



## Supplementary Materials

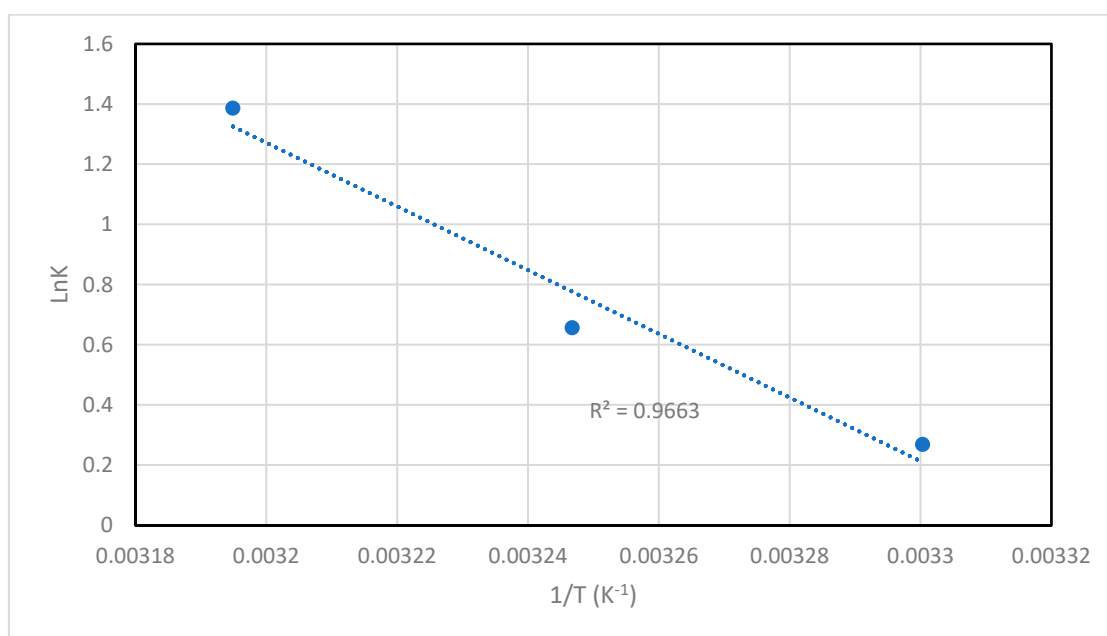
# Synthesis and Characterization of Silver-Modified Nanoporous Silica Materials for Enhanced Iodine Removal

Ahmed Elmekawy <sup>1,2</sup>, Qui Quach <sup>2</sup> and Tarek M. Abdel-Fattah <sup>2\*</sup>

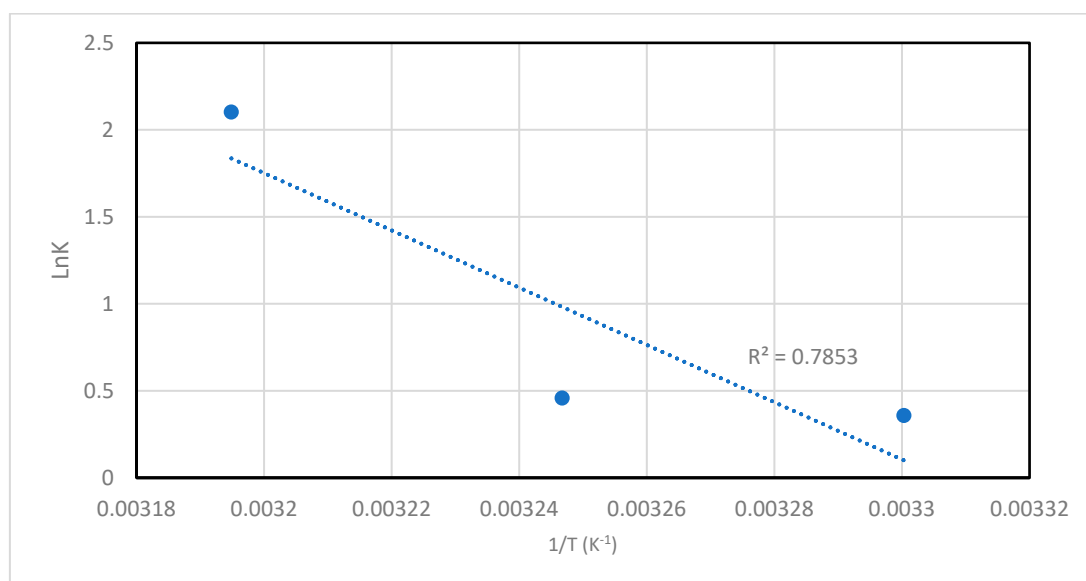
<sup>1</sup> Department of Physics at Tanta University, Tanta 31527, Egypt; ahmedfelmekawy@gmail.com

<sup>2</sup> Applied Research Center, Thomas Jefferson National Accelerator Facility and Department of Molecular Biology and Chemistry, Christopher Newport University, Newport News, VA 23606, USA; qui.quach.13@cnu.edu

