I J R B A T, Issue (XIII) Volume (II) May 2025: 21-29 e-ISSN 2347 – 517X

A Double-Blind Peer Reviewed & Refereed Journal OPEN ACCESS Original Article

INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY

 www.ijrbat.in

ADSORPTION OF CU(II), NI(II) AND CO(II) ON THE ADSORBENT PREPARED FROM LEMON PEEL

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Communicated: 13.11.2024 Revision: 03.01.2025 & 16.01.2025 Accepted: 14.02.2025 Published: 31.05.2025

ABSTRACT:
Due to discharge of contaminated water in recourses without treatment it becomes polluted and causing hazardous effects on ecosystem. Various techniques are used for treatment of water such as coagulation, ion exchange, adsorption, reverse osmosis etc. Adsorption is the cheaper method for the removal of heavy metals. Activated charcoal was prepared from lemon peels are used as adsorbent for removal of heavy metals like copper, nickel, cobalt. It was observed that the prepared adsorbent was very good for removal of heavy metal.

Keywords:- Adsorption, activated charcoal, lemon peel, absorbance.

INTRODUCTION:

Due to rapid development of industries like paper, fertilizers, pesticides which deliberately discharged various types of pollutants in water resources without any treatment. Hence water is getting contaminated due to presence of heavy metals like nickel, copper, lead, mercury, cadmium, chromium in it. (1-3). The toxic effect of heavy metals bioaccumulation in living organisms which can lead to harmful effects.(4-5) Water pollution is now a serious problem due to presence of heavy metals in different sourses. All heavy metals are non biodegradable and toxic when their concentration exceeds their permissible limits in the ecosystem. Heavy metals in water can cause many health problems in human beings such as nausea, dizziness, weakness when they are in excess concentration than permissible limits. The toxicity of heavy metals on health depends on different parameters.

Water pollution is a challenging problem. In order to treat water various techniques are available such as ion exchange, biological treatment, coagulation, biological treatment, adsorption etc. Adsorption method has proved to be an effective low cost method for the removal of inorganic pollutants, synthetic dyes. Charcoal is very good adsorbent. Charcoal finds widespread applications in various fields including water pollution, gas separation, environmental remediation and industrial processes. It effectively absorbs a wide range of pollutants including heavy metals, organic pollutants, and organic contaminants. As the demand of clean water is increased, the cheaper adsorption technique is widely used for treatment of waste water.(6-7). Agricultural wastes have been mainly utilized as biosorbents since they are inexpensive and abundantly available in large volumes as the residues from agricultural activities.(8-9)

METHODS :

The adsorbents were prepared from lemon peels. The peels were collected washed several times with distilled water and dried in sunlight. The charcoal was prepared by burning and later

http://doi.org/10.29369/ijrbat.2025.010.2.0002

on activated by using calcium chloride. The solutions Of Cu (II), Ni (II),Co(II) were prepared as 1M, 0.5M, 0.25M, 0.125M, 0.0625M. The absorbances of all solutions were noted at different wavelengths. Later on 0.2 gm charcoal was added to 50 ml solution of heavy metal and was shaken for 30 minutes. After shaking solutions were filtered and absorbance/optical density was recorded at different wavelengths. Same procedure was repeated for all metal ions

Table 1: Determination of optical density of Cu(II) solution before and after absorption on lemon charcoal.

Initial conc.	1M		0.5M		0.25M		0.125M		0.0625M	
Wavelength	Before	After	Before	After	Before	After	Before	After	Before	After
400	0.14	0.21	0.09	0.07	0.08	0.12	0.14	0.21	0.09	0.07
420	0.16	0.22	0.11	0.07	0.09	0.09	0.16	0.22	0.11	0.07
480	0.3	0.22	0.25	0.06	0.22	0.03	0.3	0.22	0.25	0.06
500	0.34	0.2	0.3	0.07	0.27	0.13	0.34	0.2	0.3	0.07
520	0.42	0.2	0.37	0.07	0.34	0.09	0.42	0.2	0.37	0.07
540	0.37	0.2	0.33	0.06	0.3	0.09	0.37	0.2	0.33	0.06
620	0.3	0.25	0.22	0.1	0.1	0.1	0.3	0.25	0.22	0.1

