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SOME PHYSICOCHEMICAL PROPERTIES OF GROUND WATER FROM HINTHADA AND ZALUN TOWNSHIPS AND REMOVAL OF LEAD TOXIC METAL BY KYAUK PATAUNG KAOLIN

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Abstract

This research work is focused on the determination of physicochemical properties of ground water collected from Hinthada and Zalun townships, Ayeyarwady Region, and Pb(II) ion in model solution and groundwater sample (3) were removed. Water samples: sample (1) from No.512, Myopart Street, Kanaungsu, sample (2) from No.1, Yankin Street, Kanaungsu, sample (3) from Lain Knoe Village, sample (4) from Lain Knoe Village, sample (5) from Htan Hnint Pin, Dar Sin Gaung Village from Hinthada, sample (6) from Yay Kyaw middle school, sample (7) from Hospital Street and sample (8) from General Administration Office of Zalun were collected. The physicochemical parameters such as pH, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, alkalinity, nitrate nitrogen, total phosphate, temperature, turbidity, and total dissolved solid of the collected water samples were determined. In this research, removal of Pb(II) ion from model solution by KPT Kaolin was studied by effect of contact time, effect of dosage, effect of pH and effect of concentration of metal ion solution. Sorption of Pb(II) ion by Kaolin clay sample was very fast and then adsorbed ion was slowly release into the solution. After 24 h, the adsorption process reached equilibrium. The optimum pH 6.5 observed while 96.3 % Pb(II) was removed. The Pb(II) ion sorption efficiency increased with increasing dosage of Kaolin sample. The sorption efficiency become decreased as the concentration of metal ions increased and the sorption site decrease. It was found that, the removal percent of Pb(II) ions was 90 %.

Keyword: ground water, lead, adsorption, Kyauk Pataung Kaolin.

Introduction

Kaolinite is a clay mineral with a soft consistency and earth texture. It is easily broken and can be molded or shaped, especially when wet. Kaolinite is a lackluster and uninteresting mineral on its own, but it occasionally forms interesting pseudomorphs, especially after feldspars. It is also a common

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assessor to other minerals, including gem crystals in decomposing feldspar pegmatites. Kaolinite is the most common clay mineral, and entire clay deposits can be composed of this mineral (Appelo *et al*., 2002). There are many commercial kaolinite mines where this mineral is mined in large volume for its various industrial uses.

The use of natural materials for heavy metals removal is becoming a concern in all countries. Heavy metals have been excessively released into the environment due to rapid industrialization and have created a major global concern (Mortada *et al*., 2001)

Heavy metal ions have great effects on all forms of life. Heavy metal pollution is one of the most important environmental problems today because of their toxicity, bio-accumulation tendency, threat to human life and the environment (Igwe and Abia, 2003). Heavy metals are present in nature and industrial waste water, so the presence of heavy metals in surface and ground water pose a contamination problem. Large number of industries can produce and discharge wastes containing different heavy metals into the environment (Gupta *et al*., 2009). The main source of heavy metal pollution are metal plating, mining, smelting, battery manufacturing, tanneries, petroleum refining, pigment manufacture, printing paint manufacture, pesticides, etc.

The main elements that considered as a heavy metals are chromium (Cr), manganese (Mn), cobalt (Co), copper (Cu), zinc (Zn), molybdenum (Mo) are of concern, including toxic metals such as mercury, Chromium, Lead, Zinc, Nickel, Cadmium, Arsenic, etc. (Wang and Chen, 2006).

Lead, mercury, cadmium and chromium (VI) are at the top on the toxicity list from among various metal ions, the first three, called "the big three", are in the limelight due to their major impact on the environment (Volesky, 1994).

Heavy metals are natural components from the earth's crust. They cannot be destroyed or degraded. However, most of these heavy metals become toxic at high concentrations due to their ability to accumulate in living tissues (Lidsky and Schneider, 2003)

Removal of heavy metals from ground water is of primary importance. Cadmium, zinc, copper, lead and mercury are often detected in industrial wastewaters (Deer *et al*., 1992). Due to their mobility in aquatic ecosystems and their toxicity to higher life forms, heavy metals in surface and groundwater supplies have been prioritized as major inorganic contaminants in the environment (Formar, 1997). Even if they are present in dilute, undetectable quantities, their recalcitrance and consequent persistence in water bodies imply that through natural processes such as biomagnifications, concentrations may become elevated to such an extent that they begin exhibiting toxic characteristics. These metals can either be detected in their elemental state, which implies that they are not subject to further biodegradative processes or bound in various salt complexes. In either instance, metal ions cannot be mineralized (Giffin and Shimp, 1978) Apart from environmental issues, technological aspects of metal recovery from industrial waters must also be considered. The heavy metals hazardous to humans include lead, mercury, cadmium, arsenic, copper, zinc and chromium. Such metals are found naturally in the soil in trace amounts, which pose few problems. When concentrated in particular areas, however, they present a serious danger. Arsenic and cadmium for instance can cause cancer. Mercury can cause mutations and genetic damage, while copper, lead and mercury can cause brain and bone damage. (Hikichi, 1998)