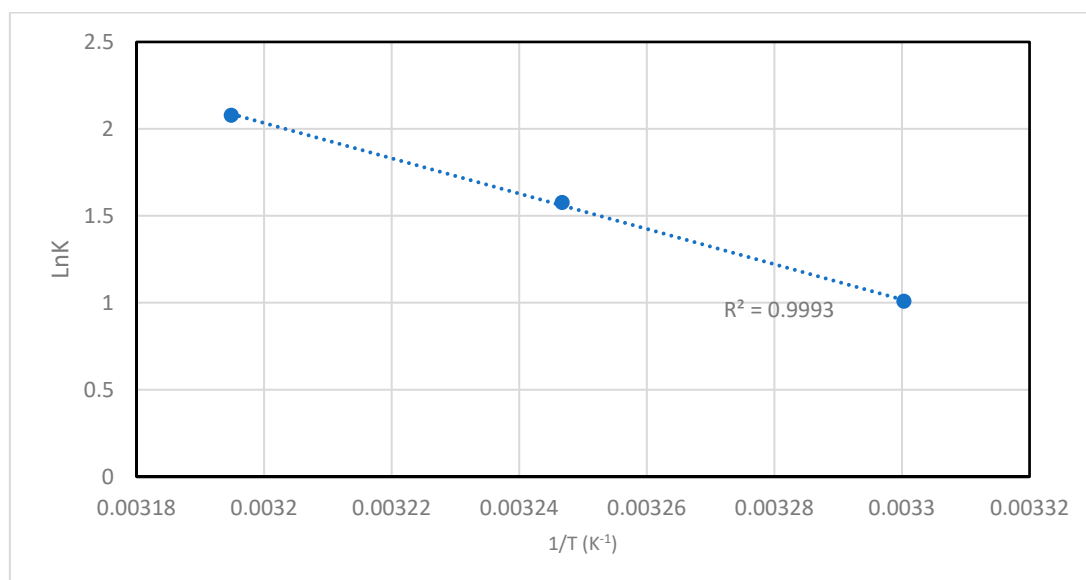
\* Correspondence: fattah@cnu.edu



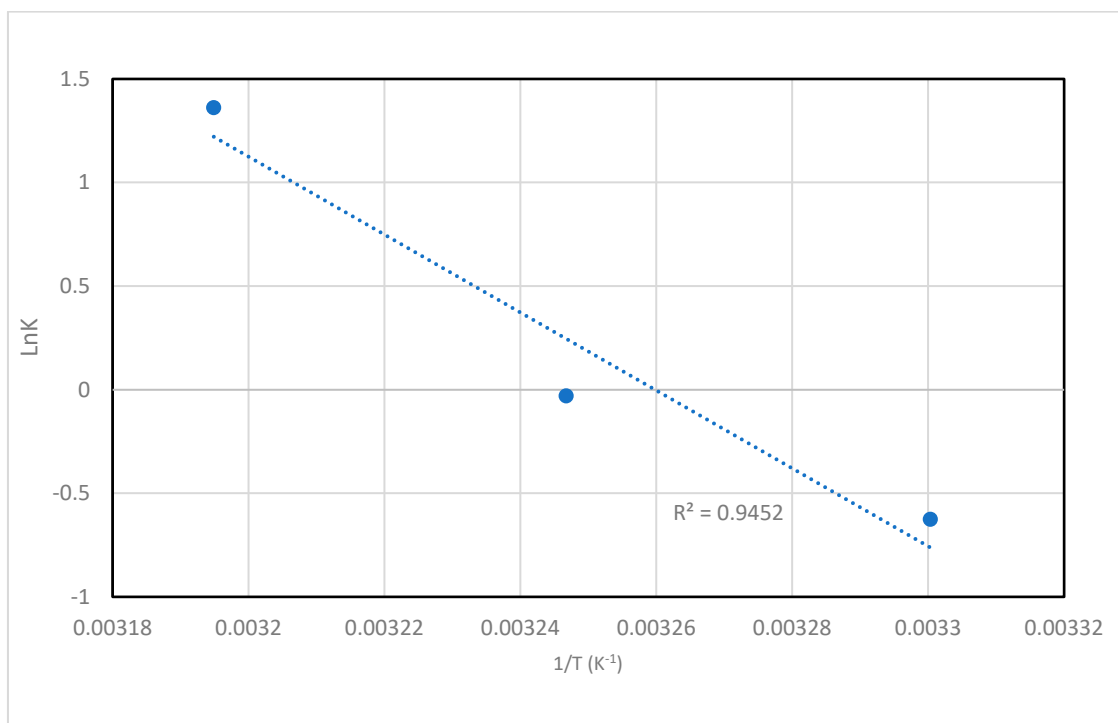
**Figure S1.** The van't Hoff plot for the iodine adsorption of 13X-Ag at 303 K, 308 K and 313 K.



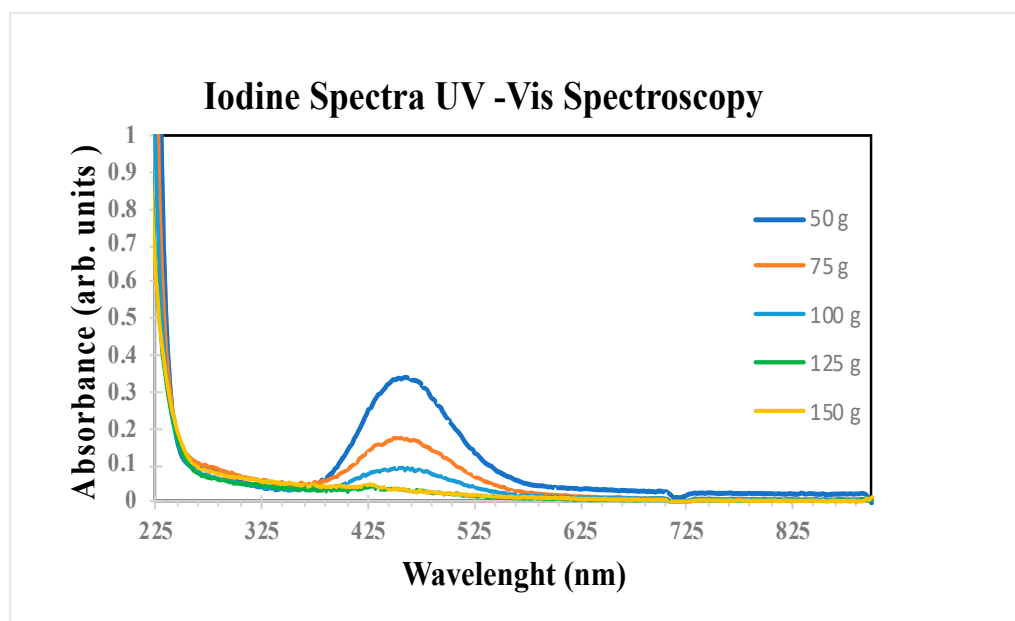
**Figure S2.** The van't Hoff plot for the iodine adsorption of 5A-Ag at 303 K, 308 K and 313 K.



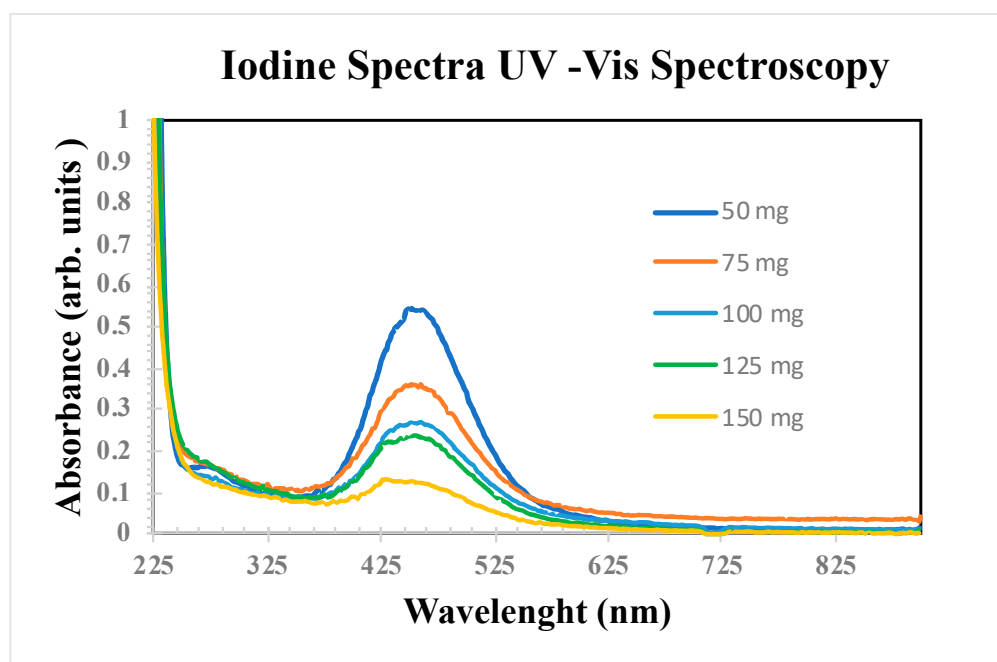
**Figure S3.** The van't Hoff plot for the iodine adsorption of Chabazite-Ag at 303 K, 308 K and 313 K.



