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APPENDICES

Appendix A Calculation and Sample of Calculation

A1 Calculation of Sulfur Concentration

A1.1 Calibration of Sulfur Compounds

From

$$n_i * RMR_i = A_i$$

$$n_{std} * RMR_{std} = A_{std}$$

So, $$RMR_i = \frac{A_i * n_{std}(RMR_{std})}{A_{std} * n_i}$$

A1.2 Concentration of Sulfur Compounds in The Simulated Fuels

$$Y_i = \frac{A_i / RMR_i}{\sum_{i=1}^{n} [A_i / RMR_i]}$$

Give $RMR_{std} = 1$

A_i = Peak area of component i

n_i = Concentration of component i (weight basis)

A_{std} = Peak area of standard component

n_{std} = Concentration of standard component (weight basis)

RMR_i = Respond factor of component i

RMR_{std} = Respond factor of standard component

Y_i = Concentration of component i from calibration

Example: Adsorption of dibenzothiophene in decane on NaY zeolite at room temperature

A1.2.1 Data from Table

Initial Concentration

Peak area of DBT#1 (A_{DBT}#1) = 117119

Peak area of DBT#2 (A_{DBT}#2) = 107648

Peak area of Decane#1 (A_{std}#1) = 67589900

Peak area of Decane#2 (A_{std}#2) = 61807100

Equilibrium Concentration

Peak area of DBT#1 (A_{DBT}#1) = 12796

Peak area of DBT#2 (A_{DBT}#2) = 12864

Peak area of Decane#1 (A_{std}#1) = 68428900

Peak area of Decane#2 (A_{std}#2) = 67291500

Respond factor

$RMR_{DBT} = 0.8174$

$RMR_{std} = 1$

A1.2.2 To Calculate The Initial Concentration of DBT in Decane

For the initial concentration of DBT#1

$$Y_{DBT}\#1 = \frac{(117119/0.8174)}{(117119/0.8174) + (67589900/1)}$$

$$= 0.00211539 * 10^6$$

$$= 2115.39 \text{ ppmw}$$

For the initial concentration of DBT#2

$$Y_{DBT}\#2 = \frac{(107648/0.8174)}{(107648/0.8174) + (61807100/1)}$$

$$= 0.00212622 * 10^6$$

$$= 2126.22 \text{ ppmw}$$

Average of Y_{DBT} = (2115.39+2126.22)/2

= 2120.81 ppmw

A1.2.3 To Calculate The Equilibrium Concentration of DBT in Decane

For the equilibrium concentration of DBT#1

$$Y_{DBT}\#1 = \frac{(12796/0.8174)}{(12796/0.8174) + (68428900/1)}$$

$$= 0.00022872 * 10^{6}$$

$$= 228.72 \text{ ppmw}$$

For the equilibrium concentration of DBT#2

$$Y_{DBT}\#2 = \frac{(12864/0.8174)}{(12864/0.8174) + (67291500/1)}$$

$$= 0.00023382 * 10^{6}$$

$$= 233.82 \text{ ppmw}$$

Average of Y_{DBT} = (228.72 + 233.82)/2
= 231.27 ppmw

A1.2.4 To Convert Concentration of Sulfur Compound Before and After Adsorption from ppmw to μmole/g of Simulated Fuel

Molecular weight of dibenzothiophene = 184.26 g/mole

The initial concentration of DBT = 2120.81 ppmw

$$= \frac{2120.81*10^{-6}}{184.26}$$

= 11.51 μmole/g of simulated fuel

The equilibrium concentration of DBT = 231.27 ppmw

$$= \frac{231.27*10^{-6}}{184.26}$$

= 1.26 μmole/g of simulated fuel

A2 Calculation of Amount of Sulfur Compounds

A2.1 Calculation of Adsorption Amount of Sulfur Compound on Zeolite

$$A = \frac{F*C_i}{100} - [\frac{C_f}{100} * \frac{F*(100-C_i)}{(100-C_f)}]$$

A = amount of sulfur compound adsorbed on zeolite (g)

C_i = sulfur concentration before adsorption (%)

C_f = sulfur concentration after adsorption (%)

F = amount of solution before adsorption (g)

Example: Adsorption of dibenzothiophene in decane on NaY zeolite at room temperature

A2.1.1 To Convert Concentration of Sulfur Compound Before and After Adsorption from ppmw to Percent

C_i = 2121 ppmw = 2121/10000 = 0.2121 percent

C_f = 231 ppmw = 231/10000 = 0.0231 percent

A2.1.2 To Calculate The Amount Dibenzothiophene Adsorbed on NaY Zeolite

From, F = 10.0039 g

So,

$$A = \frac{10.0039*0.2121}{100} - [\frac{0.0231}{100} * \frac{10.0039*(100-0.2121)}{(100-0.0231)}]$$

= 0.0189 g

A2.1.3 To Convert The Amount of Dibenzothiophene Adsorbed on NaY Zeolite to Millimole

Molecular weight of dibenzothiophene = 184.26 g/mole

A = 0.0189 g = (0.0189/184.26)*1000 = 0.1026 millimole

A2.1.4 To Divide The Amount Adsorbed Dibenzothiophene on Zeolite with The Amount of Zeolite

From, NaY zeolite = 0.1197 g

So,

The amount of dibenzothiophene adsorbed on NaY zeolite

= 0.1026/0.1197

= 0.8571 mmol/g

APPENDIX B Experimental Data

Table B1 Calibration table of 3-metylthiophene in isooctane (single-solute system)

