Supplementary data

Comparative study of the selective sorption of organic dyes on inorganic materials – a cost-effective way of waste treatment in educational and small research laboratories

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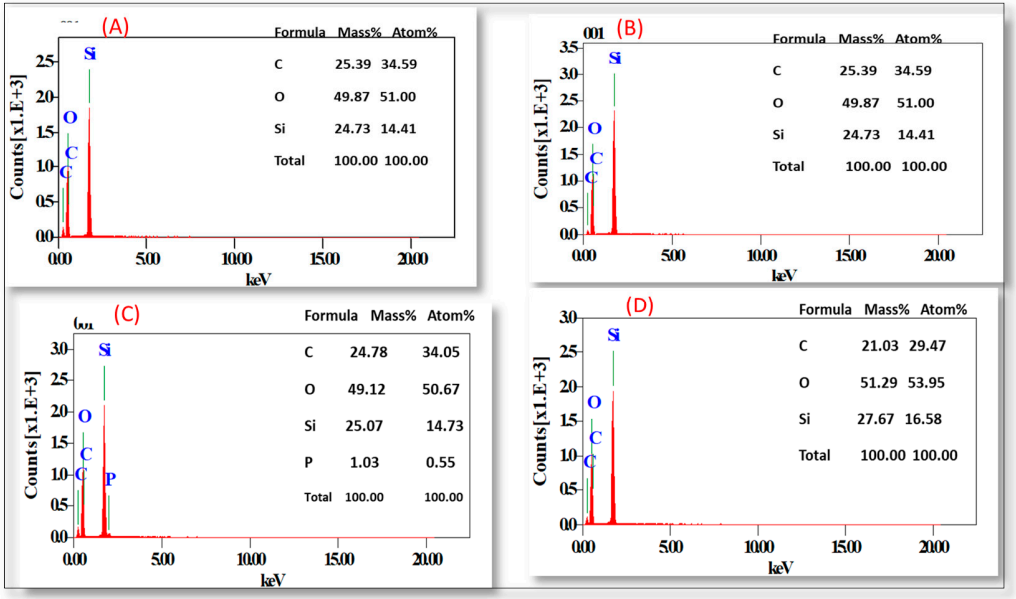
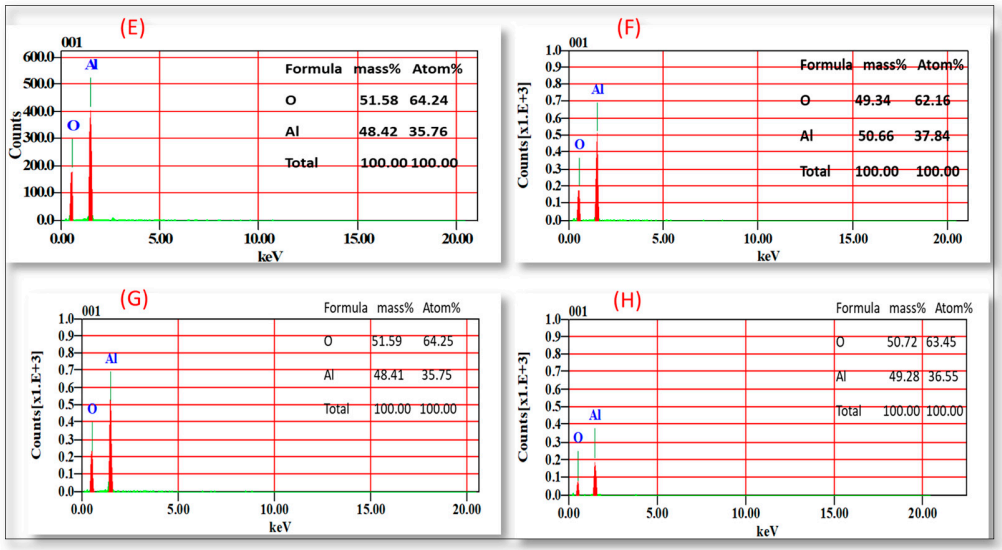
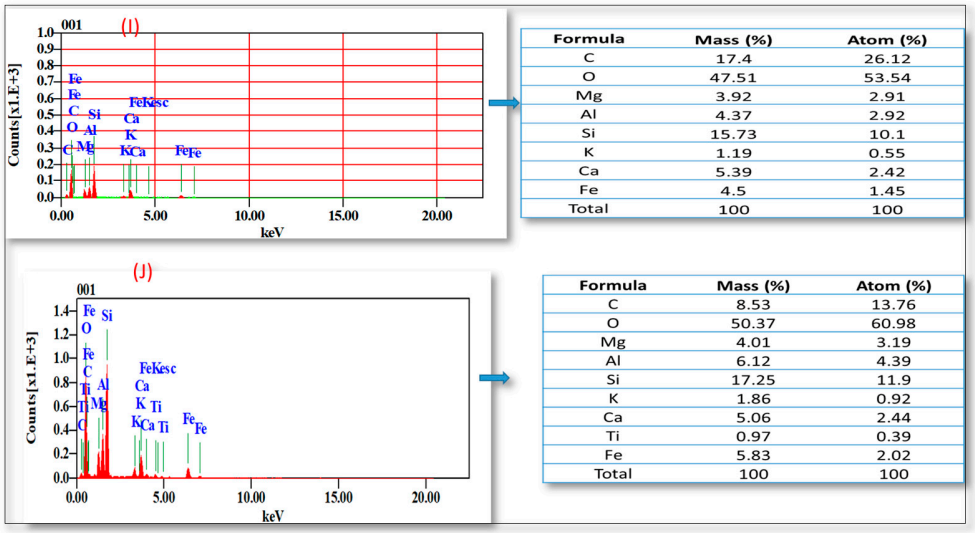