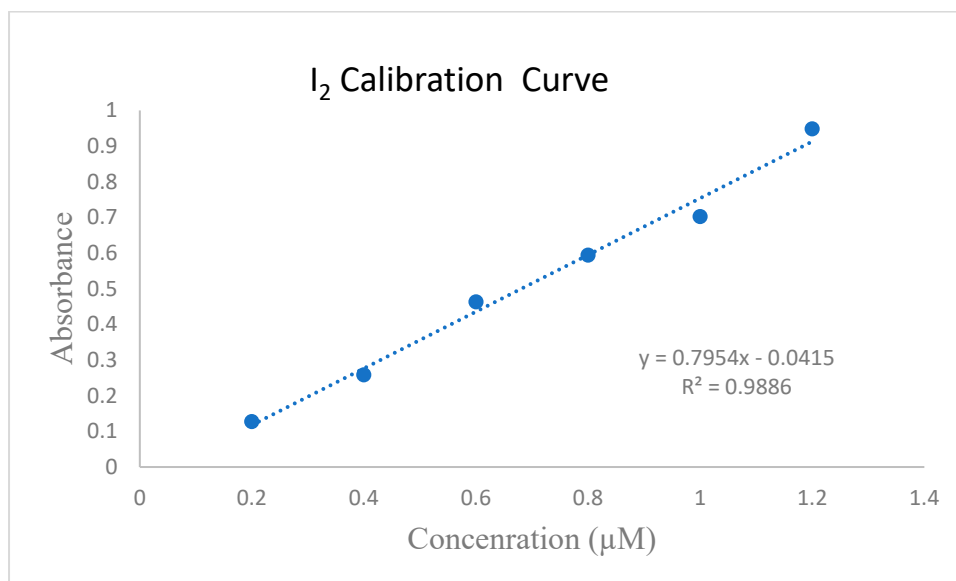
**Figure S4.** The van't Hoff plot for the iodine adsorption of Clinoptilolite-Ag at 303 K, 308 K and 313 K.



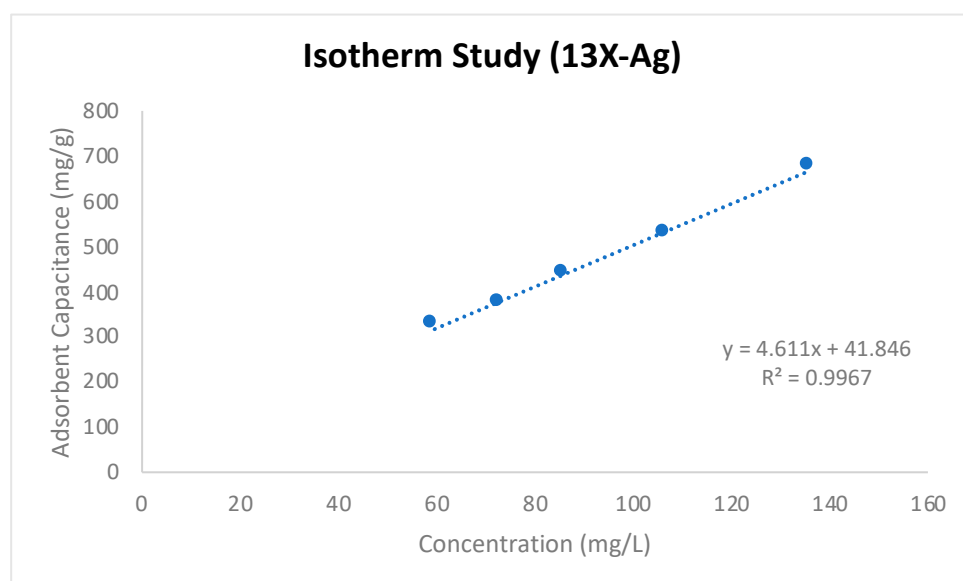
**Figure S5.** Iodine Spectra UV-Vis Spectroscopy for Chabazite -Ag adsorbent.



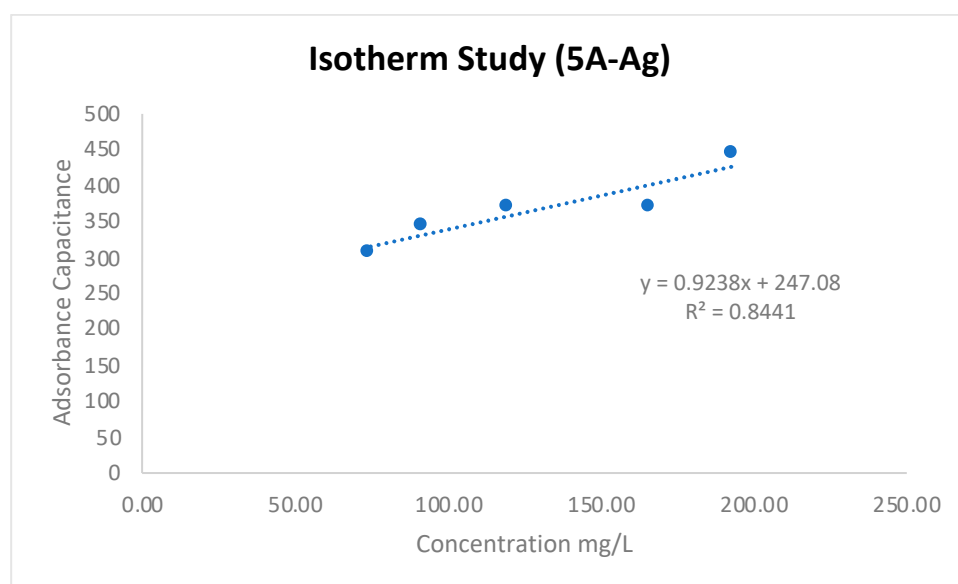
**Figure S6.** Iodine Spectra UV-Vis Spectroscopy for Clinoptilolite -Ag adsorbent.



