Electronic Supplementary Material (ESI) for RSC Advances.

High Performance CO_2 Filtration and Sequestration by using Bromomethyl Benzene Linked Microporous Networks

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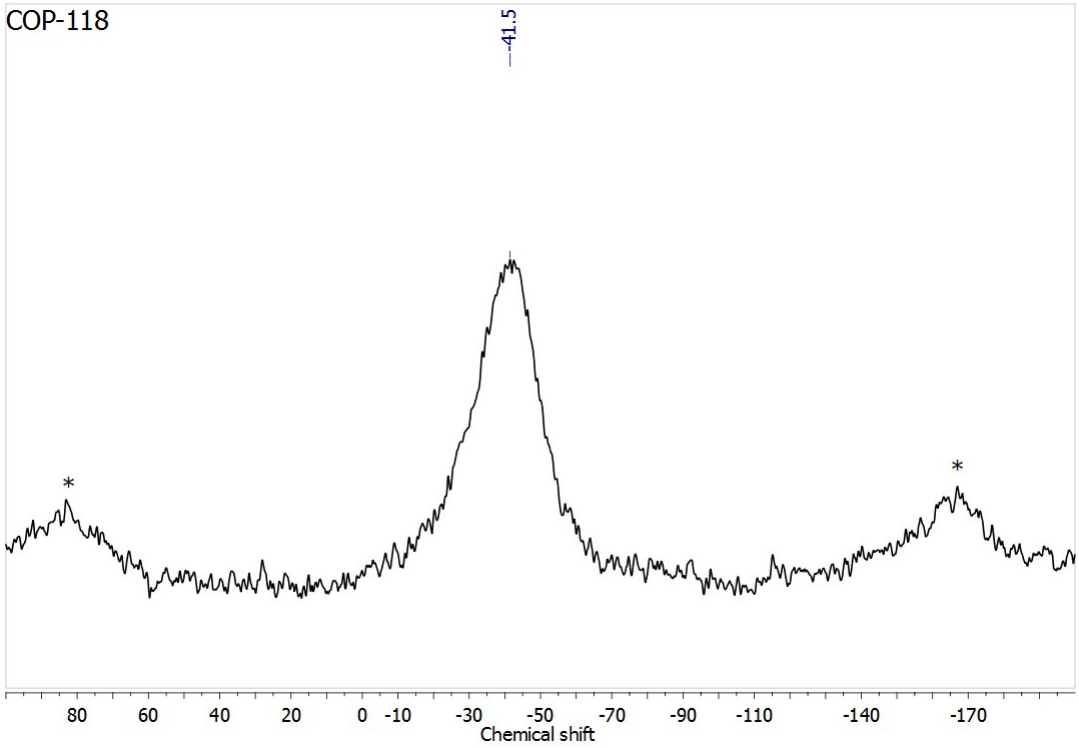
Supplementary Electronic Information

