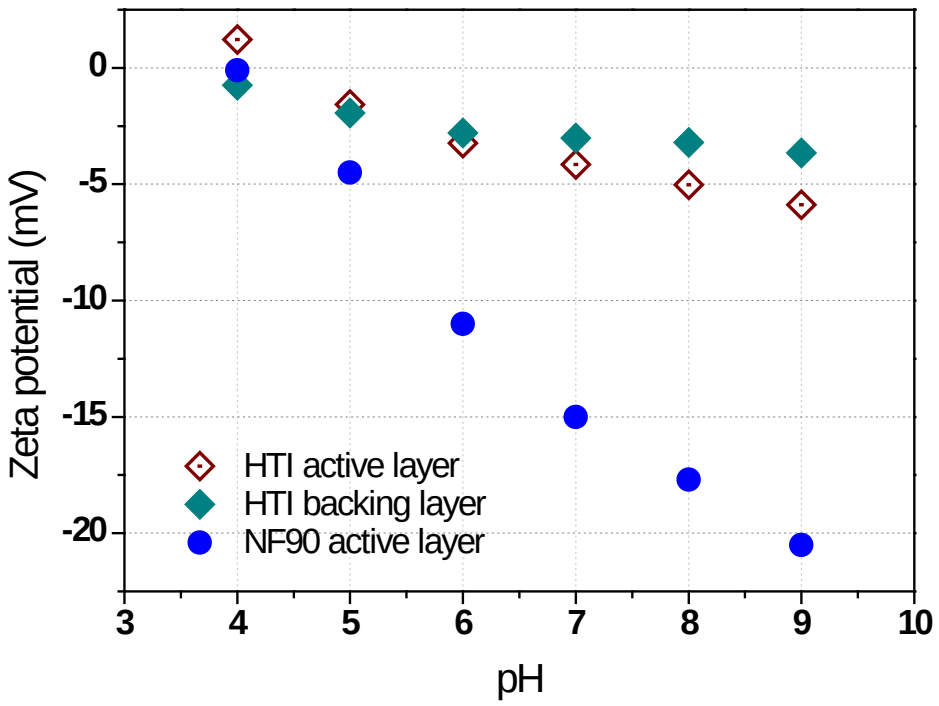
Zeta potential (mV)
0
-5
-10
-15
-20
3
4
5
6
7
8
9
10
pH
HTI active layer
HTI backing layer
NF90 active layer

Figure 3

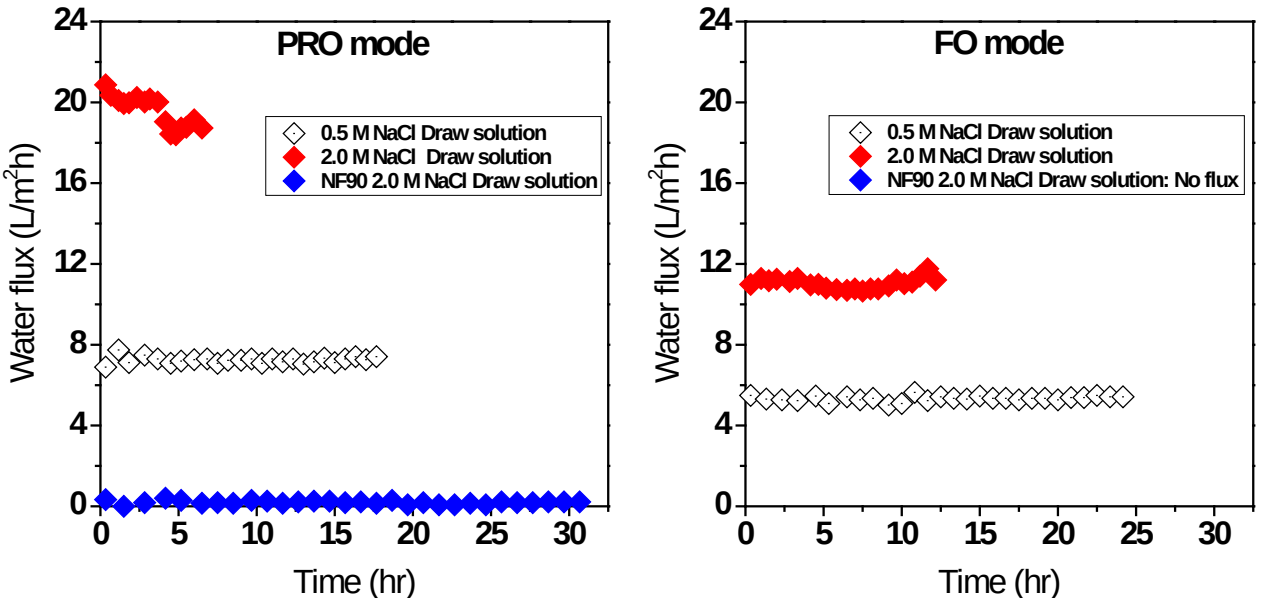
PRO mode
0.5 M NaCl Draw solution
2.0 M NaCl Draw solution
NF90 2.0 M NaCl Draw solution
Water flux (L/m2h)
Time (hr)
FO mode
0.5 M NaCl Draw solution
2.0 M NaCl Draw solution
NF90 2.0 M NaCl Draw solution: No flux
Water flux (L/m2h)
Time (hr)