No	Concentration of 3MT(ppm)	Isooctane		3MT		RMR of 3MT			In Used Range	
		n_{std}	A_{std}	n_i	A_i	RMR_i	Av.	SD.	Av.	SD.
1	579	10.0069	1.86E+08	0.0058	6.67E+04	0.61854	0.62695	0.01190	0.67142	0.02506
		10.0069	2.13E+08	0.0058	7.83E+04	0.63536				
2	1038	10.0056	1.71E+08	0.0104	1.22E+05	0.68673	0.68742	0.00098		
		10.0056	1.60E+08	0.0104	1.15E+05	0.68811				
3	1576	10.0070	1.91E+08	0.0158	2.04E+05	0.67915	0.67870	0.00063		
		10.0070	1.94E+08	0.0158	2.07E+05	0.67825				
4	1957	9.9962	2.00E+08	0.0196	2.66E+05	0.67681	0.68142	0.00652		
		9.9962	1.60E+08	0.0196	2.15E+05	0.68602				
5	2543	10.0017	2.06E+08	0.0255	3.57E+05	0.68030	0.68260	0.00325		
		10.0017	1.91E+08	0.0255	3.33E+05	0.68490				

Table B2 Calibration table of benzothiophene in isooctane (single-solute system)

No	Concentration of BT (ppm)	Isooctane		BT		RMR of BT			In Used Range	
		n_{std}	A_{std}	n_i	A_i	RMR_i	Av.	SD.	Av.	SD.
1	639	10.0032	2.15E+08	0.0064	8.91E+04	0.64880	0.70367	0.07759	0.77198	0.06944
		10.0032	1.83E+08	0.0064	8.89E+04	0.75853				
2	1018	10.0056	2.13E+08	0.0102	1.64E+05	0.75444	0.76497	0.01490		
		10.0056	2.09E+08	0.0102	1.65E+05	0.77551				
3	1467	10.0073	1.96E+08	0.0147	2.22E+05	0.77200	0.76442	0.01072		
		10.0073	1.80E+08	0.0147	2.00E+05	0.75684				
4	2024	10.0082	1.97E+08	0.0203	3.50E+05	0.87483	0.88784	0.01841		
		10.0082	2.40E+08	0.0203	4.39E+05	0.90086				
5	2442	10.0070	2.12E+08	0.0245	3.92E+05	0.75489	0.73899	0.02249		
		10.0070	1.81E+08	0.0245	3.20E+05	0.72308				

Table B3 Calibration table of dibenzothiophene in decane (single-solute system)

No	Concentration of DBT (ppm)	Decane		DBT		RMR of DBT			In Used Range	
		n_{std}	A_{std}	n_i	A_i	RMR_i	Av.	SD.	Av.	SD.
1	530	10.0000	8.61E+07	0.0053	3.69E+04	0.80773	0.80981	0.00293	0.81736	0.03207
		10.0000	8.66E+07	0.0053	3.73E+04	0.81188				
2	1018	10.0047	7.45E+07	0.0102	6.36E+04	0.83751	0.83638	0.00160		
		10.0047	8.93E+07	0.0102	7.61E+04	0.83525				
3	1477	10.0028	9.81E+07	0.0148	1.13E+05	0.77589	0.76945	0.00911		
		10.0028	1.04E+08	0.0148	1.17E+05	0.76301				
4	2025	10.0028	9.15E+07	0.0203	1.50E+05	0.80721	0.85476	0.06725		
		10.0028	7.65E+07	0.0203	1.40E+05	0.90231				
5	2503	10.0046	8.12E+07	0.0251	1.69E+05	0.82985	0.81638	0.01904		
		10.0046	9.03E+07	0.0251	1.82E+05	0.80292				

Table B4 Calibration table of 3-metylthiophene and benzothiophene in isooctane (mixed-solute system)

No	Concentration of sulfur (ppm)	RMR of 3MT			In Used Range		RMR of BT			In Used Range	
		RMR_i	Av.	SD.	Av.	SD.	RMR_i	Av.	SD.	Av.	SD.
1	503	0.65846	0.68439	0.03668	0.65365	0.03010	0.73340	0.72399	0.01331	0.73955	0.04614
		0.71033					0.71458				
2	1019	0.61108	0.63656	0.03603			0.80378	0.78446	0.02732		
		0.66204					0.76514				
3	1561	0.69523	0.70277	0.01066			0.69483	0.74508	0.07106		
		0.71030					0.79532				
4	2023	0.60543	0.63798	0.04603			0.73706	0.74077	0.00525		
		0.67052					0.74448				
5	2408	0.64655	0.65926	0.01798			0.67505	0.65357	0.03037		
		0.67198					0.63210				
6	3009	0.59334	0.63499	0.05890			0.67833	0.73412	0.07890		
		0.67664					0.78991				
7	3520	0.57641	0.61957	0.06104			0.74194	0.79490	0.07489		
		0.66273					0.84785				

Table B5 Calibration table of 3-metylthiophene in isooctane (mixed aromatic system)

No	Concentration of 3MT(ppm)	RMR of 3MT			In Used Range		RMR of *o*-xylene			In Used Range	
		RMR_i	Av.	SD.	Av.	SD.	RMR_i	Av.	SD.	Av.	SD.
1	425	0.73255	0.72813	0.00417	0.71588	0.01654	0.99813	1.00636	0.00908	1.00738	0.00693
		0.72760					1.01610				
		0.72425					1.00486				
2	963	0.74459	0.73677	0.00816			1.03619	1.01702	0.01697		
		0.73741					1.00387				
		0.72830					1.01101				
3	1267	0.68919	.0.69001	0.00565			0.99883	1.01307	0.02815		
		0.68481					0.99489				
		0.69602					1.04549				
4	1952	0.71767	0.71975	0.00195			1.00208	1.01003	0.01053		
		0.72005					1.02197				
		0.72154					1.00605				
5	2392	0.72029	0.72674	0.00712			0.97643	0.99584	0.02109		
		0.72557					0.99280				
		0.73438					1.01829				
6	2904	0.70919	0.70731	0.00894			1.00464	1.00275	0.00670		
		0.71516					1.00831				
		0.69758					0.99531				
7	3448	0.70209	0.70247	0.00276			0.99877	1.00656	0.01576		
		0.70539					1.02470				
		0.69992					0.99622				