Solid state ^{31}P-NMR of COP-118



* Asterisks denote spinning side bands

Figure S1. Solid state NMR study of COP-118

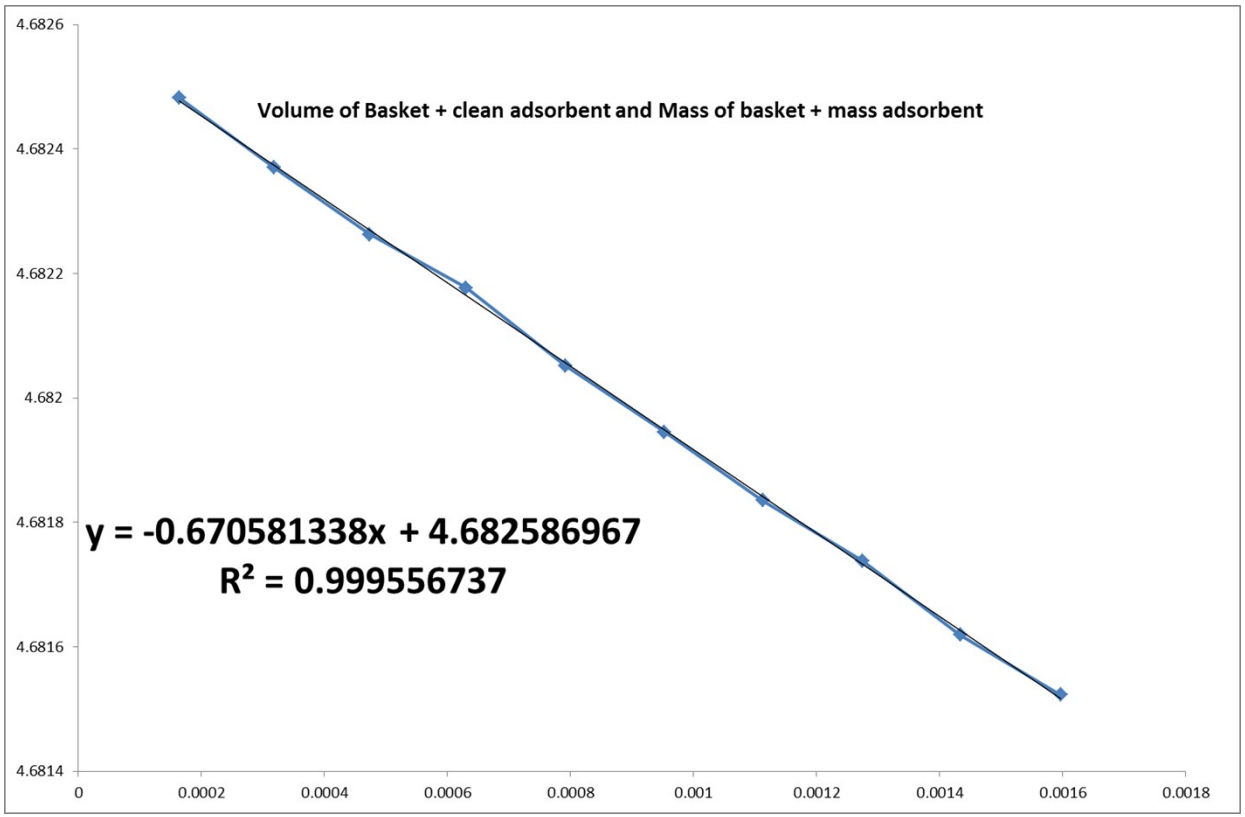


Figure S2. Fitting curve of the He run of volume and mass of the materials

Table S1. Data from Magnetic Suspension Balance

Mass of Empty basket	Mh		4.5675	
Mass of Empty basket Mass of sample	M (Ms+Mh)		4.6827	Intercept of equation 2
Sample mass (g)	Ms		0.1152	
Sample volume (cm^3)	V		0.6706	Slope of equation 2