Figure 4

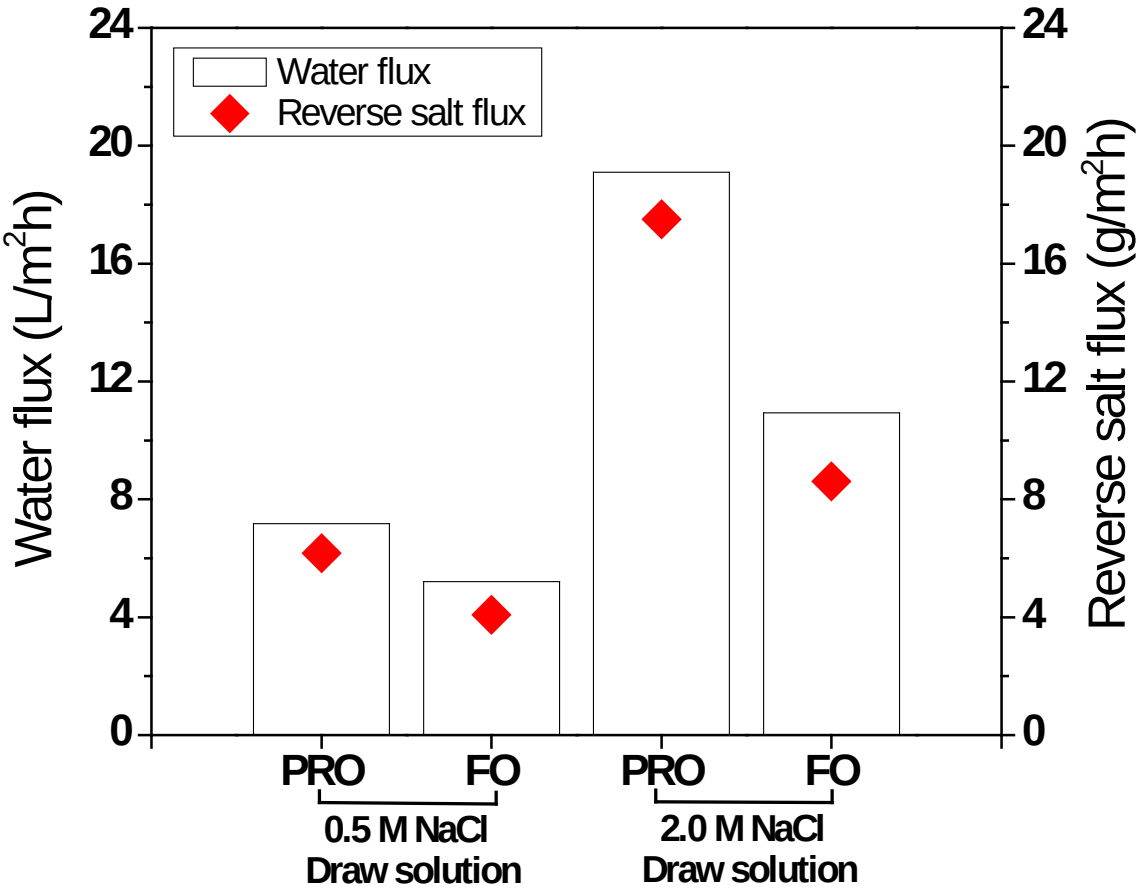
Water flux
Reverse salt flux
Water flux (L/m2h)
Reverse salt flux (g/m2h)
0
4
8
12
16
20
24
PRO
FO
PRO
FO
0.5 M NaCl
Draw solution
2.0 M NaCl
Draw solution