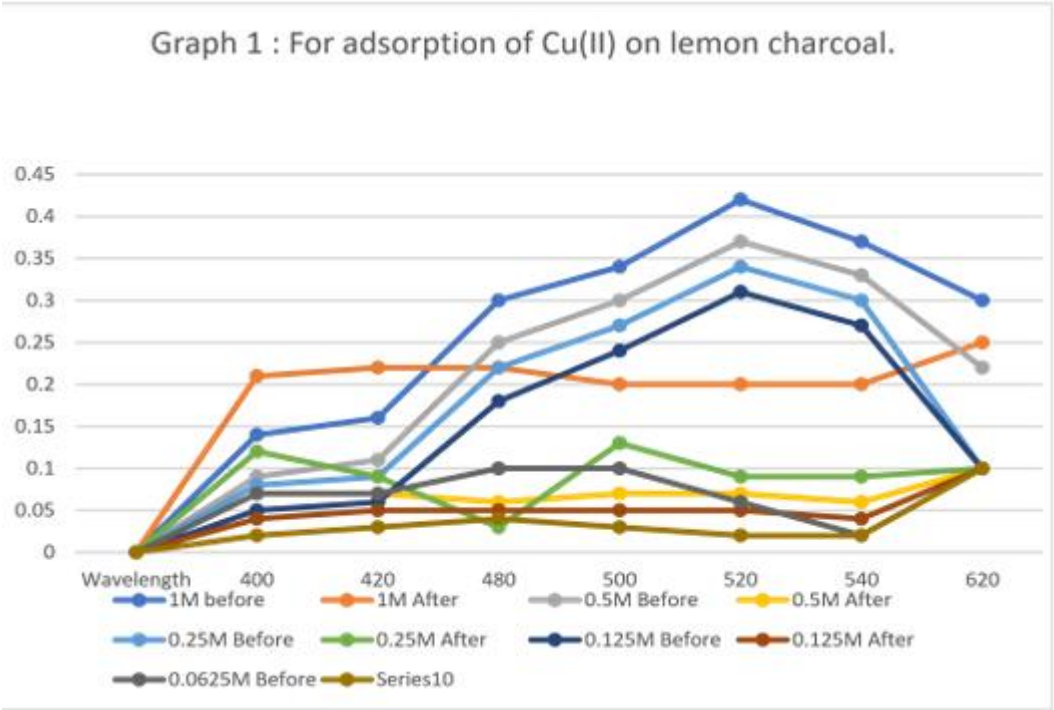


Table 2 : For concentration of Cu(II) on lemon charcoal.

Wavelength	1 M	0.5 M	0.25 M	0.125 M	0.0625 M
400	-	0.38	-	0.1	0.01
420	-	0.31	-	0.1	0.02
480	0.76	0.12	0.03	0.03	0.02
500	0.58	0.11	0.12	0.02	0.01
520	0.47	0.09	0.06	0.02	0.02
540	0.54	0.09	0.07	0.01	0.02
620	0.83	0.22	0.17	0.03	0.02