Table B6 Calibration table of benzothiophene in isooctane (mixed aromatic system)

No	Concentration of BT (ppm)	RMR of BT			In Used Range		RMR of *o*-xylene			In Used Range	
		RMR_i	Av.	SD.	Av.	SD.	RMR_i	Av.	SD.	Av.	SD.
1	521	0.84303	0.85905	0.04163	0.85638	0.03840	1.02464	1.02936	0.01746	1.02045	0.01602
		0.90632					1.04869				
		0.82781					1.01474				
2	955	0.85474	0.85093	0.02139			1.01889	1.00863	0.01158		
		0.87017					1.01092				
		0.82790					0.99608				
3	1648	0.96828	0.92923	0.04395			1.05405	1.03680	0.02411		
		0.93777					1.04709				
		0.88164					1.00925				
4	1955	0.88459	0.87164	0.01155			1.02494	1.03458	0.01400		
		0.86797					1.05064				
		0.86237					1.02815				
5	2428	0.80997	0.82886	0.03698			1.00167	1.00796	0.01339		
		0.80514					0.99887				
		0.87147					1.02334				
6	3085	0.87504	0.84795	0.03639			1.02451	1.03001	0.00477		
		0.80658					1.03274				
		0.86222					1.03279				
7	3386	0.82450	0.80697	0.01599			1.00244	0.99580	0.00730		
		0.80324					0.99698				
		0.79317					0.98798				

Table B7 Calibration table of dibenzothiophene in decane (mixed aromatic system)

No	Concentration of DBT (ppm)	RMR of DBT			In Used Range		RMR of o-xylene			In Used Range	
		RMR_i	Av.	SD.	Av.	SD.	RMR_i	Av.	SD.	Av.	SD.
1	645	0.95443	0.96770	0.03056	0.91351	0.05044	1.07062	1.08364	0.01409	1.08192	0.01750
		1.00265					1.08172				
		0.94602					1.09860				
2	1087	0.96717	0.96555	0.01368			1.08255	1.08075	0.00260		
		0.95114					1.08193				
		0.97835					1.07777				
3	1495	0.92037	0.96773	0.10099			1.05143	1.06762	0.01404		
		1.08369					1.07624				
		0.89912					1.07521				
4	1855	0.89395	0.87522	0.01748			1.08338	1.09738	0.01307		
		0.87233					1.10925				
		0.85936					1.09951				
5	2455	0.82764	0.86030	0.02959			1.07303	1.10160	0.05324		
		0.86793					1.06875				
		0.88534					1.16303				
6	2812	0.90079	0.88122	0.01946			1.10178	1.09090	0.00998		
		0.88102					1.08876				
		0.86186					1.08216				
7	2602	0.95497	0.87687	0.06834			1.03616	1.05157	0.02247		
		0.82804					1.07736				
		0.84762					1.04120				

Table B8 Adsorption isotherm of 3-metylthiophene in isooctane on NaX zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	3-methylthiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
561	1	0.1179	10.0044	193	1.9662	1.9764	0.3182	0.3170	0.0016
	2	0.1181	10.0039	195	1.9866		0.3159		
1024	1	0.1183	10.0047	480	4.8900	4.8696	0.4689	0.4712	0.0033
	2	0.1180	10.0041	476	4.8492		0.4735		
1531	1	0.1180	10.0012	801	8.1601	8.1805	0.6308	0.6297	0.0016
	2	0.1178	10.0021	805	8.2009		0.6285		
2059	1	0.1169	10.0137	1156	11.7767	11.8480	0.7889	0.7804	0.0120
	2	0.1176	10.0122	1170	11.9193		0.7720		
2542	1	0.1185	10.0003	1435	14.6190	14.5171	0.9531	0.9625	0.0134
	2	0.1183	10.0012	1415	14.4152		0.9720		
3015	1	0.1172	10.0145	1823	18.5717	18.5157	1.0395	1.0420	0.0036
	2	0.1177	10.0136	1812	18.4597		1.0446		
3460	1	0.1188	10.0190	1871	19.0607	18.9588	1.3678	1.3798	0.0170
	2	0.1182	10.0181	1851	18.8570		1.3919		

Table B9 Adsorption isotherm of 3-metylthiophene in isooctane on NaY zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	3-methylthiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
522	1	0.1185	10.0021	236	2.4042	2.3991	0.2460	0.2467	0.0010
	2	0.1182	10.0015	235	2.3941		0.2475		
990	1	0.1172	10.0031	465	4.7372	4.7677	0.4567	0.4530	0.0053
	2	0.1178	10.0045	471	4.7983		0.4492		
1513	1	0.1178	10.0003	787	8.0175	7.9921	0.6284	0.6303	0.0027
	2	0.1179	10.0007	782	7.9666		0.6322		
2060	1	0.1183	10.0174	1161	11.8276	11.7716	0.7764	0.7802	0.0053
	2	0.1186	10.0169	1150	11.7156		0.7839		
2545	1	0.1180	10.0154	1529	15.5766	15.5359	0.8799	0.8825	0.0038
	2	0.1182	10.0143	1521	15.4951		0.8852		
3080	1	0.1174	10.0061	1946	19.8248	19.8401	0.9866	0.9839	0.0038
	2	0.1177	10.0034	1949	19.8553		0.9812		
3468	1	0.1182	10.0134	2241	22.8301	22.8759	1.0613	1.0579	0.0049
	2	0.1181	10.0128	2250	22.9218		1.0544		