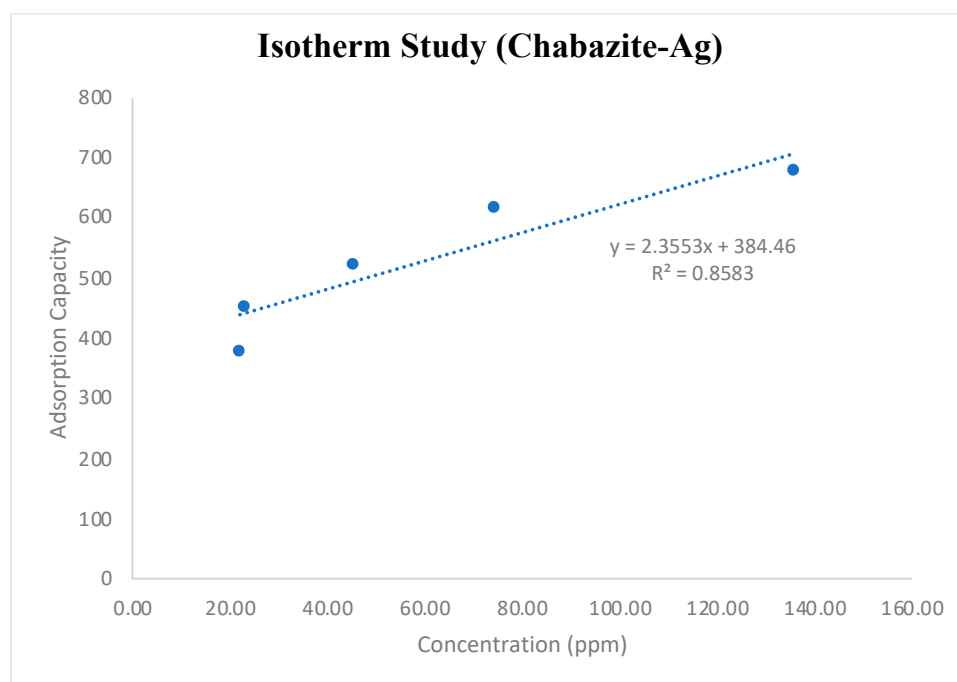
**Figure S7.** Calibration Curve for Iodine Spectra Measured with UV-Vis Spectrophotometer at 462 nm.



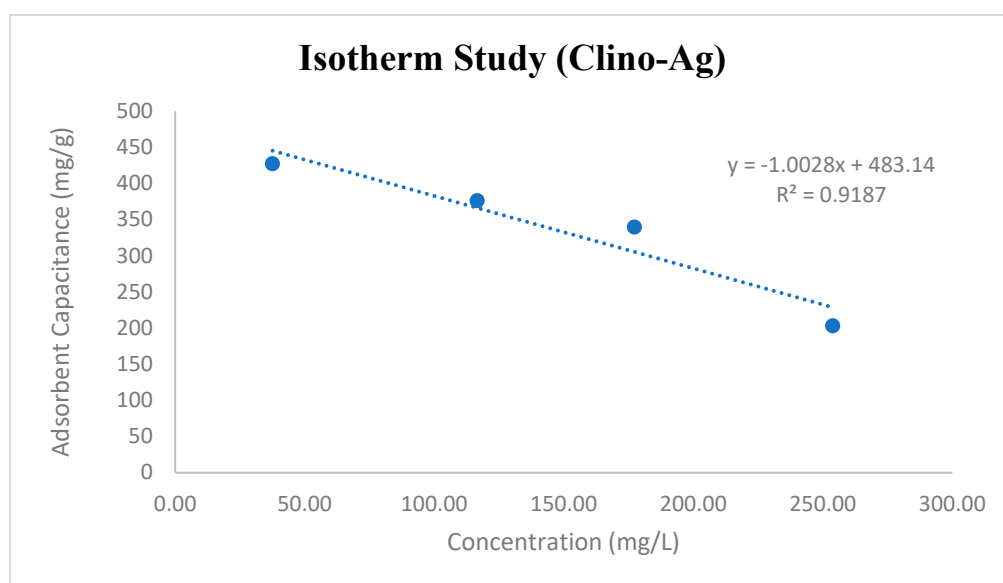
**Figure S8.** Isotherm Study for 13X-Ag Measured with UV-Vis Spectrophotometer at 462 nm.



**Figure S9.** Isotherm Study for 5a-Ag Measured with UV-Vis Spectrophotometer at 462 nm.



**Figure S10.** Isotherm Study for chabazite-Ag Measured with UV-Vis Spectrophotometer at 462 nm.



**Figure S11.** Isotherm Study for clinoptilolite-Ag Measured with UV-Vis Spectrophotometer at 462 nm.

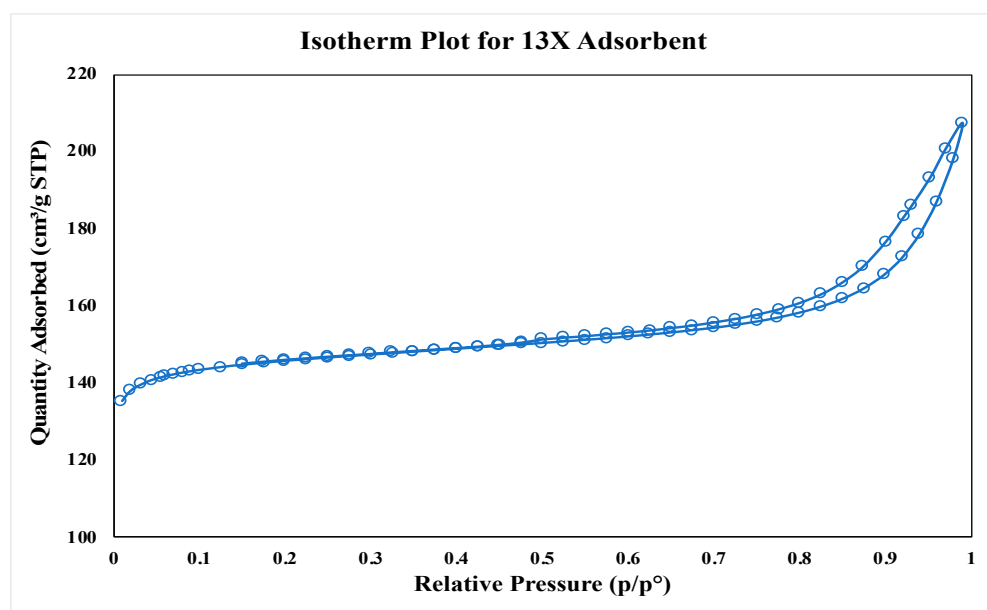


Figure S12. Nitrogen adsorption–desorption isotherm of 13X zeolite Adsorbent.