Adsorption segments of CO_2 at 323 K and 10 bars

Segment	T /°C	P /bar	Sigma p /bar	corr. Weight (g)	corr. Weightdiff. (g)	Sigma m(g)	Comp. factor for CO2	CO2 Density (g/cm3)	(C-/Ms)/Mw	Density correction	mmoleCO2/g
1	52.1	0.06	0	4.682611	0.000001	0.000003	0.999	9.84293E-05	-1.7554E-05	1.30192E-05	-0.004535207
2	52.5	0.91	0	4.683901	0.001291	0.000006	0.9962	0.001497041	0.000236886	0.000198013	0.434898725
3	52.6	1.894	0.0049	4.684378	0.001768	0.000006	0.99235	0.003127908	0.00033097	0.000413727	0.744696378
4	52.6	2.891	0.003	4.684439	0.001829	0.000004	0.9885	0.004793031	0.000343001	0.000633972	0.976973083
5	52.6	3.89	0	4.684263	0.001653	0.000003	0.98465	0.006474505	0.000308287	0.000856379	1.164666405
6	52.6	4.89	0	4.683949	0.001339	0.000009	0.9808	0.00817085	0.000246353	0.001080754	1.327107611
7	52.6	5.89	0	4.68354	0.00093	0.000001	0.97686	0.009881475	0.000165682	0.001307018	1.472699822
8	52.6	6.89	0	4.683028	0.000418	0.000006	0.97292	0.011605956	6.46949E-05	0.001535114	1.599808843
9	52.6	7.89	0	4.682462	-0.000148	0.000007	0.96898	0.01334446	-4.6943E-05	0.001765065	1.718121813
10	52.6	8.89	0	4.68185	-0.00076	0.000005	0.96504	0.015097161	-0.00016765	0.001996894	1.829239376
11	52.6	9.889	0.003	4.681191	-0.001419	0.000008	0.9611	0.016862526	-0.00029764	0.002230398	1.932761841

Table S1. con't

Desoprtion segments of CO_2 at 323 K and 10 bars											
Segment	**T /°C**	**P /bar**	**Sigma p /bar**	**corr. Weight (g)**	**corr. Weightdiff. (g)**	**Sigma m(g)**	**Comp. factor for CO2**	**CO2 Density (g/cm3)**	**(C-/Ms)/Mw**	**Density correction**	**mmoleCO2/g**
12	52.6	8.89	0	4.681896	-0.000714	0.000004	0.96504	0.015097161	-0.00015858	0.001996894	1.83831244
13	52.7	7.89	0	4.682551	-0.000059	0.000004	0.96898	0.01334446	-2.9389E-05	0.001765065	1.735676219
14	52.6	6.89	0	4.683159	0.000549	0.000005	0.97292	0.011605956	9.05334E-05	0.001535114	1.625647352
15	52.7	5.89	0	4.683686	0.001076	0.000017	0.97686	0.009881475	0.000194479	0.001307018	1.501496939
16	52.7	4.89	0	4.684127	0.001517	0.000015	0.9808	0.00817085	0.000281462	0.001080754	1.362216425
17	52.7	3.89	0	4.684466	0.001856	0.000005	0.98465	0.006474505	0.000348327	0.000856379	1.204706232
18	52.8	2.89	0	4.684653	0.002043	0.000006	0.9885	0.004791373	0.000385211	0.000633753	1.018963264
19	52.8	2.024	0.0092	4.684601	0.001991	0.000007	0.99235	0.0033426	0.000374954	0.000442124	0.817078313
20	52.8	1.228	0.0117	4.684287	0.001677	0.000028	0.9962	0.002020183	0.000313021	0.000267209	0.580229269
21	52.8	0.06	0	4.682602	-0.000008	0.000014	0.9999	9.83407E-05	-1.933E-05	1.30075E-05	-0.00632209