(A)
Formula Mass% Atom%
C 25.39 34.59
O 49.87 51.00
Si 24.73 14.41
Total 100.00 100.00
Si
O
C
C
Counts[x1.E+3]
keV
(B)
Formula Mass% Atom%
C 25.39 34.59
O 49.87 51.00
Si 24.73 14.41
Total 100.00 100.00
Si
O
C
C
Counts[x1.E+3]
keV
(C)
Formula Mass% Atom%
C 24.78 34.05
O 49.12 50.67
Si 25.07 14.73
P 1.03 0.55
Total 100.00 100.00
Si
O
C
C
P
Counts[x1.E+3]
keV
(D)
Formula Mass% Atom%
C 21.03 29.47
O 51.29 53.95
Si 27.67 16.58
Total 100.00 100.00
Si
O
C
C
Counts[x1.E+3]
keV

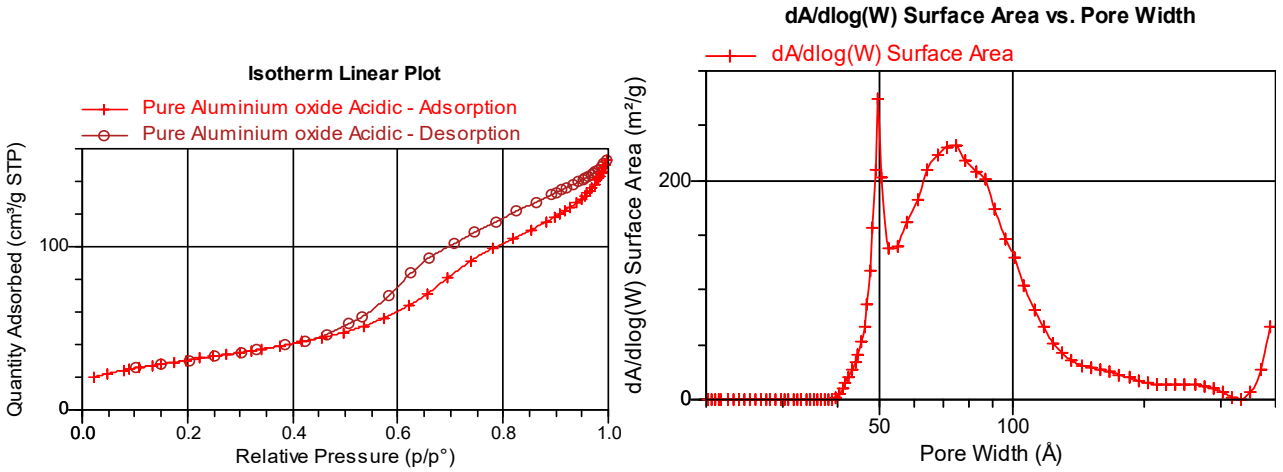

(E)
001
Formula mass% Atom%
O 51.58 64.24
Al 48.42 35.76
Total 100.00 100.00
Al
O
Counts
keV
(F)
001
Formula mass% Atom%