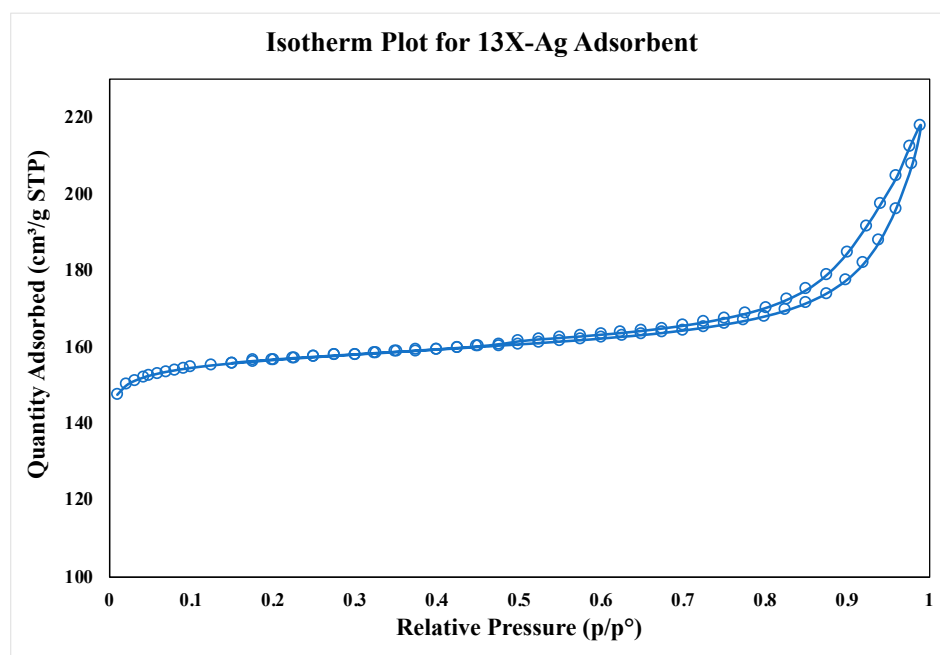


Figure S13. Nitrogen adsorption–desorption isotherm of 13X-Ag zeolite Adsorbent.

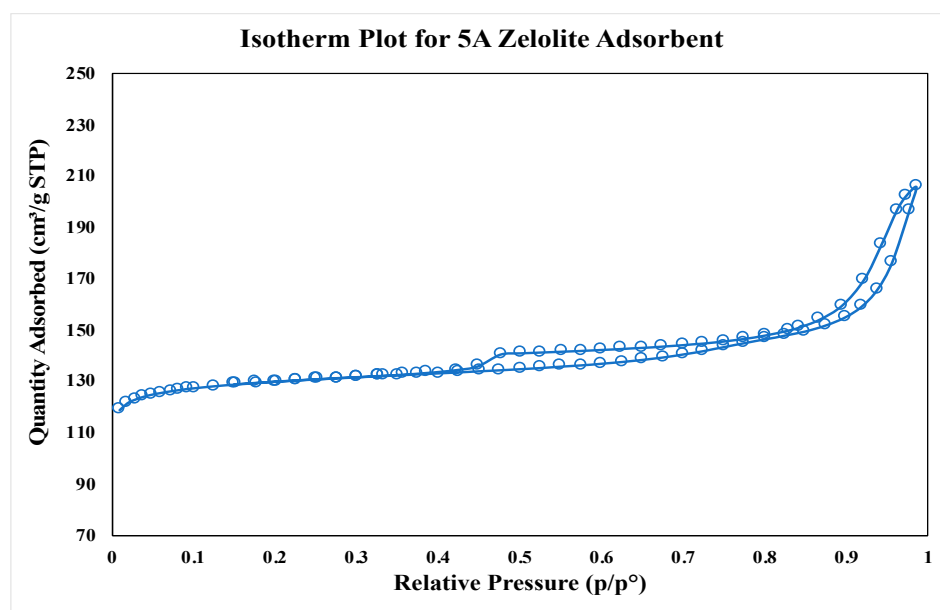


Figure S14. Nitrogen adsorption–desorption isotherm of 5A zeolite Adsorbent.

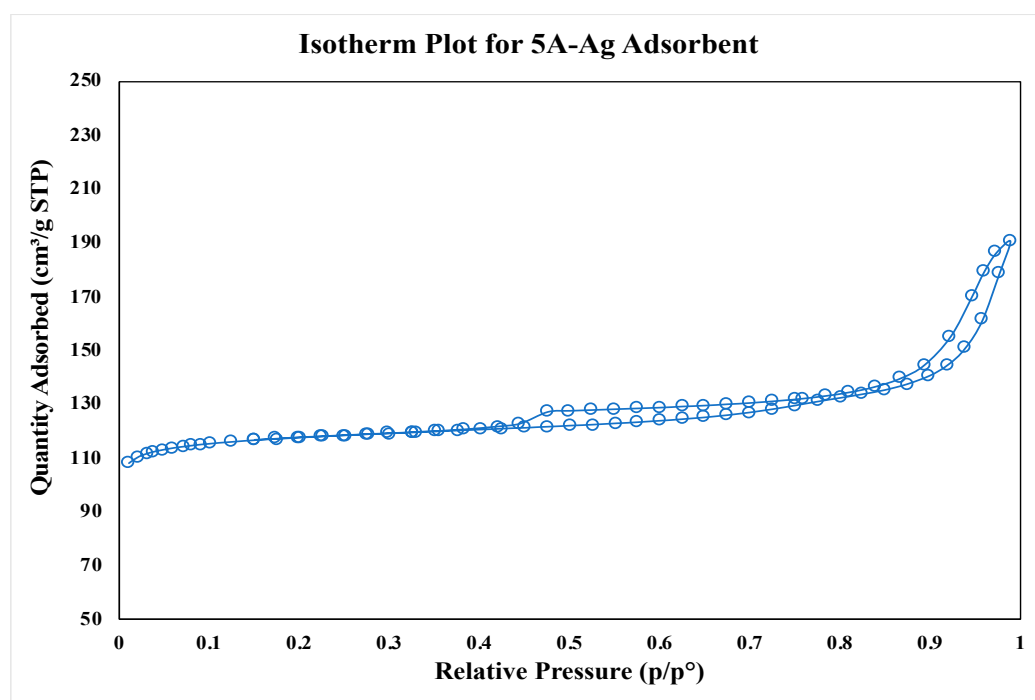


Figure S15. Nitrogen adsorption–desorption isotherm of 5A-Ag zeolite Adsorbent.