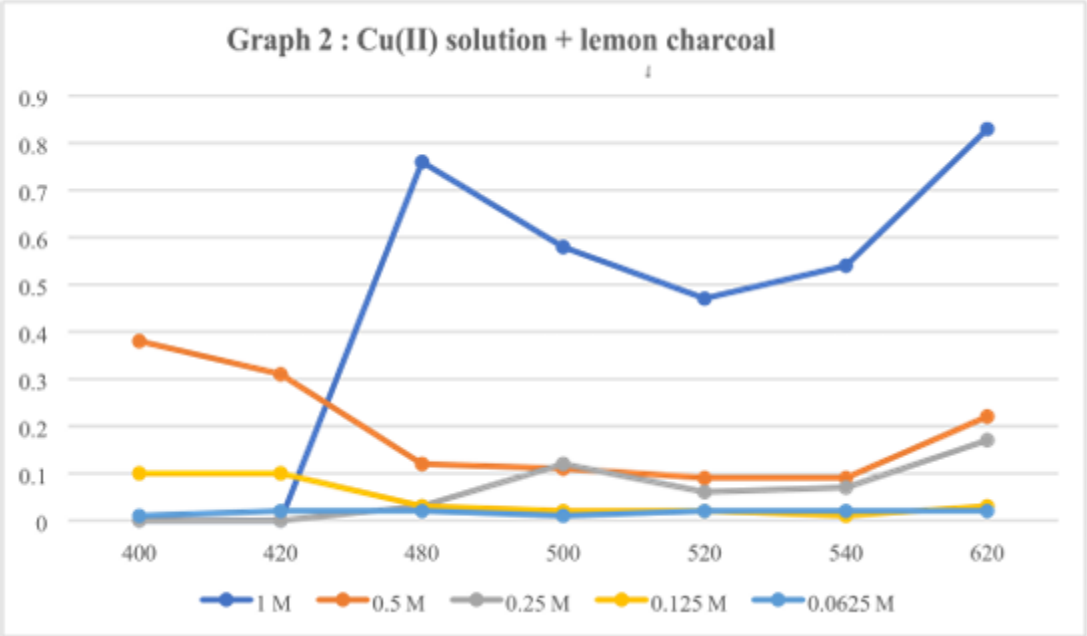


Table 3 : Determination of optical density of Ni(II) solution before and after absorption on lemon charcoal.

Initial conc.	1M		0.5M		0.25M		0.125M		0.0625	
Wavelength	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
400	0.34	0.2	0.2	0.13	0.16	0.11	0.11	0.09	0.11	0.08
420	0.34	0.2	0.2	0.13	0.16	0.11	0.12	0.09	0.11	0.08
480	0.25	0.14	0.18	0.1	0.16	0.09	0.11	0.09	0.1	0.08
500	0.24	0.12	0.17	0.1	0.15	0.09	0.1	0.07	0.1	0.08
520	0.24	0.11	0.17	0.09	0.14	0.08	0.1	0.07	0.09	0.08
540	0.23	0.1	0.17	0.08	0.12	0.07	0.9	0.07	0.09	0.07
620	0.2	0.12	0.16	0.07	0.12	0.06	0.1	0.13	0.08	0.05

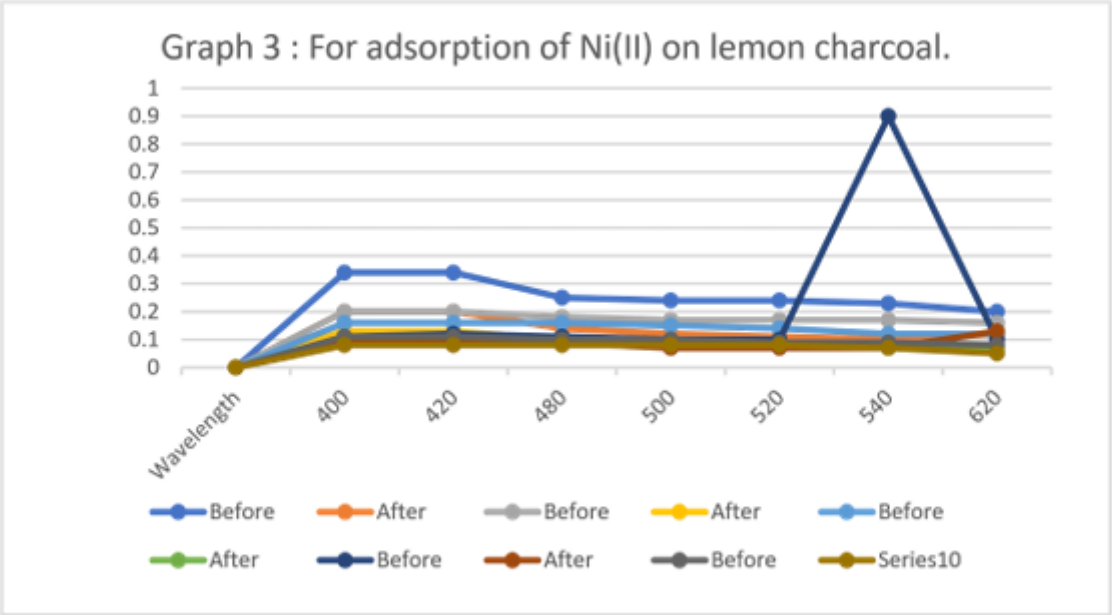


Table 4 : For Concentration of Ni(II) on lemon charcoal.