FTIR study of the materials

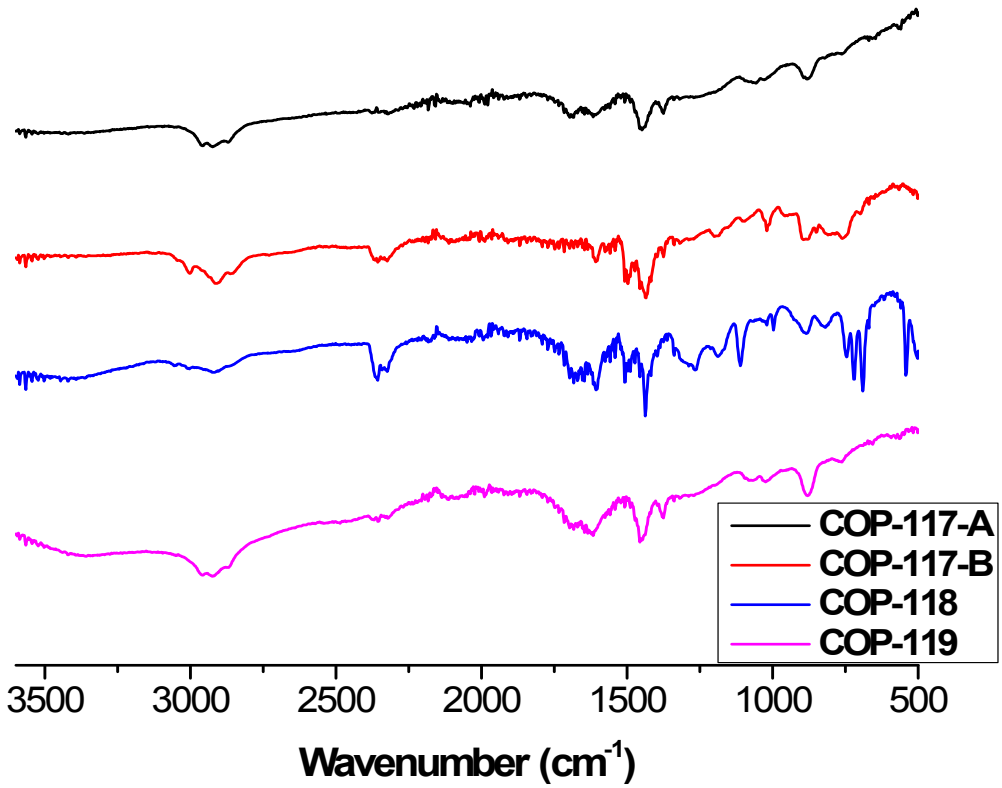


Figure S3. FTIR analysis of all the COPs materials

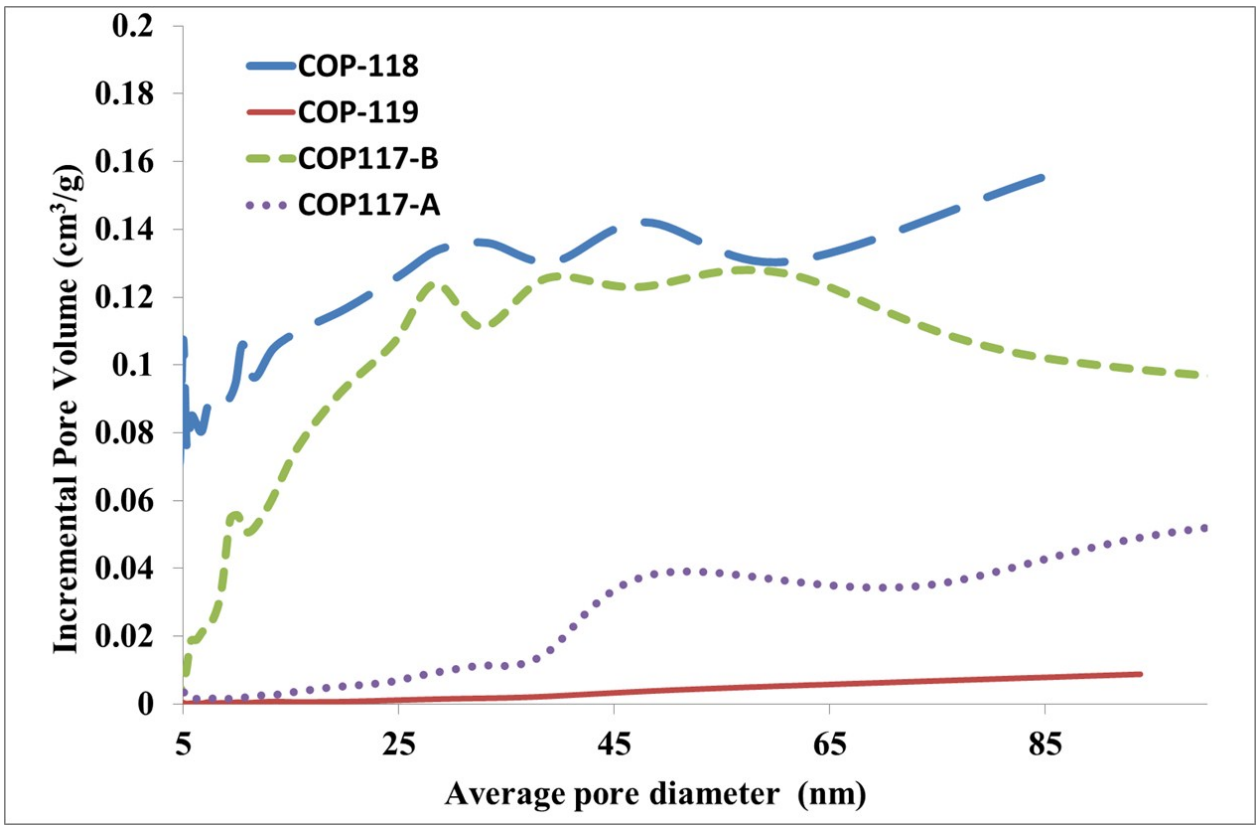