Table B10 Adsorption isotherm of benzothiophene in isooctane on NaX zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	Benzothiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
401	1	0.1168	10.0037	10	0.0745	0.0745	0.2495	0.2505	0.0014
	2	0.1159	10.0041	10	0.0745		0.2515		
970	1	0.1178	9.9952	31	0.2310	0.2273	0.5937	0.5934	0.0004
	2	0.1181	10.0004	30	0.2235		0.5931		
1289	1	0.1175	10.0041	95	0.7079	0.7116	0.7576	0.7566	0.0014
	2	0.1177	10.0038	96	0.7154		0.7556		
2154	1	0.1175	9.9985	302	2.2504	2.2355	1.1747	1.1776	0.0041
	2	0.1172	10.0003	298	2.2206		1.1804		
2475	1	0.1189	10.0046	520	3.8748	3.9046	1.2264	1.2270	0.0008
	2	0.1183	10.0042	528	3.9344		1.2276		
2766	1	0.1175	9.9997	750	5.5887	5.4881	1.2794	1.2869	0.0106
	2	0.1177	10.0007	723	5.3875		1.2944		
3413	1	0.1184	10.0017	1388	10.3428	10.2720	1.2764	1.2841	0.0108
	2	0.1181	10.0022	1369	10.2012		1.2917		

Table B11 Adsorption isotherm of benzothiophene in isooctane on NaY zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	Benzothiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
679	1	0.1147	9.9767	41	0.3055	0.3018	0.4135	0.4136	0.0001
	2	0.1151	10.0004	40	0.2981		0.4137		
908	1	0.1169	10.0025	78	0.5812	0.5849	0.5292	0.5283	0.0014
	2	0.1172	10.0029	79	0.5887		0.5273		
1729	1	0.1172	10.0075	325	2.4218	2.4106	0.8936	0.8949	0.0018
	2	0.1171	10.0066	322	2.3994		0.8962		
2139	1	0.1167	10.0069	539	4.0164	4.0387	1.0229	1.0201	0.0039
	2	0.1169	10.0075	545	4.0611		1.0174		
2691	1	0.1188	10.0006	937	6.9821	6.9188	1.1013	1.1048	0.0049
	2	0.1192	10.0011	920	6.8554		1.1082		
2959	1	0.1178	10.0008	1237	9.2176	9.3182	1.0907	1.0799	0.0153
	2	0.1183	10.0005	1264	9.4188		1.0691		
5458	1	0.1188	10.0055	3451	25.7154	24.0052	1.2639	1.4090	0.2052
	2	0.1186	10.0003	2992	22.2951		1.5541		

Table B12 Adsorption isotherm of dibenzothiophene in decane on NaX zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	Dibenzothiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
482	1	0.1189	10.0486	9	0.0488	0.0597	0.2169	0.2158	0.0017
	2	0.1192	10.0479	13	0.0706		0.2146		
960	1	0.1183	10.0005	29	0.1574	0.1601	0.4271	0.4262	0.0013
	2	0.1187	10.0014	30	0.1628		0.4253		
1514	1	0.1168	10.0052	49	0.2659	0.2659	0.6811	0.6794	0.0024
	2	0.1174	10.0068	49	0.2659		0.6777		
2032	1	0.1191	10.0003	98	0.5319	0.5373	0.8814	0.8784	0.0042
	2	0.1198	10.0017	100	0.5427		0.8755		
2465	1	0.1166	10.0184	330	1.7909	1.8045	0.9959	0.9897	0.0087
	2	0.1178	10.0194	335	1.8181		0.9835		
2872	1	0.1157	10.0101	747	4.0541	4.0459	0.9985	0.9958	0.0039
	2	0.1165	10.0098	744	4.0378		0.9930		
3395	1	0.1170	10.0155	1116	6.0567	6.0350	1.0599	1.0589	0.0014
	2	0.1176	10.0125	1108	6.0132		1.0579		

Table B13 Adsorption isotherm of dibenzothiophene in decane on NaY zeolite (single-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	Dibenzothiophene					
				Ce	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
550	1	0.1195	10.0029	13	0.0706	0.0733	0.2440	0.2441	0.0002
	2	0.1191	10.0009	14	0.0760		0.2443		
1076	1	0.1170	10.0035	36	0.1954	0.1899	0.4826	0.4824	0.0003
	2	0.1173	10.0023	34	0.1845		0.4822		
1567	1	0.1195	10.0048	95	0.5156	0.5210	0.6689	0.6701	0.0017
	2	0.1189	10.0039	97	0.5264		0.6713		
2121	1	0.1197	10.0039	231	1.2537	1.2618	0.8574	0.8582	0.0011
	2	0.1193	10.0045	234	1.2699		0.8590		
2591	1	0.1176	10.0040	481	2.6104	2.5860	0.9746	0.9746	0.0000
	2	0.1181	10.0041	472	2.5616		0.9746		
3108	1	0.1198	10.0005	792	4.2983	4.3118	1.0501	1.0503	0.0003
	2	0.1195	10.0012	797	4.3254		1.0505		
3643	1	0.1177	10.0034	1235	6.7025	6.6536	1.1121	1.1114	0.0009
	2	0.1187	10.0023	1217	6.6048		1.1108		

Table B14 Adsorption isotherm of 3-methylthiophene and benzothiophene in isooctane on NaX zeolite (mixed-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	3-methylthiophene					Benzothiophene				
				Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
503	1	0.1502	13.0040	0.6826	0.7182	0.1720	0.1691	0.0041	0.0969	0.1006	0.1471	0.1469	0.0002
	2	0.1498	13.0008	0.7539		0.1662			0.1043		0.1468		
1019	1	0.1507	13.0067	2.3533	2.1343	0.2287	0.2483	0.0278	0.0894	0.1080	0.3319	0.3312	0.0010
	2	0.1498	13.0005	1.9152		0.2679			0.1267		0.3305		
1561	1	0.1500	13.0043	3.5350	3.6013	0.3940	0.3886	0.0077	0.2012	0.2049	0.4787	0.4788	0.0001
	2	0.1497	13.0005	3.6675		0.3832			0.2086		0.4789		
2023	1	0.1500	13.0025	5.6133	5.7253	0.3764	0.3662	0.0144	0.3428	0.3912	0.6460	0.6410	0.0071
	2	0.1504	13.0046	5.8374		0.3561			0.4396		0.6360		
2408	1	0.1498	13.0052	7.9156	7.6762	0.4355	0.4549	0.0275	0.6781	0.6297	0.6780	0.6803	0.0032
	2	0.1506	13.0005	7.4368		0.4744			0.5812		0.6825		
3009	1	0.1499	13.0052	10.2078	10.1467	0.4185	0.4230	0.0064	0.8644	0.8308	0.9168	0.9180	0.0017
	2	0.1504	12.9998	10.0856		0.4275			0.7973		0.9192		
3520	1	0.1500	13.0035	12.5611	12.5458	0.3829	0.3835	0.0009	1.8629	1.8815	1.0364	1.0330	0.0048
	2	0.1505	13.0020	12.5306		0.3842			1.9001		1.0296		
4585	1	0.1504	13.0058	17.1455	17.3339	0.4350	0.4189	0.0228	4.4560	4.3815	1.1677	1.1746	0.0098
	2	0.1502	12.9993	17.5224		0.4027			4.3070		1.1815		