Continuous discharge of industrial, domestic and agricultural wastes in rivers and lakes causes deposit of pollutants in sediments. Such pollutants include heavy metals, which endanger public health after being incorporated in food chain. Heavy metals cannot be destroyed through biological degradation, as is the case with most organic pollutants. Incidence of heavy metal accumulation in fish, oysters, mussels, sediments and other components of aquatic ecosystems have been reported from all over the world (Ekosse *et al*., 2007). Exposure to different metals may occur in common circumstances, particularly in industrial setting. Accidents in some environments can result in acute, high level exposure. Some of the heavy metals are toxic to aquatic organisms even at low concentration. The problem of heavy metal pollution in water and aquatic organisms including fish, needs continuous monitoring and surveillance as these elements do not degrade and tend to is a need to remove the heavy metals from the aquatic ecosystems (Gupta *et al*., 2009). Research and development, therefore focuses on sector-specific methods and technologies to remove colour and heavy metals from different kinds of waste streams. In review of the above toxicological effects of heavy metals on environment, animals and human beings, it becomes imperative to treat these toxic compounds in wastewater effluents before they are discharged into freshwater bodies.

Material and Methods

Collection and Preparation of Samples

The ground water samples were collected from five different points of Hinthada Township and from three different points of Zalun Township, Ayeyarwady Region and the kaolinite sample was collected from Kyauk Pataung Township, Mandalay Region. After collection, the kaolinite sample was washed with tap water to remove impurities and then air-dried under shade to prevent some reaction of sunlight. Then the kaolinite was ground to fine particles and sieved into 90 μm aperture size and stored in air tight plastic bag so that the sample was free from getting molds to prevent moisture, as well as other contaminations and was ready to be used for the experimental works.

Sampling Sites

In this research work, ground water samples: sample (1) from No.512, Myopart Street, Kanaungsu, sample (2) from No.1, Yankin Street, Kanaungsu, sample (3) from Lain Knoe Village, sample (4) from Lain Knoe Village, sample (5) from Htan Hnint Pin, Dar Sin Gaung Village from Hinthada Township, sample (6) from Yay Kyaw middle school, sample (7) from Hospital Street and sample (8) from General Administration Office of Zalun Township were collected in July, 2017 and November, 2017.

Determination of some Physicochemical Parameters of Water Samples

The physicochemical properties such as pH, colour, turbidity, hardness, alkalinity, nitrate nitrogen, total phosphate, total dissolved solids, dissolved oxygen, chemical oxygen demand and biochemical oxygen demand were determined.

Determination of Elemental Contents of Water Samples

The concentration of arsenic in water samples were especially determined by using Wagtech digital arsenator in the field. Some trace metals such as cadmium, lead, zinc, copper were determined by AAS at Universities' Research Centre.

Determination of Pb(II) Ions Sorption Capacity of KPT Kaolin

The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample was studied at various contact times (0.5, 1, 2, 3, 5, 7, 9, 12, 15, 18, 20, 22 and 24) h. The effect of dosage of KPT Kaolin samples (0.5 g -3.5 g) on sorption of Pb(II) ion was studied at initial pH 6.8. The Pb(II) sorption efficiencies of Kyauk Pataung Kaolin sample was studied at various pH (4-9). The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample was studied at various concentrations of model solutions (50-900 ppm).

Results and Discussion

Water samples: sample (1) from No.512, Myopart Street, Kanaungsu, sample (2) from No.1, Yankin Street, Kanaungsu, sample (3) from Lain Knoe Village, sample (4) from Lain Knoe Village, sample (5) from Htan Hnint Pin, Dar Sin Gaung Village from Hinthada, sample (6) from Yay Kyaw middle school, sample (7) from Hospital Street and sample (8) from General Administration Office of Zalun were collected.

Table (1) shows some physicochemical parameters of collected water samples from eight different sites in Hinthada and Zalun Townships during July 2017. Turbidity of samples (2, 4, 6, 7 and 8) were higher than EPA guideline standard value and samples (1, 3 and 5) were found in acceptable value (EPA 2013). Total alkalinity of samples (1, 2, 4, 6 and 8) were higher than EPA guideline standard and samples (3, 5 and 7) were below the acceptable value. Biochemical oxygen demand of all samples were found to be lower value and chemical oxygen demand of all samples were higher than acceptable value of EPA guideline standard. Dissolved oxygen of samples (1, 2, 3, 7 and 8) were higher and dissolved oxygen of samples (4, 5 and 6) were lower than acceptable value.