O 49.34 62.16
Al 50.66 37.84
Total 100.00 100.00
Al
O
Counts[x1.E+3]
keV
(G)
001
Formula mass% Atom%
O 51.59 64.25
Al 48.41 35.75
Total 100.00 100.00
Al
O
Counts[x1.E+3]
keV
(H)
001
Formula mass% Atom%
O 50.72 63.45
Al 49.28 36.55
Total 100.00 100.00
Al
O
Counts[x1.E+3]
keV



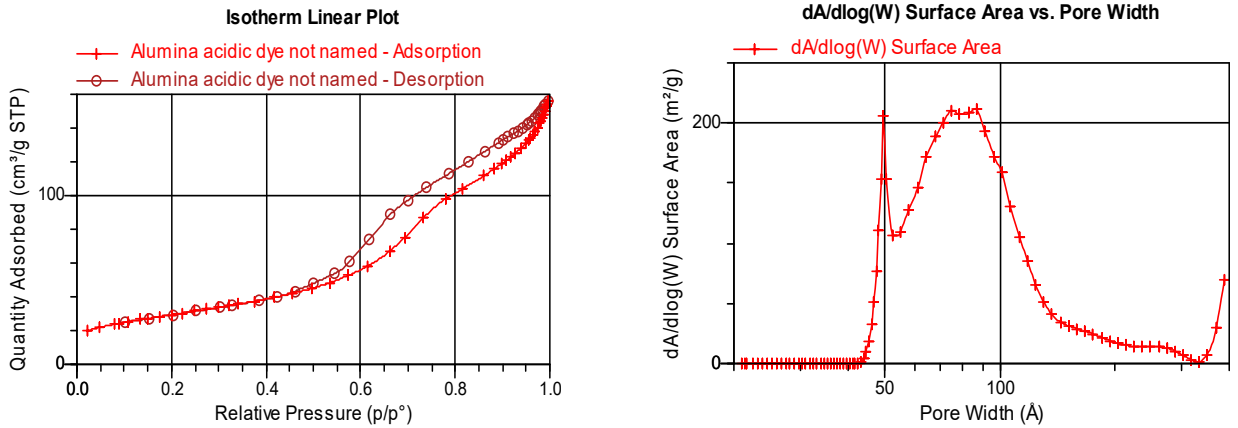
Formula	Mass (%)	Atom (%)
C	17.4	26.12
O	47.51	53.54
Mg	3.92	2.91
Al	4.37	2.92
Si	15.73	10.1
K	1.19	0.55
Ca	5.39	2.42
Fe	4.5	1.45
Total	100	100

Formula	Mass (%)	Atom (%)
C	8.53	13.76
O	50.37	60.98
Mg	4.01	3.19
Al	6.12	4.39
Si	17.25	11.9
K	1.86	0.92
Ca	5.06	2.44
Ti	0.97	0.39
Fe	5.83	2.02
Total	100	100