Table B15 Adsorption isotherm of 3-methylthiophene and benzothiophene in isooctane on NaY zeolite (mixed-solute system)

Initial Total Sulfur Concentration (ppmw)	No.	Adsorbent (g)	Fuel (g)	3-methylthiophene					Benzothiophene				
				Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.	Ce*	Av. of Ce*	A (mmol/g)	Av.	SD.
503	1	0.1502	13.0021	0.9984	0.9678	0.1446	0.1472	0.0037	0.1267	0.1267	0.1445	0.1444	0.0001
	2	0.1503	13.0001	0.9372		0.1498			0.1267		0.1444		
1019	1	0.1500	13.0008	2.6895	2.7506	0.2005	0.1951	0.0077	0.2608	0.2645	0.3184	0.3179	0.0008
	2	0.1502	13.0003	2.8117		0.1896			0.2683		0.3173		
1561	1	0.1499	13.0002	4.9511	4.9409	0.2714	0.2720	0.0009	0.6036	0.6036	0.4440	0.4437	0.0005
	2	0.1502	13.0054	4.9307		0.2727			0.6036		0.4433		
2023	1	0.1505	12.9998	6.4487	6.5556	0.3029	0.2937	0.0131	1.0209	1.0842	0.5852	0.5797	0.0077
	2	0.1505	13.0001	6.6626		0.2844			1.1475		0.5742		
2408	1	0.1500	13.0021	8.9548	8.7154	0.3447	0.3645	0.0280	1.9076	1.7250	0.5705	0.5848	0.0203
	2	0.1508	13.0067	8.4760		0.3843			1.5425		0.5991		
3009	1	0.1506	13.0012	10.6051	10.6204	0.3821	0.3812	0.0013	2.3770	2.3063	0.7818	0.7888	0.0098
	2	0.1503	13.0023	10.6357		0.3802			2.2355		0.7957		
3520	1	0.1506	13.0004	12.2249	11.9448	0.4103	0.4346	0.0343	3.5022	3.3159	0.8907	0.9069	0.0229
	2	0.1506	13.0043	11.6646		0.4588			3.1297		0.9231		
4585	1	0.1505	13.0036	16.9825	17.1404	0.4488	0.4359	0.0182	5.6110	5.8569	1.0670	1.0477	0.0274
	2	0.1499	12.9995	17.2983		0.4230			6.1028		1.0283		

Table B16 Effect of aromatic content on 3-methylthiophene adsorption on NaX zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount 3-methylthiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1502	13.0051	1977.00	1091.00	0.0115	0.0768	0.7824	0.7978	0.0218
	2	0.1506	13.0117	1977.00	1054.00	0.0120	0.0798	0.8133		
4.0	1	0.1655	13.7765	1893.00	1800.00	0.0013	0.0078	0.0790	0.0891	0.0143
	2	0.1643	14.0100	1913.00	1799.00	0.0016	0.0097	0.0992		
8.0	1	0.1648	13.8806	1889.00	1860.00	0.0004	0.0024	0.0249	0.0363	0.0160
	2	0.1650	13.9893	1932.00	1877.00	0.0008	0.0047	0.0476		
12.0	1	0.1648	13.9264	1885.00	1874.00	0.0002	0.0009	0.0095	0.0254	0.0226
	2	0.1641	13.8650	1945.00	1897.00	0.0007	0.0041	0.0414		
16.0	1	0.1645	13.8461	1935.00	1931.00	0.0001	0.0003	0.0034	0.0159	0.0177
	2	0.1648	13.9137	1935.00	1902.00	0.0005	0.0028	0.0284		

Table B17 Effect of aromatic content on 3-methylthiophene adsorption on NaY zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount 3-methylthiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1509	13.0021	1977.00	1069.00	0.0118	0.0783	0.7979	0.7968	0.0015
	2	0.1507	13.0077	1977.00	1073.00	0.0118	0.0781	0.7958		
4.0	1	0.1630	13.8483	1724.00	1544.00	0.0025	0.0153	0.1560	0.1643	0.0116
	2	0.1642	13.8068	1914.00	1713.00	0.0028	0.0169	0.1725		
8.0	1	0.1647	13.8728	1935.00	1849.00	0.0012	0.0073	0.0739	0.0835	0.0136
	2	0.1643	13.8807	1915.00	1807.00	0.0015	0.0091	0.0931		
12.0	1	0.1636	13.9432	1898.00	1867.00	0.0004	0.0026	0.0270	0.0510	0.0339
	2	0.1643	13.8712	1959.00	1872.00	0.0012	0.0074	0.0750		
16.0	1	0.1652	13.8603	1895.00	1888.00	0.0001	0.0006	0.0060	0.0245	0.0262
	2	0.1632	13.7515	1961.00	1911.00	0.0007	0.0042	0.0430		