Table (2) shows some heavy metals contents in there collected water samples. The concentration of arsenic in sample (7) was found to be acceptable level of EPA Guideline standard. The concentration of arsenic in sample (8) was found in exceeded level and the concentration of arsenic in samples (1), (2), (3), (4), (5) and (6) were not detected. The concentration of cadmium and mercury in all samples were not detected. The concentration of lead in samples (1), (2), (3), (4), (5), (6) and (8) were higher than EPA guideline standard value. The sample (7) was found to be acceptable level of EPA guideline standard value.

Table 1: Some Physicochemical Parameters of the Collected Water Samples from Eight Different Sites in Hinthada and Zalun Townships (July, 2017)

Sample	Parameters										
	Temperature (°C)	pH	Turbidity (NTU)	Total Dissolved Solid (ppm)	Total Alkalinity (ppm)	Total Suspended Solid (ppm)	Total Phosphate (ppm)	Nitrate Nitrogen (ppm)	Chemical Oxygen Demand (ppm)	Bio chemical Oxygen Demand (ppm)	Dissolved Oxygen (ppm)
1	27.7	6.9	2	226	176	4	Nil	Nil	32	2	6.0
2	27.8	6.8	6	251	156	10	Nil	0.1	32	4	8.2
3	27.8	7.1	3	179	132	8	Nil	Nil	32	3	7.4
4	27.8	6.4	188	250	220	120	Nil	0.2	32	4	2.0
5	27.8	6.7	3	182	132	6	Nil	Nil	32	4	2.4
6	27.8	7.1	48	315	248	55	Nil	0.1	32	4	2.0
7	27.8	7.5	22	220	148	30	Nil	0.1	32	3	7.2
8	27.8	7.6	10	247	184	19	Nil	Nil	32	2	7.4
EPA 2010 2013	<32	6.5-8.5	5	500	30-150	150	0.12	50	10.0	5.0	4.0-5.0

Table 2: Concentrations of Heavy Metals of the Collected Water Samples from Eight Different Sites in Hinthada and Zalun Townships (July, 2017)

Elements	Sample (1) (280')	Sample (2) (220')	Sample (3) (320')	Sample (4) (37')	Sample (5) (120')	Sample (6) (150')	Sample (7) (460')	Sample (8) (230')	EPA Guideline Standard (2013)
As (ppm)	ND	ND	ND	ND	ND	ND	0.002	0.013	0.010
Cd (ppm)	ND	ND	ND	ND	ND	ND	ND	ND	0.005
Hg (ppm)	ND	ND	ND	ND	ND	ND	ND	ND	0.001
Pb (ppm)	0.023	0.018	0.03	0.016	0.020	0.011	0.009	0.019	0.010

Table (3) shows some physicochemical parameters of collected water samples from eight different sites in Hinthada and Zalun Townships during November 2017. Turbidity values of samples (2, 4, 6, 7 and 8) were higher than EPA guideline standard value and samples (1, 3 and 5) were found to be acceptable. Total alkalinity values of samples (1, 4, 6 and 8) were higher than EPA guideline standard and samples (2, 3, 5 and 7) were found as acceptable. Chemical oxygen demand of all samples and biochemical oxygen demand of samples (1, 2, 3, 4, 6 and 7) were higher than value of EPA guideline standard. Dissolved oxygen of samples (1, 2, 3 and 7) were higher than EPA value and dissolved oxygen of samples (4, 5, 6 and 8) were found as acceptable.

Table (4) shows some heavy metals contents in there collected water samples. According to the determination of arsenic concentration, arsenic concentration for all samples were found in acceptable level of EPA guideline standard value. The concentrations of cadmium and mercury in all samples were not detected. The concentrations of lead in sample (1), (2), (3), (5) and (8) were found to be higher than EPA guideline standard value. The concentrations of lead in sample (4), (6) and (7) were found in acceptable level of EPA guideline standard value.

Table 3: Some Physicochemical Parameters of the Collected Water Samples from Eight Different Sites in Hinthada and Zalun Townships (November, 2017)

Sample	Parameters										
	Temperature (°C)	pH	Turbidity (NTU)	Total Dissolved Solid (ppm)	Total Alkalinity (ppm)	Total Suspended Solid (ppm)	Total Phosphate (ppm)	Nitrate Nitrogen (ppm)	Chemical Oxygen Demand (ppm)	Bio chemical Oxygen Demand (ppm)	Dissolved Oxygen (ppm)
1	27.7	7.6	2	210	176	4	Nil	Nil	32	6.0	7.0
2	27.8	7.3	12	240	144	20	Nil	0.1	32	8.0	7.4
3	27.8	7.5	3	161	136	8	Nil	Nil	32	6.0	7.8
4	27.8	6.8	286	238	196	182	Nil	0.8	32	8.0	2.0
5	27.8	7.1	3	175	130	6	Nil	Nil	32	4.0	4.2
6	27.8	7.4	52	290	308	60	Nil	0.1	32	6.0	4.4
7	27.8	7.7	48	200	148	65	Nil	0.2	32	6.0	6.8
8	27.8	7.8	13	238	172	25	Nil	0.1	32	4.0	5.0
EPA 2010 2013	<32	6.5-8.5	5	500	30-150	150	0.12	50	10.0	5.0	4.0-5.0