Figure S4. Pore volume distribution of COPs materials

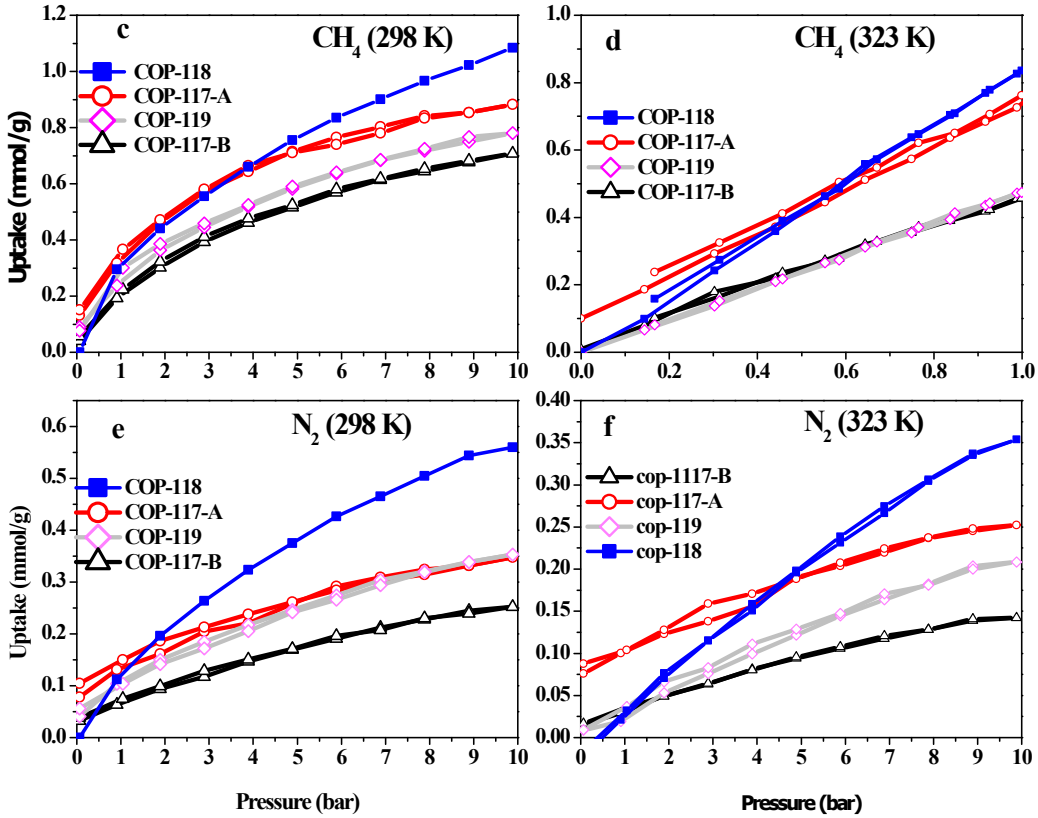


Figure S5. CH_4 and N_2 uptake of all materials at two different temperatures.