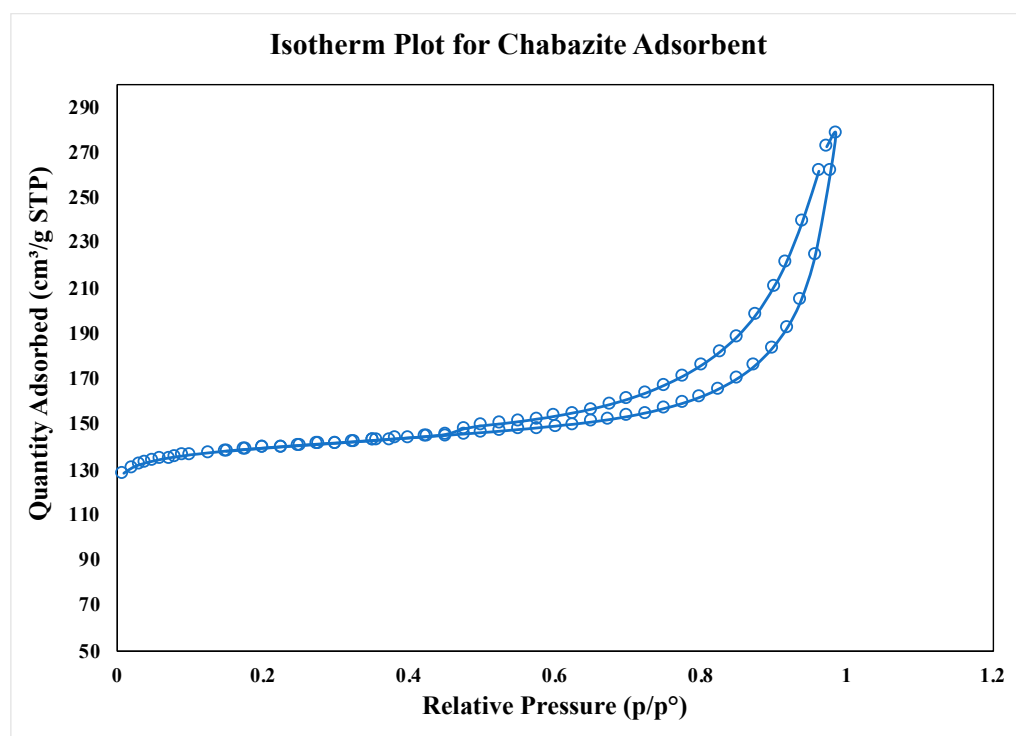


Figure S16. Nitrogen adsorption–desorption isotherm of Chabazite zeolite Adsorbent.

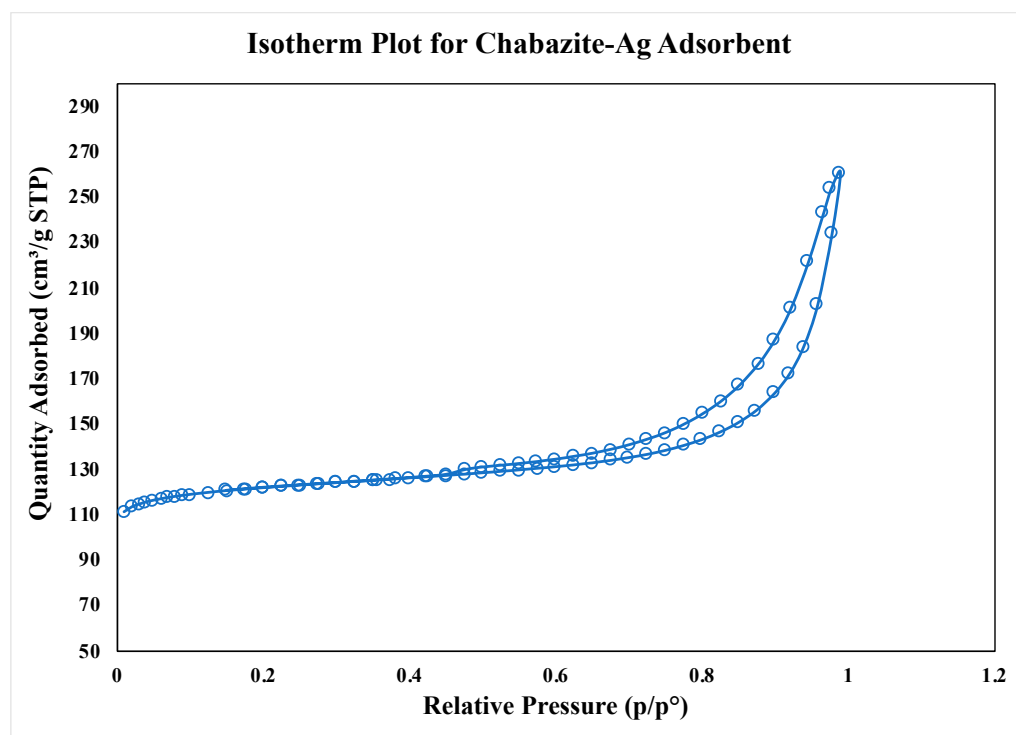


Figure S17. Nitrogen adsorption–desorption isotherm of Chabazite -Ag zeolite Adsorbent.

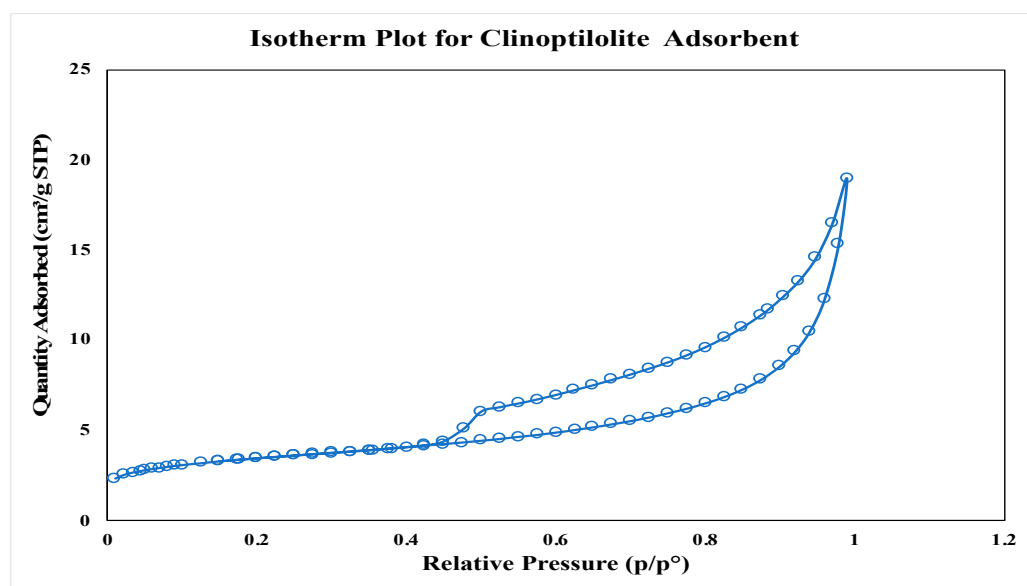


Figure S18. Nitrogen adsorption–desorption isotherm of Clinoptilolite zeolite Adsorbent.