Table B18 Effect of aromatic content on benzothiophene adsorption on NaX zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount benzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1500	13.0003	1843.00	414.00	0.0186	0.1239	0.9233	0.9193	0.0056
	2	0.1502	13.0063	1843.00	425.00	0.0185	0.1228	0.9154		
4.0	1	0.1501	13.0025	1861.00	1021.00	0.0109	0.0728	0.5428	0.5313	0.0162
	2	0.1509	13.0143	1861.00	1053.00	0.0105	0.0698	0.5198		
8.0	1	0.1496	13.0049	1858.00	1047.00	0.0106	0.0706	0.5259	0.4858	0.0567
	2	0.1498	13.0064	1858.00	1170.00	0.0090	0.0598	0.4456		
12.0	1	0.1499	13.0001	1835.00	1342.00	0.0064	0.0428	0.3190	0.3271	0.0114
	2	0.1502	13.0016	1835.00	1316.00	0.0068	0.0450	0.3352		
16.0	1	0.1506	13.0066	1842.00	1400.00	0.0058	0.0382	0.2849	0.2701	0.0209
	2	0.1509	13.0022	1842.00	1445.00	0.0052	0.0343	0.2553		

Table B19 Effect of aromatic content on benzothiophene adsorption on NaY zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount benzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1507	13.0068	1843.00	581.00	0.0164	0.1090	0.8121	0.8294	0.0245
	2	0.1500	13.0051	1843.00	533.00	0.0170	0.1136	0.8468		
4.0	1	0.1501	13.0072	1861.00	1611.00	0.0033	0.0217	0.1617	0.1656	0.0055
	2	0.1506	13.0007	1861.00	1598.00	0.0034	0.0227	0.1694		
8.0	1	0.1636	13.1252	1866.00	1633.00	0.0031	0.0187	0.1395	0.1416	0.0029
	2	0.1500	13.0052	1858.00	1636.00	0.0029	0.0193	0.1437		
12.0	1	0.1646	13.8384	1850.00	1760.00	0.0012	0.0076	0.0565	0.0533	0.0044
	2	0.1509	13.0146	1835.00	1757.00	0.0010	0.0067	0.0502		
16.0	1	0.1507	13.0021	1842.00	1800.00	0.0005	0.0036	0.0271	0.0345	0.0106
	2	0.1502	13.0008	1842.00	1777.00	0.0008	0.0056	0.0420		

Table B20 Effect of aromatic content on dibenzothiophene adsorption on NaX zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount dibenzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1502	13.0025	1947.00	152.00	0.0233	0.1554	0.8434	0.8445	0.0016
	2	0.1509	13.0033	1947.00	139.00	0.0235	0.1558	0.8457		
4.0	1	0.1505	13.0067	1773.00	913.00	0.0112	0.0744	0.4037	0.4078	0.0058
	2	0.1651	13.9275	1665.00	766.00	0.0125	0.0759	0.4119		
8.0	1	0.1500	13.0085	1720.00	1059.00	0.0086	0.0574	0.3114	0.3028	0.0122
	2	0.1649	13.9704	1690.00	1051.00	0.0089	0.0542	0.2941		
12.0	1	0.1507	13.0127	1789.00	1260.00	0.0069	0.0457	0.2482	0.2787	0.0431
	2	0.1501	13.0003	1789.00	1132.00	0.0086	0.0570	0.3092		
16.0	1	0.1662	13.9538	1766.00	1441.00	0.0045	0.0273	0.1483	0.1508	0.0035
	2	0.1508	13.0038	1765.00	1438.00	0.0043	0.0282	0.1533		

Table B21 Effect of aromatic content on dibenzothiophene adsorption on NaY zeolite

Percentage of Aromatic Content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount dibenzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1506	13.0067	1947.00	230.00	0.0223	0.1483	0.8050	0.8042	0.0012
	2	0.1497	13.0086	1947.00	244.00	0.0222	0.1480	0.8033		
4.0	1	0.1499	13.0053	1773.00	1183.00	0.0077	0.0512	0.2781	0.2844	0.0089
	2	0.1502	13.0018	1773.00	1155.00	0.0080	0.0536	0.2907		
8.0	1	0.1509	13.0086	1720.00	1333.00	0.0050	0.0334	0.1813	0.1867	0.0076
	2	0.1509	13.0069	1720.00	1310.00	0.0053	0.0354	0.1920		
12.0	1	0.1502	13.0087	1789.00	1496.00	0.0038	0.0254	0.1379	0.1284	0.0135
	2	0.1504	13.0044	1789.00	1536.00	0.0033	0.0219	0.1189		
16.0	1	0.1503	13.0072	1765.00	1619.00	0.0019	0.0127	0.0687	0.0737	0.0071
	2	0.1500	13.0053	1765.00	1598.00	0.0022	0.0145	0.0787		

Table B22 Effect of water content in the zeolite on 3-methylthiophene adsorption on NaX zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount 3-methylthiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1500	13.0105	1946.00	858.00	0.0142	0.0945	0.9622	0.9628	0.0008
	2	0.1500	13.0016	1946.00	856.00	0.0142	0.0946	0.9633		
1.5	1	0.1498	13.0105	1978.00	1104.00	0.0114	0.0760	0.7742	0.7543	0.0282
	2	0.1506	13.0019	1978.00	1144.00	0.0109	0.0721	0.7344		
3.0	1	0.1499	13.0042	1914.00	1118.00	0.0104	0.0691	0.7043	0.7132	0.0126
	2	0.1506	13.0030	1914.00	1094.00	0.0107	0.0709	0.7221		
4.5	1	0.1507	13.0005	1998.00	1277.00	0.0094	0.0623	0.6345	0.6139	0.0291
	2	0.1498	13.0050	1998.00	1328.00	0.0087	0.0582	0.5934		