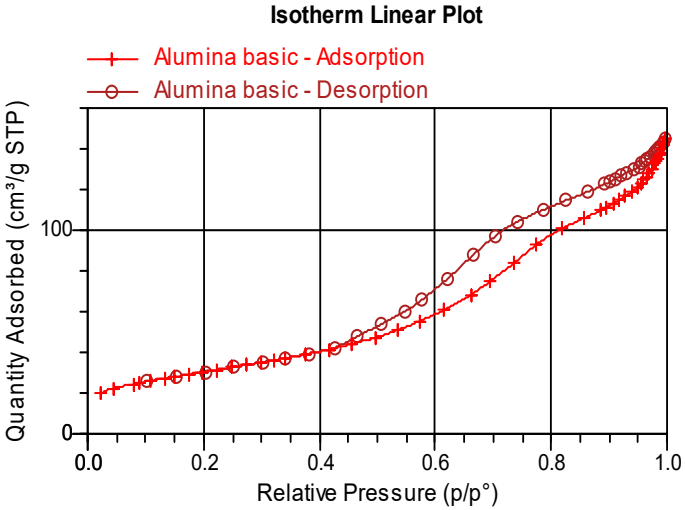
Figure S1. EDS elemental analysis of (A) silica 60-120 mesh (B) silica 60-120 mesh (C) used silica before adsorption (D) five-time recycled used silica (E) pure acidic alumina (F) five time recycled acidic alumina (G) pure basic alumina (H) five time recycled basic alumina (I) pure alginite (J) first time recycled alginite.

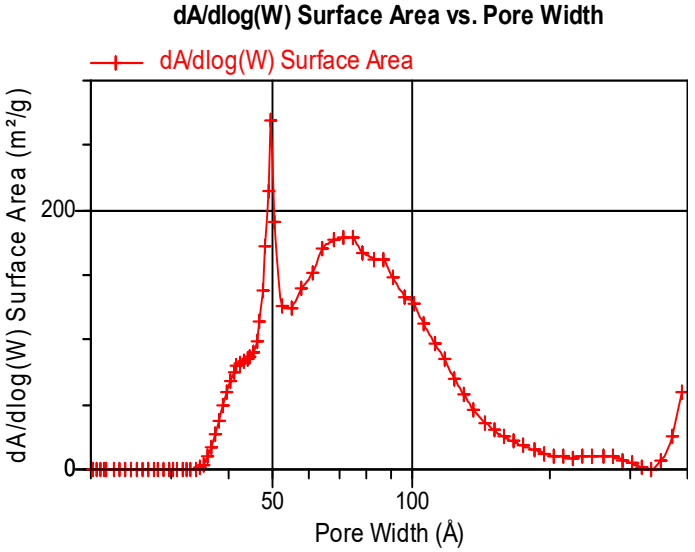

Isotherm Linear Plot
Pure Aluminium oxide Acidic - Adsorption
Pure Aluminium oxide Acidic - Desorption
Quantity Adsorbed (cm³/g STP)
Relative Pressure (p/p°)
dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
Pore Width (Å)

1A

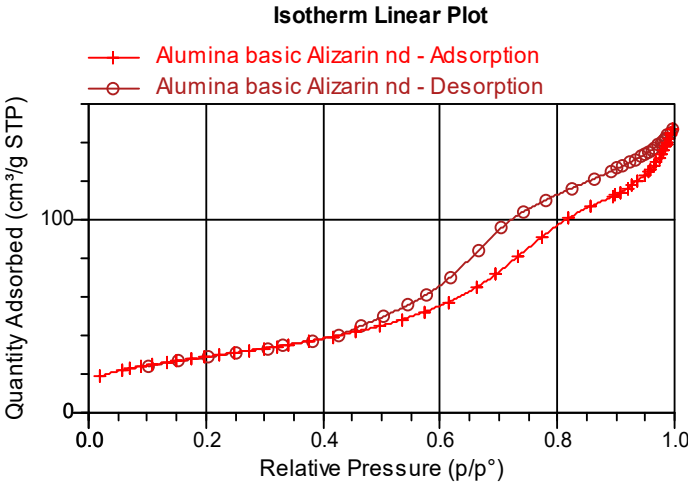

Isotherm Linear Plot
Alumina acidic dye not named - Adsorption
Alumina acidic dye not named - Desorption
Quantity Adsorbed (cm³/g STP)
Relative Pressure (p/p°)
dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
Pore Width (Å)