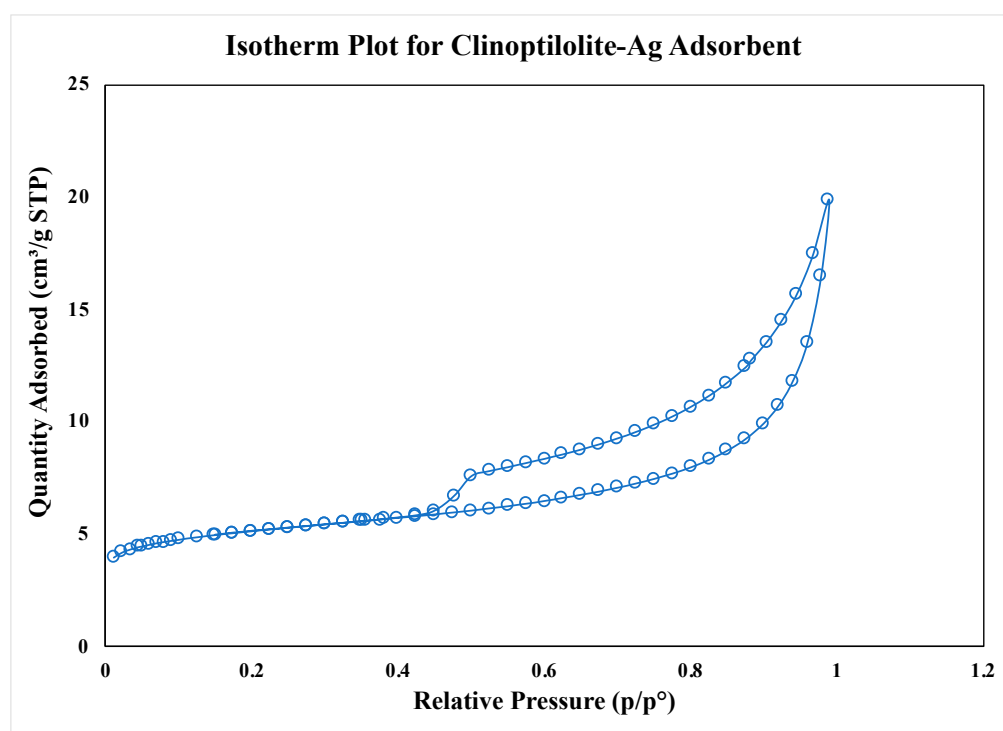


Figure S19. Nitrogen adsorption–desorption isotherm of Clinoptilolite -Ag zeolite Adsorbent.

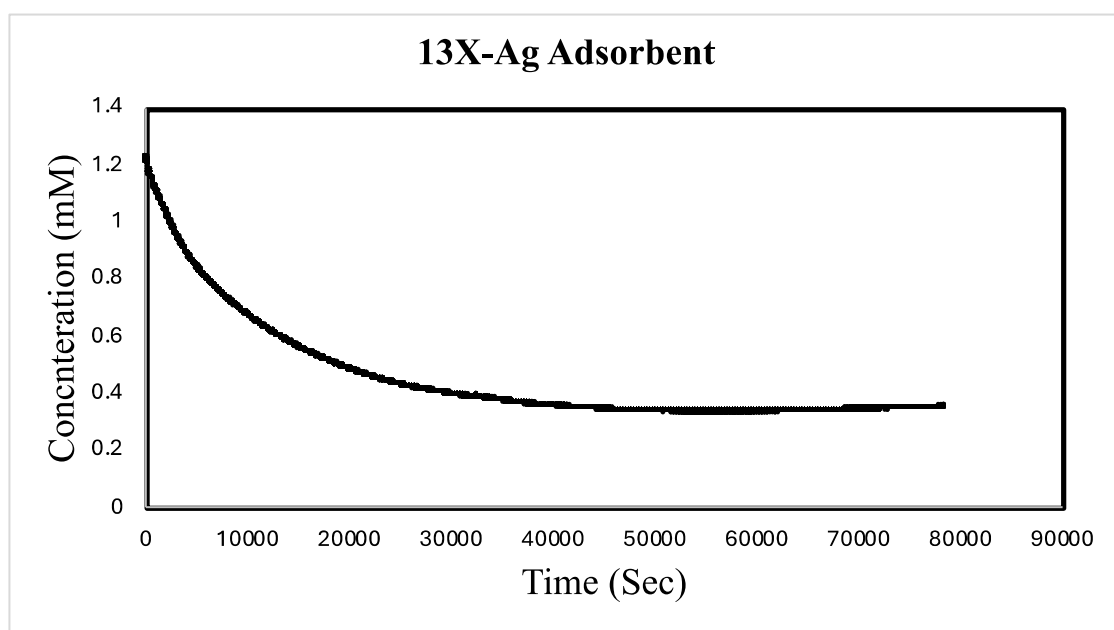


Figure S20. Adsorption kinetics of iodine on 13X-Ag adsorbent.

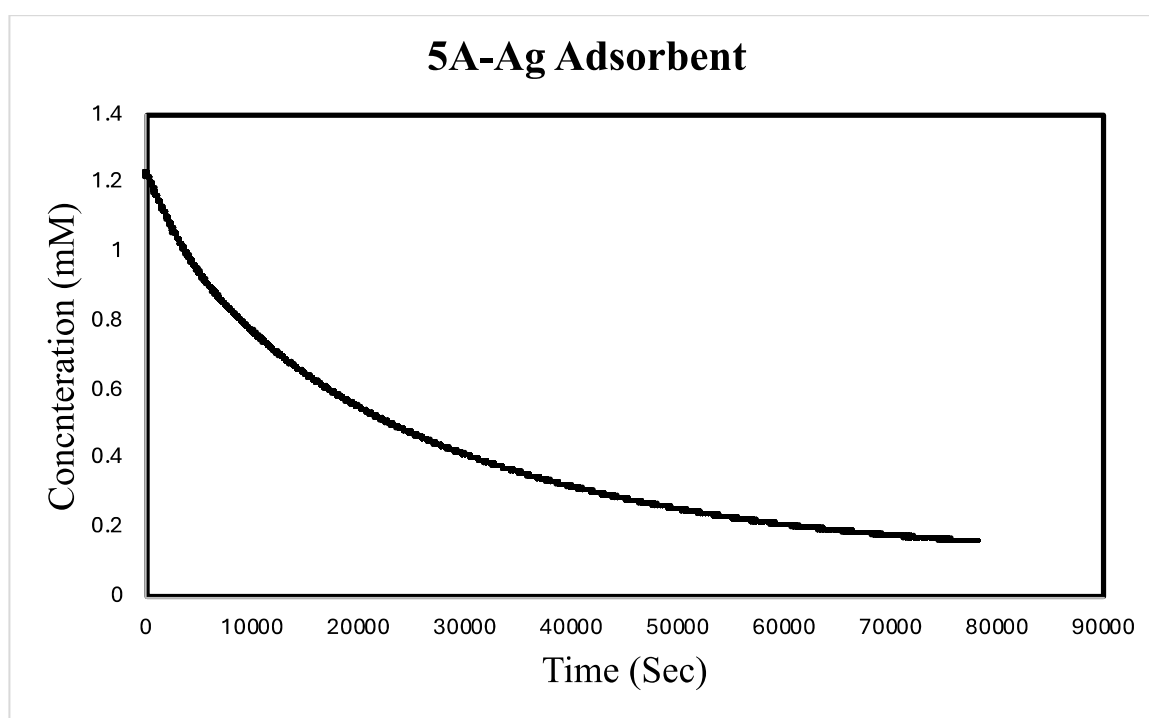


Figure S21. Adsorption kinetics of iodine on 15A-Ag adsorbent.