Table B23 Effect of water content in the zeolite on 3-methylthiophene adsorption on NaY zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount 3-methylthiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1500	13.0052	2007.00	1075.00	0.0121	0.0809	0.8241	0.8293	0.0073
	2	0.1511	13.0004	2007.00	1056.00	0.0124	0.0819	0.8344		
1.5	1	0.1502	13.0053	1978.00	1230.00	0.0097	0.0648	0.6606	0.6465	0.0200
	2	0.1504	13.0031	1978.00	1261.00	0.0093	0.0621	0.6323		
3.0	1	0.1504	13.0026	1914.00	1249.00	0.0087	0.0576	0.5864	0.5535	0.0466
	2	0.1509	13.0081	1914.00	1322.00	0.0077	0.0511	0.5206		
4.5	1	0.1505	13.0055	1998.00	1431.00	0.0074	0.0491	0.4999	0.4517	0.0681
	2	0.1499	13.0003	1998.00	1542.00	0.0059	0.0396	0.4035		

Table B24 Effect of water content in the zeolite on benzothiophene adsorption on NaX zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount benzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads	Av.	SD.
0.0	1	0.1500	13.0065	2137	346.0	0.0233	0.1554	1.1576	1.1500	0.0107
	2	0.1504	13.0082	2137	365.0	0.0231	0.1533	1.1425		
1.5	1	0.1503	13.0041	1934.000	484.0	0.0189	0.1255	0.9353	0.9104	0.0352
	2	0.1510	13.0045	1934.000	555.0	0.0179	0.1188	0.8855		
3.0	1	0.1499	13.0139	1934.000	773.0	0.0151	0.1009	0.7517	0.7273	0.0344
	2	0.1498	13.0027	1934.000	848.0	0.0141	0.0943	0.7030		
4.5	1	0.1502	13.0079	1934.000	838.0	0.0143	0.0950	0.7079	0.6903	0.0248
	2	0.1500	13.0101	1934.000	894.0	0.0135	0.0903	0.6728		

Table B25 Effect of water content in the zeolite on benzothiophene adsorption on NaY zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount benzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1501	13.0109	2137	536.0	0.0208	0.1389	1.0347	1.0382	0.0050
	2	0.1501	13.0019	2137	524.0	0.0210	0.1398	1.0417		
1.5	1	0.1504	13.0113	1934.000	751.0	0.0154	0.1024	0.7632	0.7264	0.0520
	2	0.1499	13.0037	1934.000	868.0	0.0139	0.0926	0.6897		
3.0	1	0.1501	13.0039	1934.000	918.0	0.0132	0.0881	0.6565	0.6245	0.0453
	2	0.1505	13.0075	1934.000	1015.0	0.0120	0.0795	0.5925		
4.5	1	0.1508	13.0082	1934.000	922.0	0.0132	0.0874	0.6511	0.6334	0.0251
	2	0.1503	13.0033	1934.000	980.0	0.0124	0.0826	0.6156		

Table B26 Effect of water content in the zeolite on dibenzothiophene adsorption on NaX zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount dibenzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1501	12.9995	2215	123	0.0272	0.1812	0.9834	0.9842	0.0012
	2	0.1505	12.9999	2215	114	0.0273	0.1815	0.9850		
1.5	1	0.1498	13.0048	2194	220	0.0257	0.1714	0.9303	0.9071	0.0328
	2	0.1498	13.0083	2194	319	0.0244	0.1629	0.8839		
3.0	1	0.1498	13.0083	2194	324	0.0243	0.1624	0.8816	0.8601	0.0304
	2	0.1502	13.0040	2194	410	0.0232	0.1545	0.8386		
4.5	1	0.1501	13.0033	2194	405	0.0233	0.1550	0.8414	0.8283	0.0186
	2	0.1500	13.0020	2194	462	0.0225	0.1502	0.8151		

Table B27 Effect of water content in the zeolite on dibenzothiophene adsorption on NaY zeolite

Percentage of water content	No.	Adsorbent (g)	Fuel (g)	Concentration (ppmw)		Amount dibenzothiophene adsorbed				
				Ci	Ce	g	g/g of ads.	mmol/g of ads.	Av.	SD.
0.0	1	0.1503	13.0000	2215	253	0.0255	0.1697	0.9212	0.9283	0.0100
	2	0.1506	13.0014	2215	219	0.0260	0.1724	0.9354		
1.5	1	0.1497	13.0054	2194	322	0.0244	0.1627	0.8829	0.8507	0.0455
	2	0.1500	13.0034	2194	455	0.0226	0.1508	0.8185		
3.0	1	0.1505	13.0058	2194	380	0.0236	0.1568	0.8511	0.8411	0.0141
	2	0.1500	13.0097	2194	429	0.0230	0.1531	0.8311		
4.5	1	0.1507	13.0017	2194	454	0.0226	0.1502	0.8151	0.8217	0.0093
	2	0.1500	13.0014	2194	434	0.0229	0.1526	0.8283		

Table B28 Effect of temperature on 3-methylthiophene desorption on NaX zeolite

Temperature (°C)	No.	Adsorption of 3MT before desorption					Adsorption of 3MT after desorption					Amount of 3MT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1500	13.0105	1946.00	858.00	0.9622	0.1500	13.0008	1946.00	1029.00	0.8105	0.1517	0.1353	0.0232
	2	0.1503	13.0028	2024.00	889.00	1.0012	0.1500	13.0035	2024.00	1026.00	0.8823	0.1189		
60.0	1	0.1500	13.0017	2005.00	1210.00	0.7029	0.1501	13.0035	2005.00	1435.00	0.5038	0.1991	0.2005	0.0020
	2	0.1500	13.007	1905.00	849.00	0.9337	0.1504	13.0027	1905.00	1075.00	0.7318	0.2018		
75.0	1	0.1503	13.0004	2001.00	1152.00	0.7490	0.1501	13.0010	2001.00	1502.00	0.4410	0.3080	0.3106	0.0037
	2	0.1500	13.0046	2001.00	1139.00	0.7622	0.1501	13.0007	2001.00	1493.00	0.4489	0.3133		