Table 4: Concentrations of Heavy Metals of the Collected Water Samples from Eight Different Sites in Hinthada and Zalun Townships (November, 2017)

Elements	Sample (1) (280')	Sample (2) (220')	Sample (3) (320')	Sample (4) (37')	Sample (5) (120')	Sample (6) (150')	Sample (7) (460')	Sample (8) (230')	EPA Guideline Standard
As (ppm)	ND	0.0110	ND	ND	0.0007	ND	0.0009	0.0070	0.010
Cd (ppm)	ND	ND	ND	ND	ND	ND	ND	ND	0.005
Hg(ppm)	ND	ND	ND	ND	ND	ND	ND	ND	0.001
Pb (ppm)	0.0150	0.0120	0.0210	0.0100	0.0140	0.0090	0.0030	0.0160	0.010

Table 5: Comparison of pH of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
pH	July, 2017	6.9	6.8	7.1	6.4	6.7	7.1	7.5	7.6
	November, 2017	7.6	7.3	7.5	6.8	7.1	7.4	7.7	7.8
EPA (2013) 8.5									

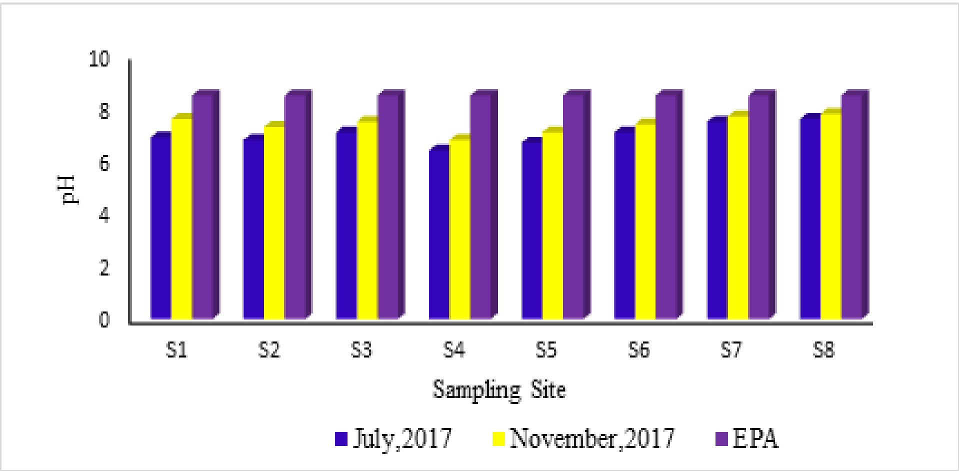

Figure 1: Comparison of pH of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 6: Comparison of Turbidity of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Turbidity (NTU)	July, 2017	2	6	3	188	3	48	22	10
	November, 20717	2	12	3	286	3	52	48	13
EPA (2013) 5 NTU									

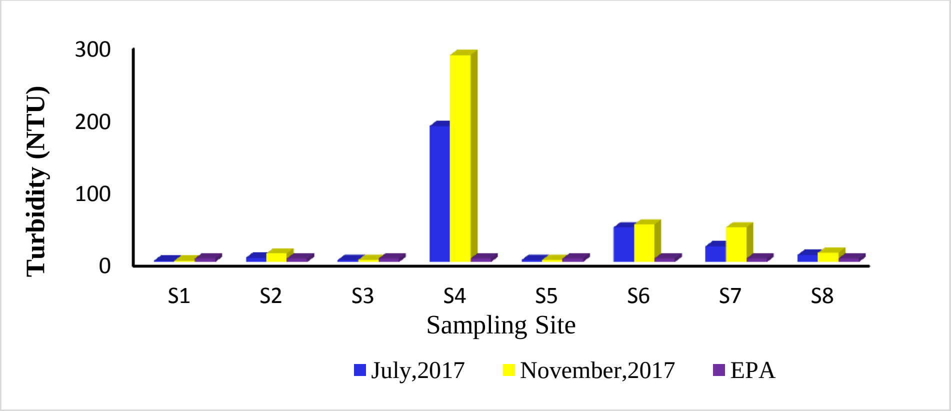

Figure 2: Comparison of turbidity of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 7: Comparison of Total Dissolved Solid of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	**Date**	**Sample**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Total dissolved solid (ppm)	July, 2017	226	251	179	250	182	315	220	247
	November, 2017	210	240	161	238	175	290	200	238