Table S2. Calculation of heat of adsorption based on Clausius-Clapeyron equation

P1	P3	n1	n3	n2	n3-n1	n2-n1	(P3-P1)/(n3-n1)	p2 = p1+(n2-n1)(p3-p1/n3-n1)	P2 (atm)	T (k)	1/T (k-1)	lnp (atm)	Slope k	Heat of Adsorption (Q(J/mol)	n (mml/g)
0.91	1.89	0.86	1.31	1	0.45	0.14	2.177777778	1.214888889	1.19900203	297.5	0.00336134	0.18149	-3986.1	**33.14**	1
2.892	3.89	0.744	1.165	1	0.421	0.256	2.370546318	3.498859857	3.453105967	323	0.00309598	1.239274			
					0										
1.892	2.892	1.31	1.61	1.5	0.3	0.19	3.333333333	2.525333333	2.492310054	297.5	0.00336134	0.91321	-3296.5	**27.40**	1.5
5.89	6.89	1.48	1.6	1.5	0.12	0.02	8.333333333	6.056666667	5.977464848	323	0.00309598	1.787997			
3.89	4.892	1.83	2.025	2	0.195	0.17	5.138461538	4.763538462	4.701246622	297.5	0.00336134	1.547828	-2752.9	**22.89**	2
8.89	9.89	1.83	2	2	0.17	0.17	5.882352941	9.89	9.760670448	323	0.00309598	2.278361			
0.91	1.892	0.86	1.31	0.6	0.45	-0.26	2.182222222	0.342622222	0.33814182	297.5	0.00336134	-1.08429			
0.91	1.892	0.44	0.75	0.6	0.31	0.16	3.167741935	1.41683871	1.398310993	323	0.00309598	0.335265			