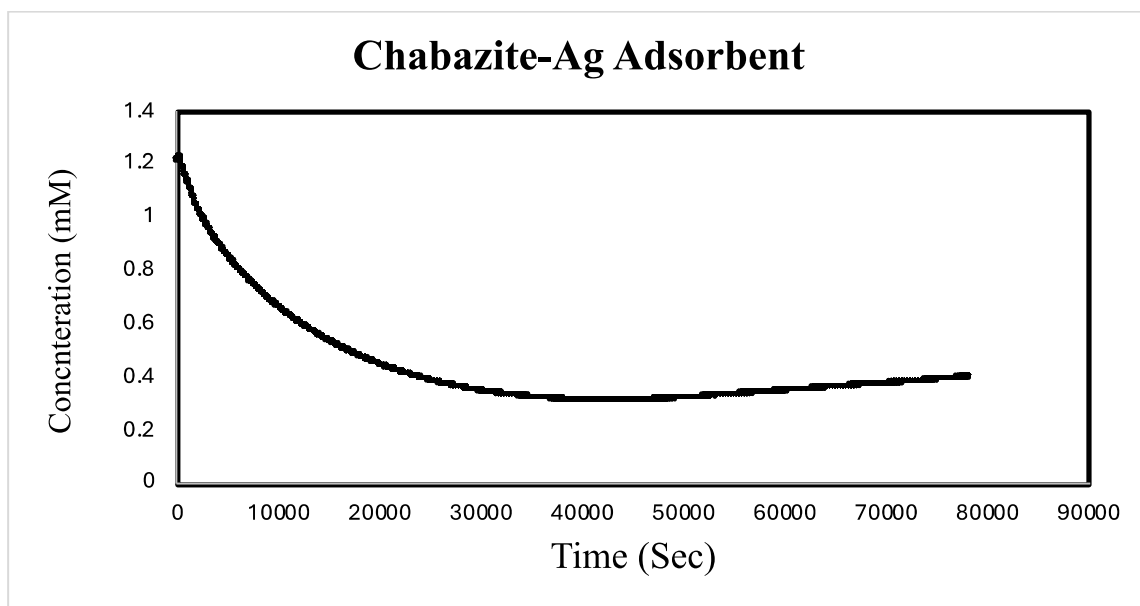


Figure S22. Adsorption kinetics of iodine on Chabazite-Ag adsorbent.

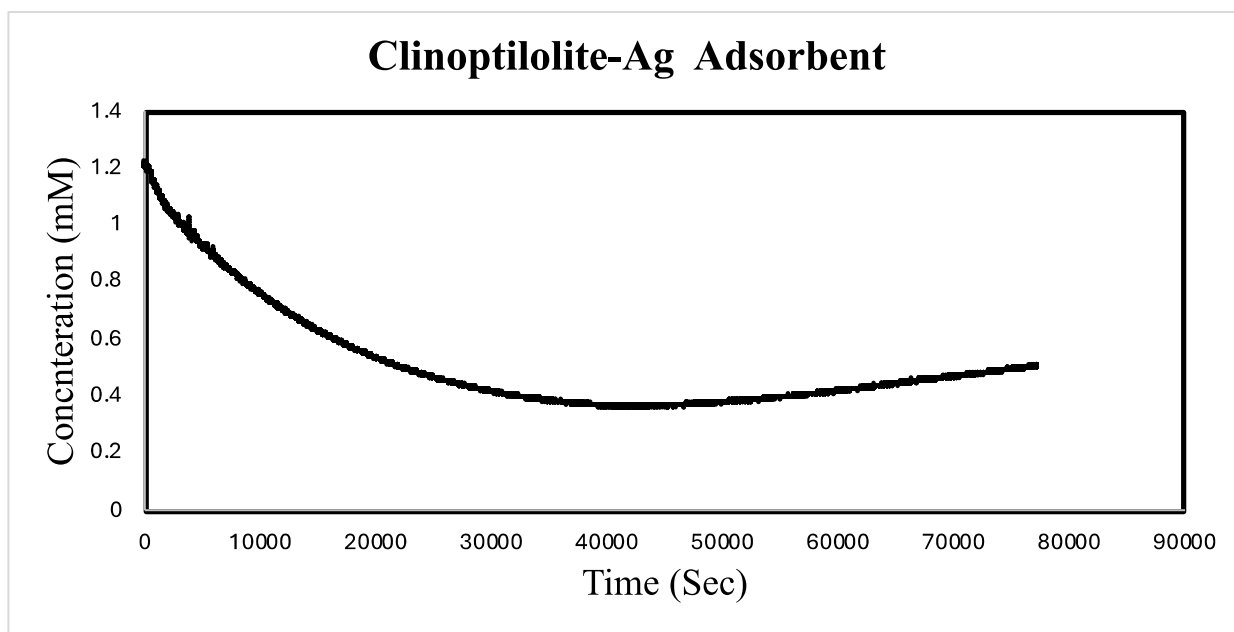


Figure S23. Adsorption kinetics of iodine on Clinoptilolite-Ag adsorbent.

Table S1. Element weight percentages by EDS for 13X and 13X-Ag adsorbent.

13X		13X-Ag	
Element	wt %	Element	wt %
C	6.09	C	4.4
O	51.2	O	47.12
Na	10.07	Na	6.56
Mg	0.81	Mg	0.8
Al	11.59	Al	14.92
Si	19.31	Si	17.77
K	0.33	Ag	7.98
Ca	0.55	Fe	0.45

**Table S2.** Element weight percentages by EDS for 5A and 5A-Ag adsorbent.

5A		5A-Ag	
Element	wt %	Element	wt %
C	2.36	C	17.4
O	52.62	O	43.77
Na	1.79	Na	0.76
Mg	1.27	Mg	0.95
Al	13.63	Al	10.38
Si	18.18	Si	11.61
Ca	8.81	Ca	4.41
Cl	0.53	Cl	0.56
Fe	0.82	Fe	0.47
-	-	Ag	9.68

**Table S3.** Element weight percentages by EDS for Chabazite and Chabazite-Ag adsorbent.

Chabazite		Chabazite-Ag	
Element	wt %	Element	wt %
C	7.33	C	17.85
O	49.28	O	44.58
Na	5.96	Na	3.15
Mg	0.36	Mg	0.32
Al	7.64	Al	5.1
Si	24.69	Si	16.65
Cl	0.26	Cl	1.24
k	0.80	K	0.67
ca	0.48	Fe	2.08
Fe	2.85	Ag	8.36

**Table S4.** Element weight percentages by EDS for Clinoptilolite and Clinoptilolite -Ag adsorbent.

Clinoptilolite		Clinoptilolite-Ag	
Element	wt %	Element	wt %
C	13.13	C	11.98
O	49.45	O	49.86
Na	2.3	Na	1.04
Mg	1.11	Mg	0.51
Al	4.47	Al	4.25
Si	24.52	Si	22.16
S	0.22	K	1.93
Cl	0.13	Fe	1.11
K	2.34	Ag	7.17
Ca	0.64	-	-
Fe	1.71	-	-