EPA (2013) 500 ppm

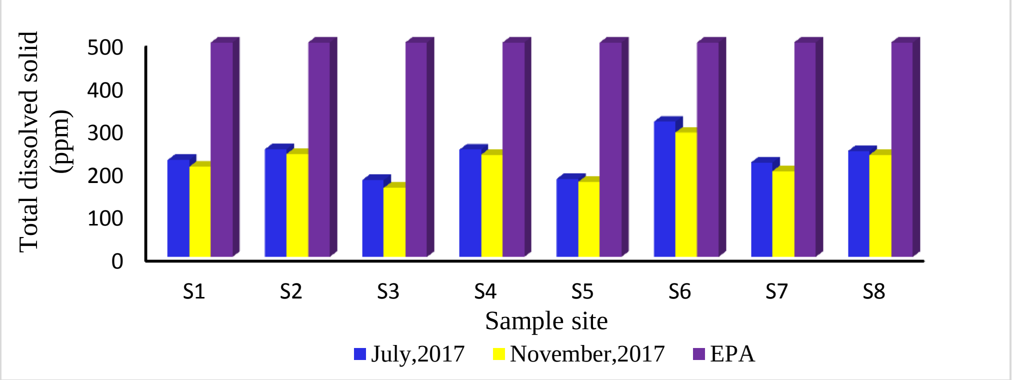

Figure 3: Comparison of total dissolved solid of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 8: Comparison of Total Alkalinity of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample 1	2	3	4	5	6	7	8
Total Alkalinity (ppm)	July, 2017	176	156	132	220	132	248	148	184
	November, 2017	176	144	136	196	130	308	148	172
EPA (2013) 150 ppm									

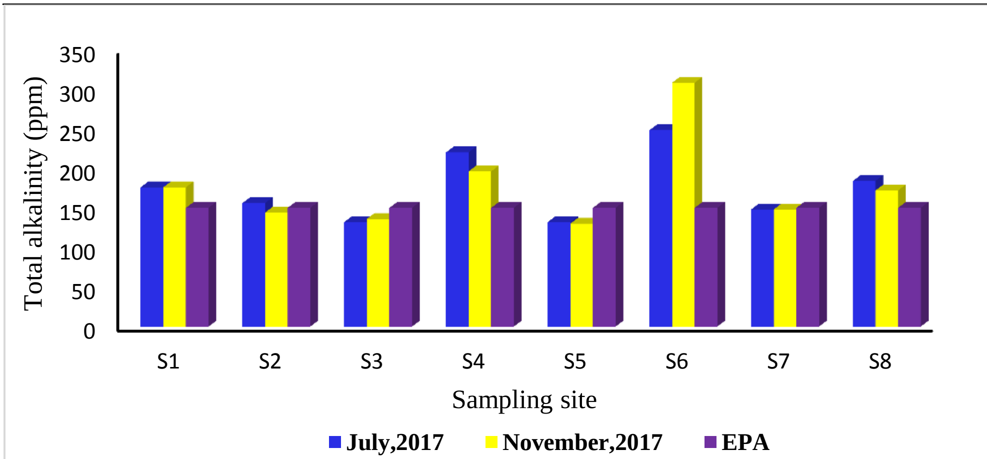

Figure 4: Comparison of total alkalinity of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 9: Comparison of Total Suspended Solid of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample 1	2	3	4	5	6	7	8
Total Suspended Solid (ppm)	July, 2017	4	10	8	120	6	55	30	19
	November, 2017	4	20	8	182	6	60	65	25
EPA (2013) 150 ppm									

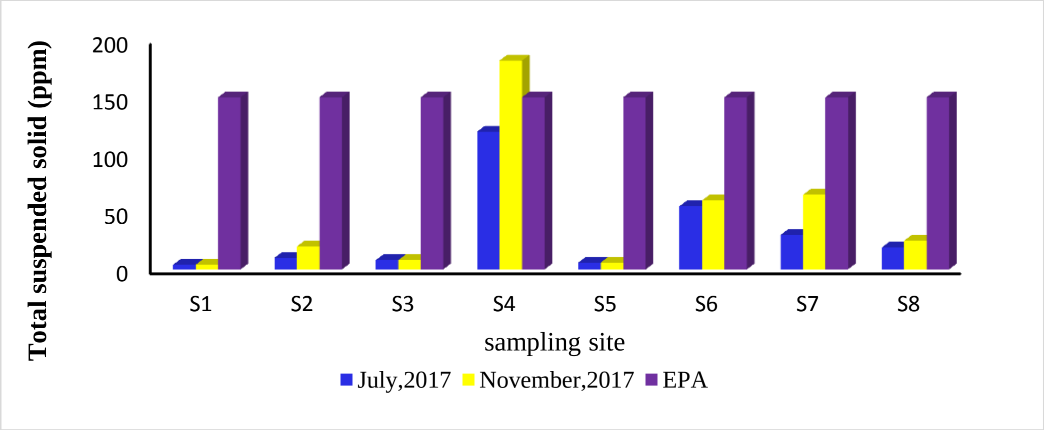

Figure 5: Comparison of total suspended solid of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 10: Comparison of Chemical Oxygen Demand of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample							
		1	2	3	4	5	6	7	8
COD (ppm)	July, 2017	32	32	32	32	32	32	32	32
	November, 2017	32	32	32	32	32	32	32	32
EPA (2013) 10 ppm									