Figure 5

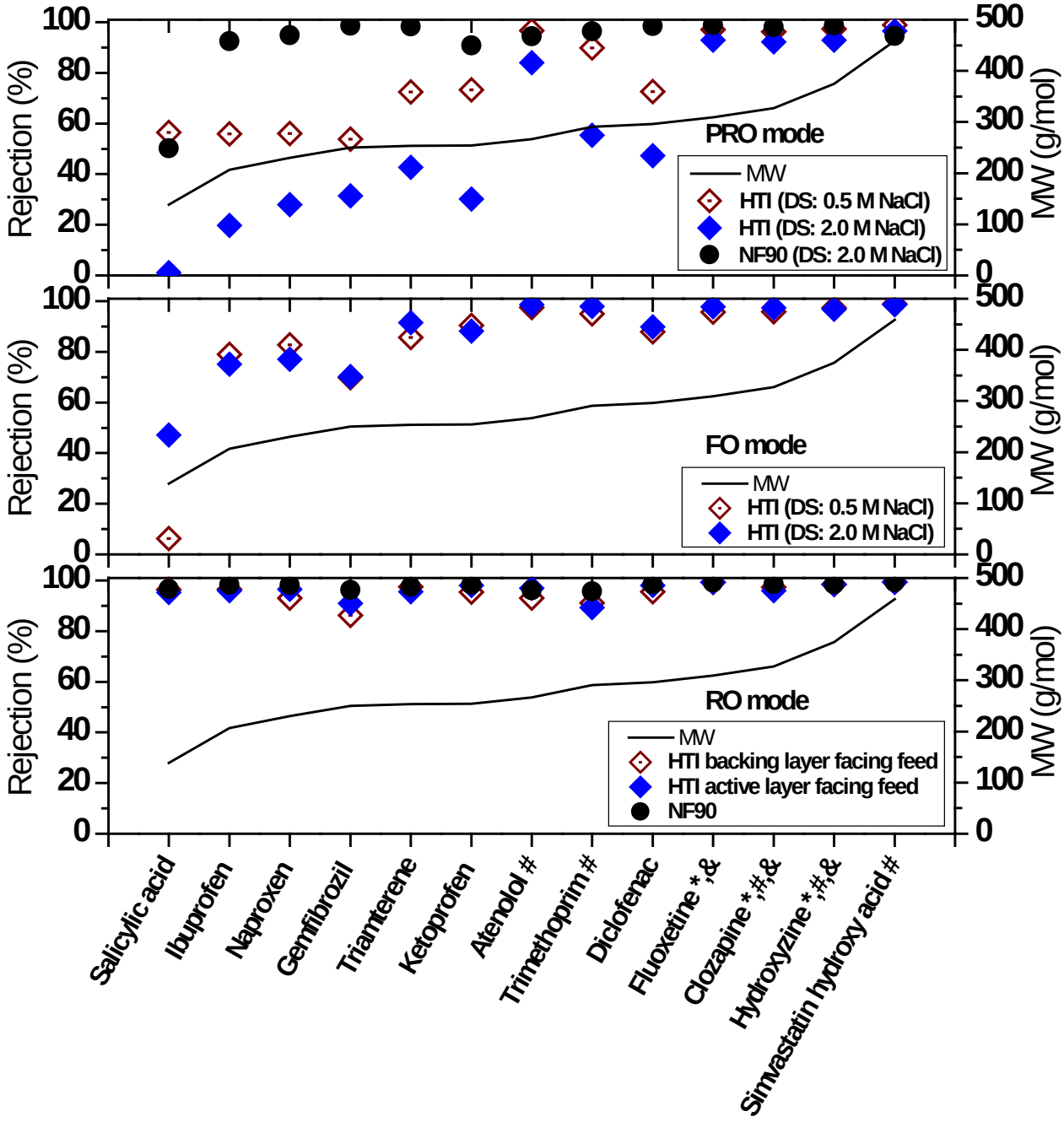
Rejection (%)
MW (g/mol)
PRO mode
MW
HTI (DS: 0.5 M NaCl)
HTI (DS: 2.0 M NaCl)
NF90 (DS: 2.0 M NaCl)
FO mode
MW
HTI (DS: 0.5 M NaCl)
HTI (DS: 2.0 M NaCl)
RO mode
MW
HTI backing layer facing feed
HTI active layer facing feed
NF90
Salicylic acid
Ibuprofen
Naproxen
Gemfibrozil
Triamterene
Ketoprofen
Atenolol #
Trimethoprim #
Diclofenac
Fluoxetine *,&
Clozapine *,#,&
Hydroxyzine *,#,&
Simvastatin hydroxy acid #