Wavelength	1 M	0.5 M	0.25 M	0.125 M	0.625 M
400	0.5	0.32	0.17	0.1	0.04
420	0.5	0.32	0.17	0.09	0.04
480	0.56	0.27	0.14	0.1	0.05
500	0.5	0.29	0.15	0.08	0.05
520	0.45	0.26	0.14	0.08	0.04
540	0.43	0.23	0.14	0.09	0.04
620	0.6	0.21	0.12	-	0.03

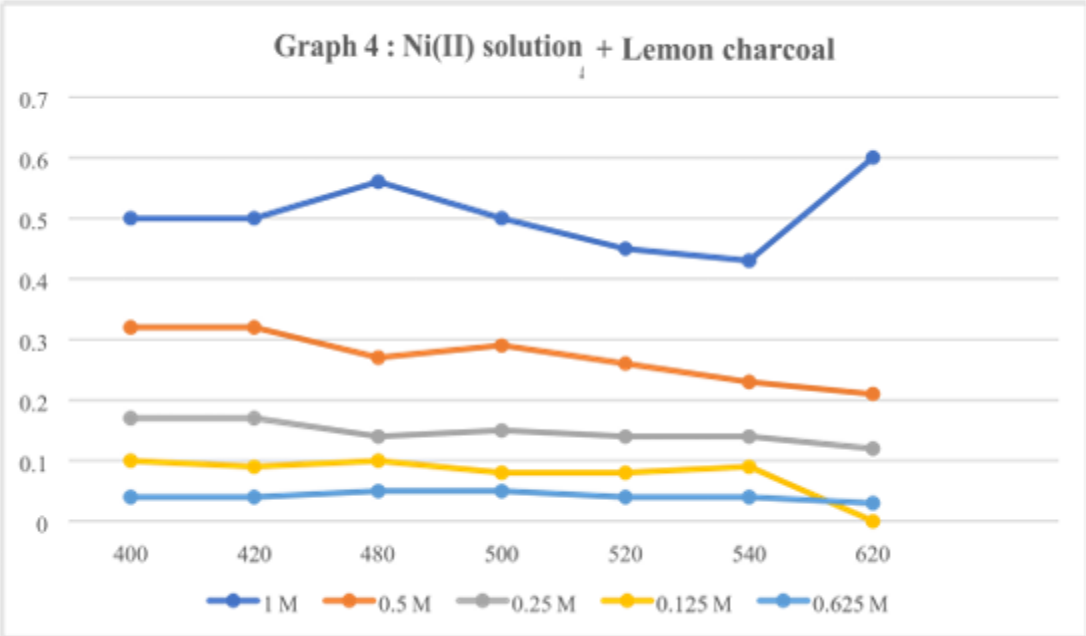


Table 5 : Determination of optical density of co(II) solution before and after adsorption on lemon charcoal.

Initial conc.	1M	
Wavelength	**Before**	**After**
400	0.52	0.43
420	0.52	0.43
480	0.65	0.55
500	0.67	0.56
520	0.74	0.67
540	0.72	0.63
620	0.33	0.22