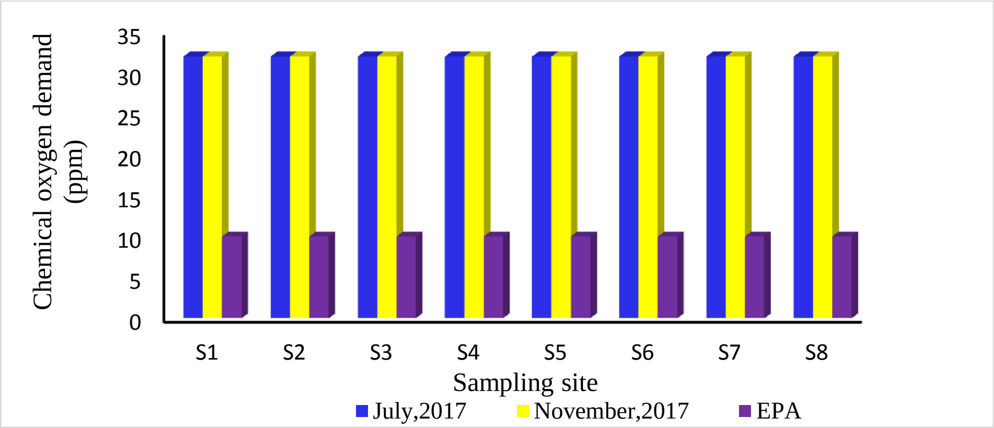

Figure 6: Comparison of chemical oxygen demand of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 11: Comparison of Biochemical Oxygen Demand of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample 1	2	3	4	5	6	7	8
Biochemical Oxygen Demand (ppm)	July, 2017	2	4	3	4	4	4	3	2
	November, 2017	6	8	6	8	4	6	6	4
EPA (2013) 5 ppm									

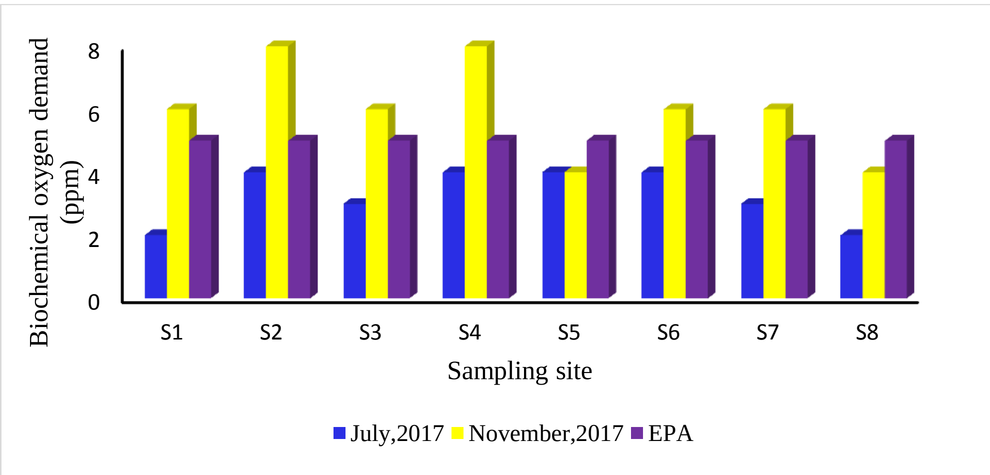

Figure 7: Comparison of biochemical oxygen demand of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

Table 12: Comparison of Dissolved Oxygen of Water Samples on (July, 2017) and (November, 2017) with EPA Guideline Standard Value

Parameter	Date	Sample 1	2	3	4	5	6	7	8
Dissolved Oxygen (ppm)	July, 2017	6.0	8.2	7.4	2.0	2.4	2.0	7.2	7.4
	November, 2017	7.0	7.4	7.8	2.0	4.2	4.4	6.8	5.0
EPA (2013) 5.0 ppm									