Table B29 Effect of temperature on 3-methylthiophene desorption on NaY zeolite

Temperature (°C)	No.	Adsorption of 3MT before desorption					Adsorption of 3MT after desorption					Amount of 3MT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1504	13.0040	1946.00	1020.00	0.8165	0.1503	13.0079	1946.00	1192.00	0.6656	0.1509	0.1597	0.0124
	2	0.1500	13.0068	2024.00	1025.00	0.8834	0.1499	13.0031	2024.00	1216.00	0.7149	0.1685		
60.0	1	0.1500	13.0052	2007.00	1075.00	0.8241	0.1503	13.0069	2007.00	1328.00	0.5994	0.2247	0.2179	0.0095
	2	0.1501	13.0006	2005.00	1223.00	0.6909	0.1499	13.0026	2005.00	1463.00	0.4797	0.2112		
75.0	1	0.1502	13.0092	2046.00	1109.00	0.8277	0.1503	13.0006	2046.00	1543.00	0.4439	0.3838	0.3773	0.0091
	2	0.1500	13.0034	1983.00	1133.00	0.7515	0.1502	13.0002	1983.00	1552.00	0.3806	0.3709		

Table B30 Effect of temperature on benzothiophene desorption on NaX zeolite

Temperature (°C)	No.	Adsorption of BT before desorption					Adsorption of BT after desorption					Amount of BT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1500	13.0065	2137.00	346.00	1.1576	0.1504	13.0085	2137.00	516.00	1.0453	0.1123	0.0973	0.0213
	2	0.1504	13.0082	2137.00	365.00	1.1425	0.1502	13.0005	2137.00	494.00	1.0602	0.0823		
60.0	1	0.1501	13.0031	2140.00	433.00	1.1024	0.1506	13.0017	2140.00	583.00	1.0022	0.1002	0.1097	0.0135
	2	0.1503	13.0073	2140.00	387.00	1.1309	0.1501	13.0054	2140.00	574.00	1.0117	0.1193		
75.0	1	0.1507	13.0047	2168.00	333.00	1.1804	0.1506	13.0092	2168.00	625.00	0.9938	0.1865	0.2072	0.0292
	2	0.1499	13.0092	2168.00	369.00	1.1638	0.1507	13.0092	2168.00	714.00	0.9360	0.2279		

Table B31 Effect of temperature on benzothiophene desorption on NaY zeolite

Temperature (°C)	No.	Adsorption of BT before desorption					Adsorption of BT after desorption					Amount of BT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1501	13.0109	2137.00	536.00	1.0347	0.1502	13.0035	2137.00	669.00	0.9477	0.0870	0.0685	0.0261
	2	0.1501	13.0019	2137.00	524.00	1.0417	0.1507	13.0063	2137.00	596.00	0.9916	0.0501		
60.0	1	0.1503	13.0021	2140.00	588.00	1.0010	0.1499	13.0042	2140.00	713.00	0.9231	0.0779	0.0899	0.0169
	2	0.1500	13.0036	1954.00	554.00	0.9049	0.1501	13.0039	1954.00	711.00	0.8030	0.1019		
75.0	1	0.1507	13.0037	2168.00	651.00	0.9760	0.1505	13.0033	2168.00	831.00	0.8615	0.1145	0.1480	0.0473
	2	0.1502	13.0037	1954.00	484.00	0.9488	0.1500	13.0040	1954.00	767.00	0.7674	0.1814		

Table B32 Effect of temperature on dibenzothiophene desorption on NaX zeolite

Temperature (°C)	No.	Adsorption of DBT before desorption					Adsorption of DBT after desorption					Amount of DBT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1503	13.0098	1989.00	78.00	0.8978	0.1506	13.0013	1989.00	122.00	0.8748	0.0230	0.0230	0.0000
	2	0.1506	13.0008	1989.00	82.00	0.8935	0.1499	13.0025	1989.00	140.00	0.8705	0.0230		
60.0	1	0.1501	12.9995	2215.00	123.00	0.9834	0.1502	13.0017	2215.00	192.00	0.9506	0.0328	0.0261	0.0095
	2	0.1503	12.9999	2161.00	107.00	0.9643	0.1505	13.002	2161.00	146.00	0.9449	0.0194		
75.0	1	0.1501	13.0011	2172.00	148.00	0.9516	0.1504	13.0021	2172.00	229.00	0.9118	0.0398	0.0496	0.0139
	2	0.1504	12.9999	2172.00	164.00	0.9421	0.1504	13.0014	2172.00	291.00	0.8827	0.0594		

Table B33 Effect of temperature on dibenzothiophene desorption on NaY zeolite

Temperature (°C)	No.	Adsorption of DBT before desorption					Adsorption of DBT after desorption					Amount of DBT desorbed		
		Adsorbent (g)	Fuel (g)	Ci	Ce	A_{before} (mmol/g)	Adsorbent (g)	Fuel (g)	Ci	Ce	A_{After} (mmol/g)	A_{des} (mmol/g)	Av.	SD.
45.0	1	0.1500	13.0044	1989.00	211.00	0.8367	0.1504	13.003	1989.00	273.00	0.8054	0.0314	0.0300	0.0020
	2	0.1504	13.0023	1989.00	228.00	0.8264	0.1502	13.0006	1989.00	291.00	0.7979	0.0286		
60.0	1	0.1506	13.0014	2215.00	219.00	0.9354	0.1501	13.0015	2215.00	393.00	0.8568	0.0785	0.0775	0.0015
	2	0.1503	13.0000	2215.00	253.00	0.9212	0.1504	13.0019	2215.00	415.00	0.8449	0.0764		
75.0	1	0.1502	13.0004	2161.00	233.00	0.9059	0.1504	13.0004	2161.00	393.00	0.8297	0.0761	0.0865	0.0146
	2	0.1504	13.0038	2172.00	257.00	0.8988	0.1505	13.0006	2172.00	462.00	0.8020	0.0968		

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