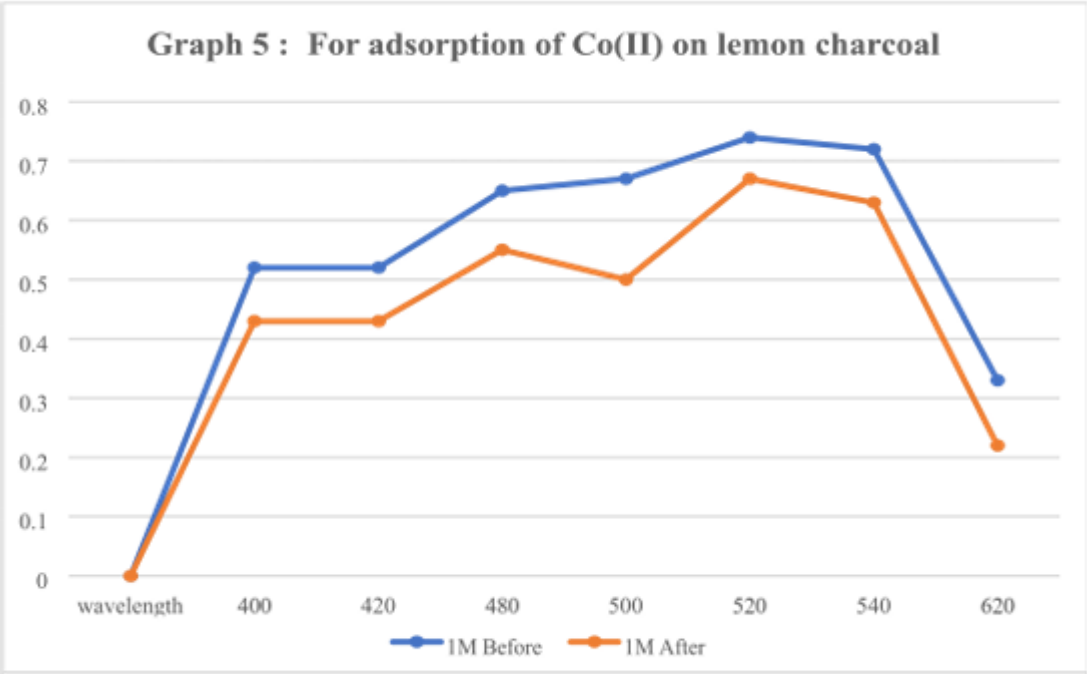
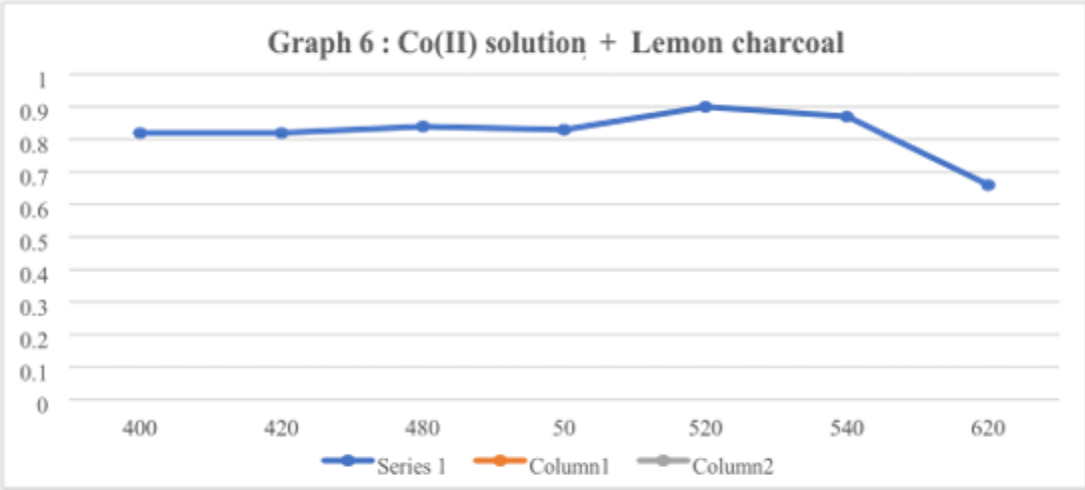


Table 6 : For concentration of Co(II) on lemon charcoal.

Wavelength	1 M
400	0.82
420	0.82
480	0.84
50	0.83
520	0.9
540	0.87
620	0.66



RESULTS AND DISCUSSION :

It was observed that lemon charcoal was very good adsorbent for adsorption of Cu (II), Ni (II) and Co (II). The adsorption was carried out at different concentrations such as 1M, 0.5M, 0.25M, 0.125M, and 0.0625M. The adsorption Cu (II) on lemon charcoal is very good especially when the concentrations are 0.5M and 0.0625M. The prepared charcoal was found to be very good adsorbent for Ni (II) at all concentrations. The prepared charcoal was found to be good adsorbent for Co (II) only at 1M concentration. The adsorption of Ni (II) is more than Cu(II) is more than Co(II).

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