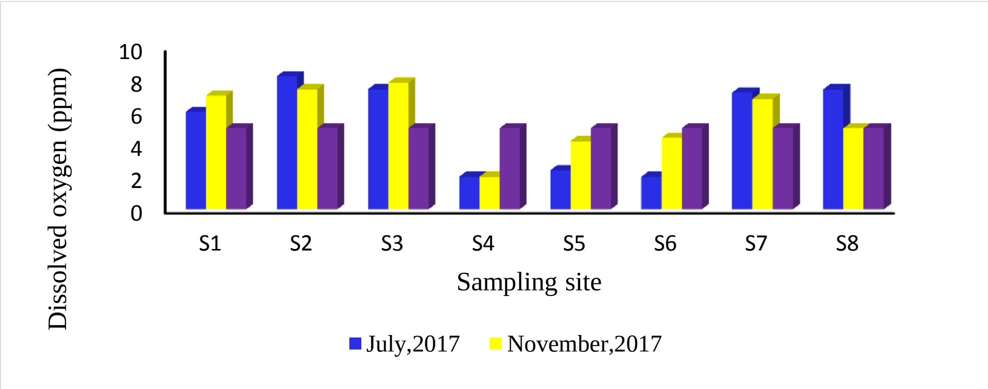

Figure 8: Comparison of dissolved oxygen of water samples on (July, 2017) and (November, 2017) with EPA guideline standard value

The effect of contact time on removal percent of Pb(II) by Kyauk Pataung Kaolin was shown in Table 13 and figure 9.The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample were studied at various contact times (0.5- 24h). Sorption of Pb(II) by KPT Kaolin was very fast at the initial state and adsorbed Pb(II) ion is slowly released into the solution. After 24 h, the adsorption process reached equilibrium. It was found that, the removal percent of Pb(II) was at optimum time 12 h.

Table 13: Effect of Contact Time on Removal Percent of Pb(II) by Kyauk Pataung Kaolin

No.	Contact time (h)	Equilibrium Concentration of Pb(II) (ppm)	Removal % of Pb(II)
1	0.5	3.80	96.90
2	1.0	10.10	89.90
3	2.0	2.10	97.20
4	.0	5.50	94.50
5	5.0	7.99	92.01
6	7.0	6.30	93.70
7	9.0	6.99	93.01
8	12.0	7.28	92.72
9	15.0	8.09	91.91
10	18.0	9.30	90.70
11	20.0	9.90	90.10
12	22.0	10.95	89.05
13	24.0	10.98	89.02

Initial Pb(II) concentration = 100 ppm, Dosage= 2g, pH = 6.8, Volume = 50 ml

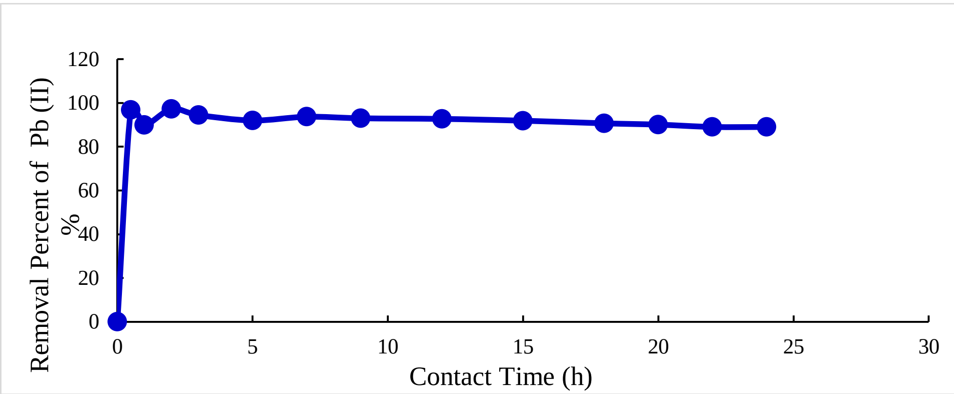

Figure 9: Removal percent of Pb(II) as a function of contact time

The effect of dosage on removal percent of Pb(II) by Kyauk Pataung Kaolin was shown in Table 14 and figure 10.The effect of dosage of KPT Kaolin samples (0.5 g -3.5 g) on sorption of Pb(II) ion was studied at initial pH 6.8. It was found that the removal percent of Pb(II) ion adsorption efficiency increased with increasing dosage of Kaolin samples. It was found that, the removal percent of Pb(II) was at optimum dosage 2 g.