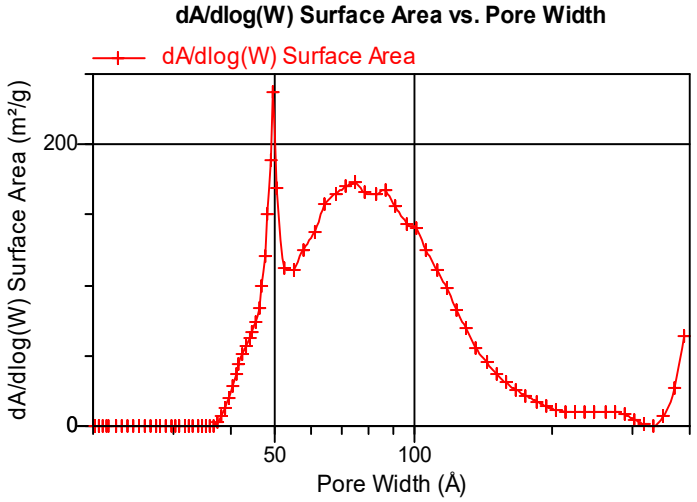
1B


Isotherm Linear Plot
Alumina basic - Adsorption
Alumina basic - Desorption
Quantity Adsorbed (cm³/g STP)
100
0
0.0
0.2
0.4
0.6
0.8
1.0
Relative Pressure (p/p°)

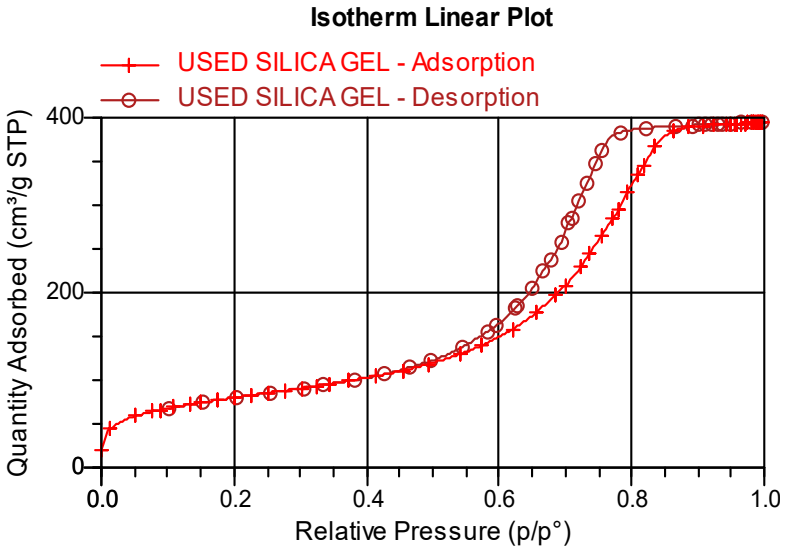

dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
200
0
50
100
Pore Width (Å)

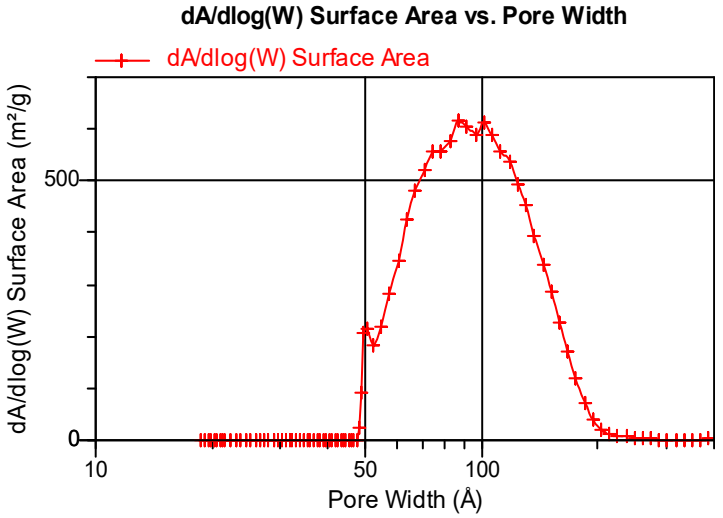
2A


Isotherm Linear Plot
Alumina basic Alizarin nd - Adsorption
Alumina basic Alizarin nd - Desorption
Quantity Adsorbed (cm³/g STP)
100
0
0.0
0.2
0.4
0.6
0.8
1.0
Relative Pressure (p/p°)

