

Tables

Table 1 Behnken's Matrix of the Box design for eliminating *E. coli*

Codes for variables	Range and levels			
	Codes	Low level (−1)	Central level (0)	High level (+1)
Disinfectant dose (g/L)	A	10	20	30
Initial <i>E. coli</i> concentration (cfu/mL)	B	80×10^7	160×10^6	250×10^7
Contact time (hours)	C	1	3	6

Table 2: The Distribution of the bacteria in collected water samples from urban water supplies including desalinated water used in households and at Al-Darb College. The water originates from Al-Shaqiq desalination plants and is transported through pipelines to southern Saudi Arabia during the period from (October-December 2024)

Samples	Total coliform	Fecal coliform	Fecal <i>Streptococci</i>	Total bacterial count 37°C	Total bacterial count 22°C
D1	44	13	9	55	72
D2	90	62	50	120	160

Table 3 *E.coli*-PQ795799.1 inhibitory zones (mm) for phytofabricated MS-ZVI@PP, pomegranate peel extract, and moringa seed aqueous extract

Concentrations (mg/mL)	At different concentrations, the zone of inhibition (ZOI; diameter in mm) ± standard deviation (SD)								
	Moringa seeds extract			Pomegranate peel extract			MS-ZVI@PP		
	Min	Max	Mean ± SE	Min	Max	Mean ± SE	Min	Max	Mean ± SE
100	8.0	13.0	10.5±0.8	6.0	12.0	9.3±0.5	27.5	29.6	28.5±0.7
200	9.0	14.0	11.5±0.7	8.0	13.0	10.5±0.4	20.0	22.5	22.5±0.6
300	11.0	15.0	13.0±0.7	10.0	14.0	12.1±0.5	25.0	26.0	25.5±0.8
400	13.5	16.0	15.0±0.6	12.5	15.5	14.25±0.2	29.0	31.5	30.25±0.8
Control ^a	0.0	0.0	0.0±0.0	0.0	0.0	0.0±0.0	0.0	0.0	0.0±0.0
Streptomycin ^b	18.0	20.0				19.0±0.8			

^a negative control (sterilized distilled water) ^b positive control (standard antibiotic 30 µg/mL)

Table 4 Calculation of MS-ZVI@PP size.

Peak number	Pos. (2 θ)	FWHM	Size (nm)
1	10.77°	0.2734	18.03
2	14.86°	0.2905	19.04
3	19.9°	0.4620	20.22
4	21.2°	0.4923	22.4
5	25.1	0.6803	21.37
6	27.2°	0.7233	20.23
7	29.1°	0.6425	19.67
8	34.23°	0.7430	18.23
9	35.9°	0.4654	21.38
10	42.7°	0.7612	21.44
11	51.05°	0.4923	18.66
12	69.05°	0.6803	19.89

Table 5 *E. Coli* adhesion kinetic and isotherm characteristics on MS-ZVI@PP

(I)					
Pseudo-first order			Pseudo-second order		
[surf], calc. (cfu g ⁻¹)	K1 (min ⁻¹)	R ²	[surf _t], calc. (cfu g ⁻¹)	K ₂ (g cfu min ⁻¹)	R ²
3.5	0.012	0.920	6.02	0.008	0.993
(II)					
Langmuir			Frendlich		
[surf _{max}], calc. (cfu g ⁻¹)	k _L	R ²	K _f	N	R ²
1.17	0.05	0.940	20.2	2.7	0.991

Table 6 Experimental design based on BBD for three independent variables

Run	Factor 1	Factor 2	Factor 3	<i>E. coli</i> removal (%)	
				predicted	Observed
1	1	0	1	91.18	93.11

2	0	0	0	98.32	97.8
3	0	1	1	99.48	98.1
4	-1	0	-1	71.03	69.1
5	1	1	0	100	99.7
6	0	0	0	98.32	99.8
7	0	0	0	98.32	97.6
8	0	0	0	98.32	98.9
9	0	1	-1	97.02	98.4
10	0	0	0	98.32	97.5
11	-1	-1	0	68.55	69.1
12	0	-1	-1	88.12	89.5
13	1	0	-1	97.92	97.1
14	-1	0	1	76.58	77.4
15	-1	1	0	86.85	87.4
16	0	-1	1	85.48	84.1
17	1	-1	0	96.65	96.1

Table7. ANOVA regression model for *E. coli* - PQ795799.1 elimination:

Source	Sum of squares	Degree of Freedom	Mean Sum of Squares	F- value	P- value
Model	1702.6	9	189.178	77.9	< 0.001
A	855.74	1	855.74	18150.65	<0.0001
B	248.09	1	248.09	5262.0701	<0.0001
C	0.23	1	0.23	4.9763	0.0050
AB	394.36	1	394.36	8364.4886	0.0012
AC	6.42	1	6.42	136.2433	0.0652
BC	97.62	1	97.62	2070.5235	.07894
A^2	55.88	1	55.88	1185.1507	0.0348
B^2	37.76	1	37.76	800.9308	<0.0001
C^2	6.50	1	6.50	137.9214	0.0013
Residual	0.33	7	0.33		

Lack-of-ft	22.05	3	7.35	2.92	0.1639
Cor Total	1702.93	R^2			0.9998
Std. Dev	0.2236	Adjusted R^2			0.9756
Mean	91.20353	Predicted R^2			0.8779719
C.V. %	2.79	Adequate Precision			27.4431

Table 8 Potential for reusing immobilized phytofabricated MS-ZVI@PP for elimination *E. coli*- PQ795799.1 from Red Sea water samples.

No. of cycles	Removal percentages (%)
First cycle (After 6 h)	96.6±0.9%
Second cycle (After 9 h)	95.1±0.5%
Third cycle (After 12 h)	93.9±0.4%
Fourth cycle (After 24 h)	90.9±0.7%