Figure 6

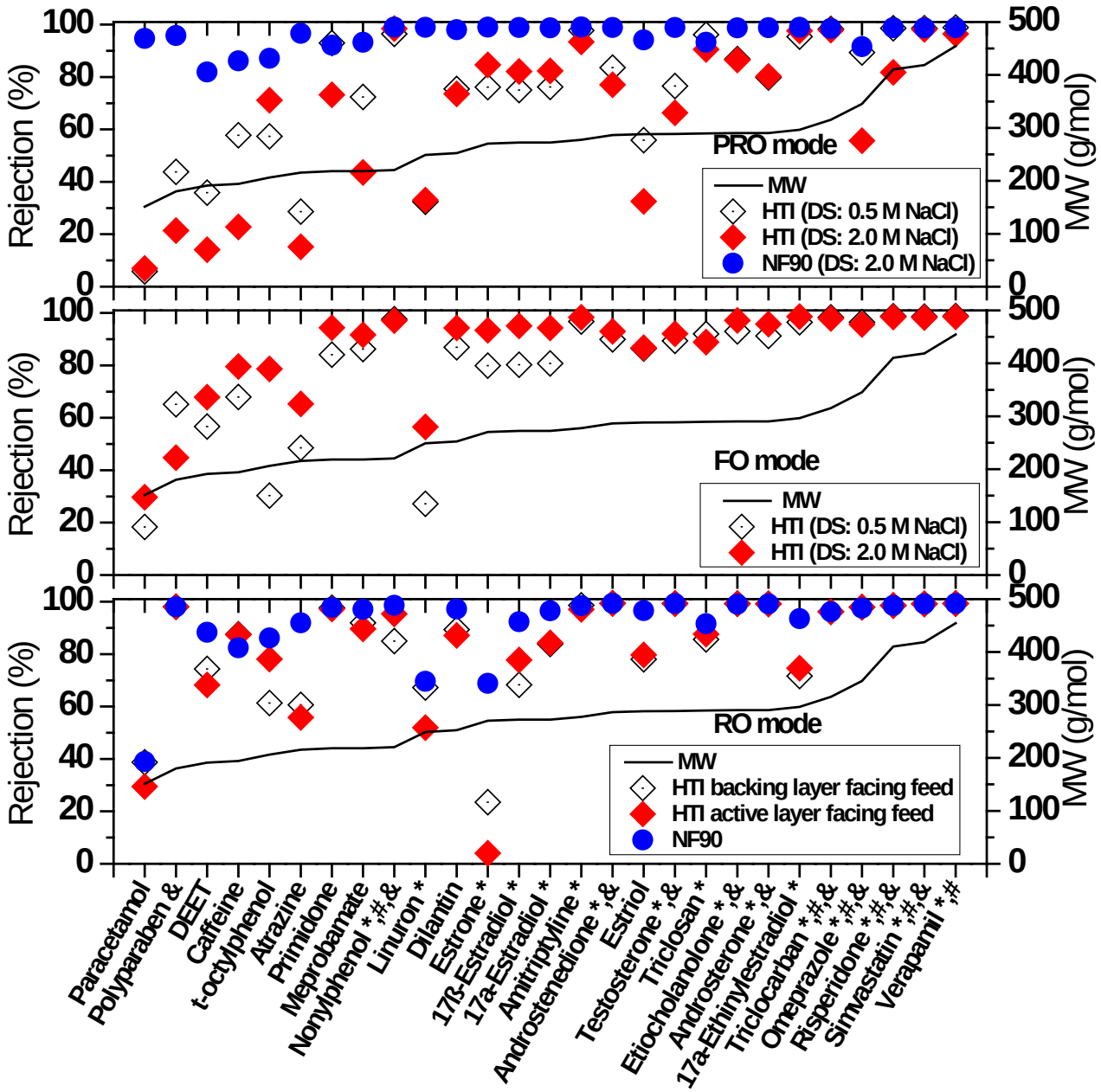
Rejection (%)
MW (g/mol)
PRO mode
MW
HTI (DS: 0.5 M NaCl)
HTI (DS: 2.0 M NaCl)
NF90 (DS: 2.0 M NaCl)
FO mode
MW
HTI (DS: 0.5 M NaCl)
HTI (DS: 2.0 M NaCl)
RO mode
MW
HTI backing layer facing feed
HTI active layer facing feed
NF90
Paracetamol
Polyparaben &
DEET
Caffeine
t-octylphenol
Atrazine
Primidone
Meprobamate
Nonylphenol *,#,&
Linuron *
Dilantin
Estrone *
17ß-Estradiol *
17a-Estradiol *
Amitriptyline *
Androstenedione *,&
Estriol
Testosterone *,&
Triclosan *
Etiocholanolone *,&
Androsterone *,&
17a-Ethinylestradiol *
Triclocarban *,#,&
Omeprazole *,#,&
Risperidone *,#,&
Simvastatin *,#,&
Verapamil *,#

Figure 7