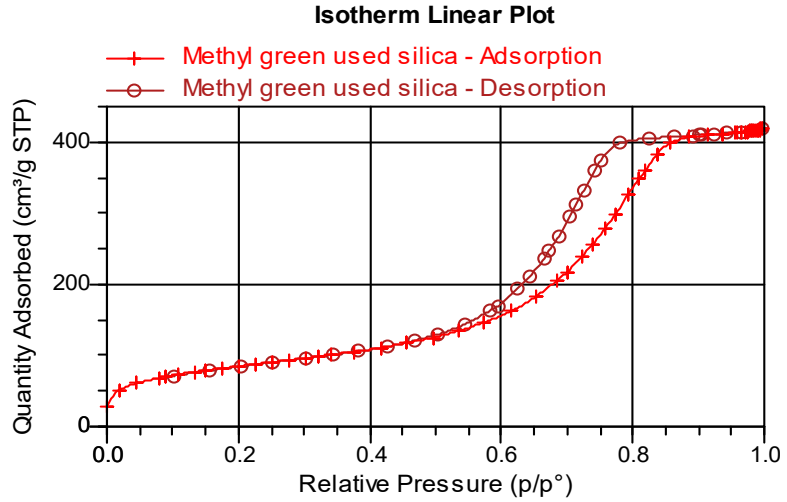

dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
200
0
50
100
Pore Width (Å)

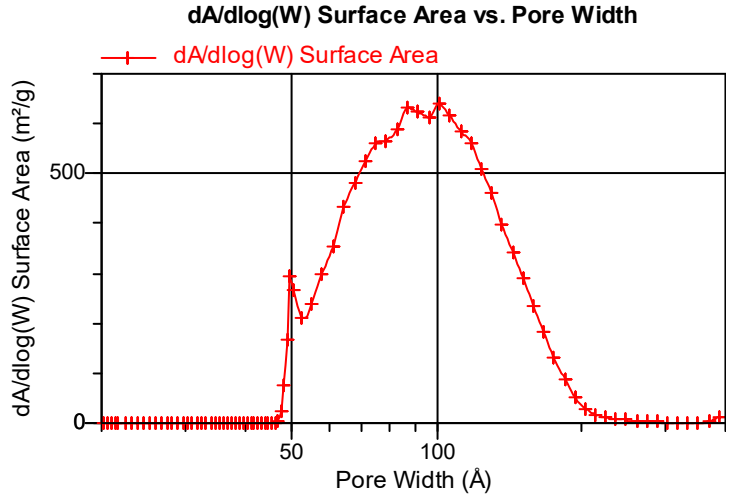
2B


Isotherm Linear Plot
USED SILICA GEL - Adsorption
USED SILICA GEL - Desorption
Quantity Adsorbed (cm³/g STP)
400
200
0
0.0
0.2
0.4
0.6
0.8
1.0
Relative Pressure (p/p°)


dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
500
0
10
50
100
Pore Width (Å)

3A


Isotherm Linear Plot
Methyl green used silica - Adsorption
Methyl green used silica - Desorption
Quantity Adsorbed (cm³/g STP)
400
200
0
0.0
0.2
0.4
0.6
0.8
1.0
Relative Pressure (p/p°)


dA/dlog(W) Surface Area vs. Pore Width
dA/dlog(W) Surface Area
dA/dlog(W) Surface Area (m²/g)
500
0
50
100
Pore Width (Å)

3B

Figure S2. The N_2 adsorption-desorption isotherm linear plot and surface area vs pore width plot for pure acidic alumina before adsorption (Fig: 1A) for acidic alumina after five-time regeneration (Fig: 1B), for basic alumina before adsorption (Fig: 2A), for basic alumina after regeneration (Fig: 2B), for used silica gel before adsorption (Fig: 3A), for used silica gel after regeneration (Fig: 3B)