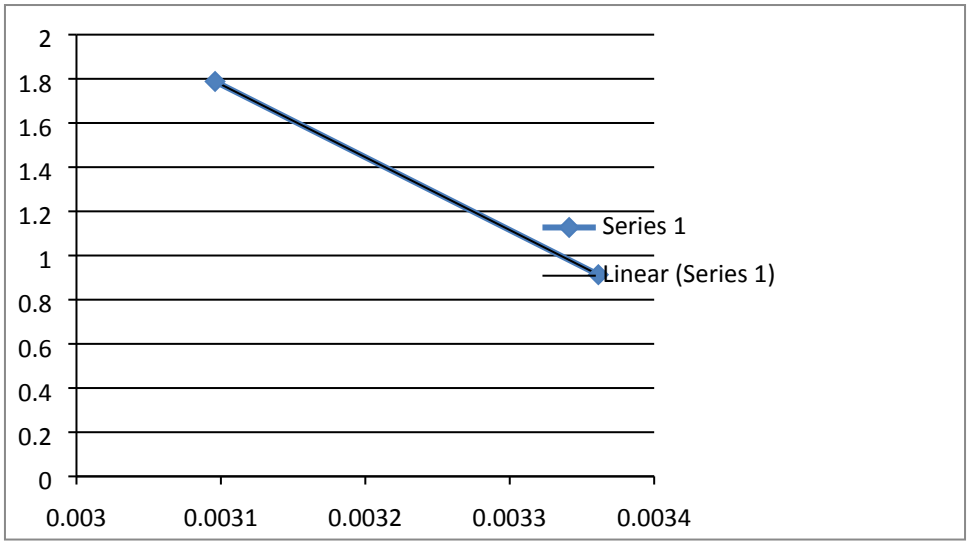


Figure S6. Equation curve for heat of adsorption

Table S3. Calculation of rate of adsorption

No.	Time (min)	t (sec)	Current Pressure (bar)	corr.Weight (g)	**CO2 Density (g/cm3)**	(C-M/Ms)/Mw	Density correction	mmoles of CO2/g of adsorbent	Mt/Me	(1-mt/me)
0	809.2323	0	8.89		0.016376	-0.92362	0.002166	0	0	1
1	810.607	1.3747	8.99	4.682326	0.01656	-7.4E-05	0.00219	2.116619662	1	1.6E-07
2	810.9409	1.7086	9.72	4.680629	0.017905	-0.00041	0.002368	1.959764888	0.925894	0.074106
3	811.2742	2.0419	9.84	4.680517	0.018126	-0.00043	0.002397	1.966911603	0.92927	0.07073
4	811.6076	2.3753	9.89	4.680562	0.018218	-0.00042	0.00241	1.987969783	0.939219	0.060781
5	812.7932	3.5609	9.89	4.681053	0.018218	-0.00032	0.00241	2.084814882	0.984974	0.015026
6	813.1266	3.8943	9.89	4.681054	0.018218	-0.00032	0.00241	2.085012122	0.985067	0.014933
7	813.4599	4.2276	9.89	4.681056	0.018218	-0.00032	0.00241	2.085406603	0.985253	0.014747
8	813.7943	4.562	9.89	4.681057	0.018218	-0.00032	0.00241	2.085603844	0.985346	0.014654
9	814.9776	5.7453	9.89	4.68111	0.018218	-0.00031	0.00241	2.096057592	0.990285	0.009715
10	815.312	6.0797	9.89	4.68111	0.018218	-0.00031	0.00241	2.096057592	0.990285	0.009715
11	815.6443	6.412	9.89	4.68111	0.018218	-0.00031	0.00241	2.096057592	0.990285	0.009715
12	815.9776	6.7453	9.89	4.68111	0.018218	-0.00031	0.00241	2.096057592	0.990285	0.009715
13	817.1641	7.9318	9.89	4.681132	0.018218	-0.00031	0.00241	2.100396883	0.992335	0.007665

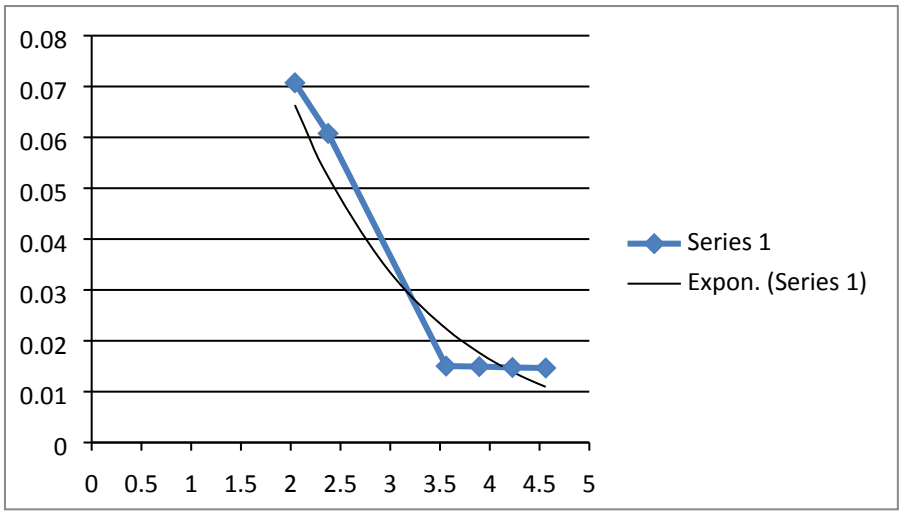


Figure S7. Curve fitting for the rate adsorption based on above table no 3