Table 14: Effect of Dosage on Removal Percent of Pb(II) by Kyauk Pataung Kaolin

No.	Dosage (g)	Equilibrium concentration of Pb(II) (ppm)	Removal (%) of Pb(II)
1	0.5	34.8	65.2
2	1.0	23.6	76.4
3	1.5	13.3	86.7
4	2.0	8.5	92.5
5	2.5	7.3	93.2
6	3.0	5.2	94.8
7	3.5	4.5	96.5

Initial Pb(II) concentration = 100 ppm, Contact Time= 12 h, pH = 6.8,
Volume = 50 ml

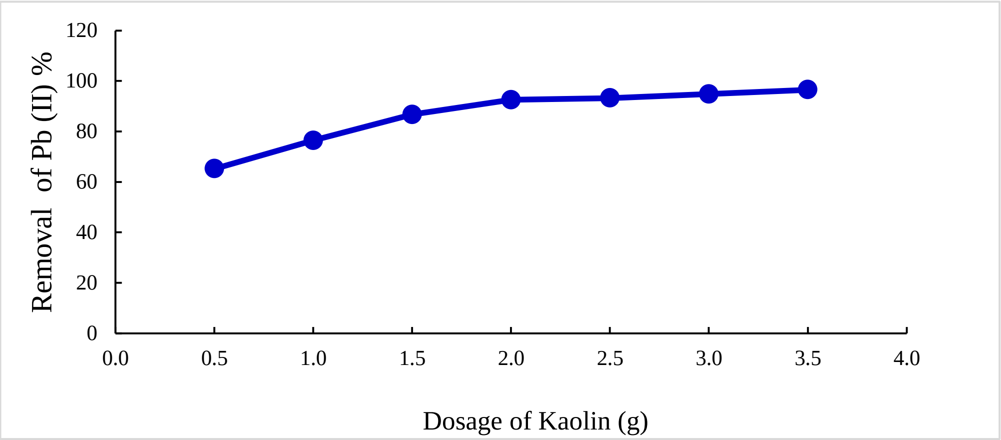

Figure 10: Removal percent of Pb(II) as a function of dosage of KPT kaolin

The effect of pH on removal percent of Pb(II) by Kyauk Pataung Kaolin was shown in Table 15 and figure 11. The Pb (II) sorption efficiencies of Kyauk Pataung Kaolin sample was studied at various pH (4-9). It was found that, the removal percent of Pb(II) was 96.3% at optimum pH 6.5.

Table 15: Effect of pH on Removal Percent of Pb(II) by Kyauk Pataung Kaolin

No.	pH	Equilibrium Concentration of Pb(II) (ppm)	Removal % of Pb(II)
1	4.0	15.5	84.5
2	4.5	14.2	85.8
3	5.0	12.7	87.3
4	5.5	11.8	88.2
5	6.0	7.1	92.9
6	6.5	3.7	96.3
7	7.0	11.5	88.5
8	7.5	10.9	89.1
9	8.0	14.6	85.4
10	8.5	17.6	82.4
11	9.0	19.4	80.6

Initial Pb(II) concentration = 100 ppm, Dosage= 2g, Contact time = 12 h, Volume = 50 ml

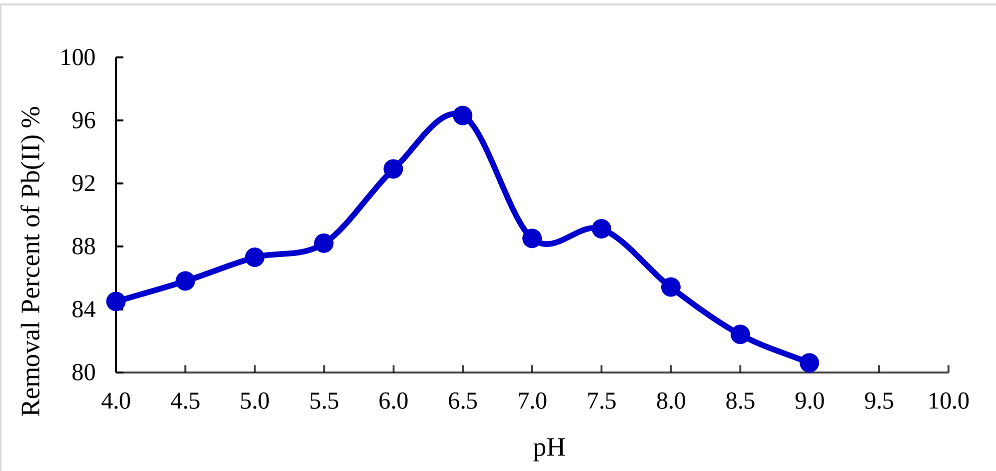

Figure 11: Removal percent of Pb(II) as a function of pH

The effect of concentration on removal percent of Pb(II) by Kyauk Pataung Kaolin The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample was studied at various concentrations of model solutions (50-900 ppm). The sorption efficiency decreased as the concentration of metal ions increase and the sorption site decreased. It was found that, the removal percent of Pb(II) was at optimum concentration 100 ppm.

Table 16: Effect of Concentration on Removal Percent of Pb(II) by Kyauk Pataung Kaolin

No.	Concentration	Equilibrium Concentration of Pb(II) (ppm)	Removal % of Pb(II)
1	50	3.0	94.0
2	100	2.0	98.0
3	200	29.6	85.2
4	300	78.6	73.8
5	400	128.8	67.8
6	500	205.5	58.9
7	600	291.0	51.5
8	700	386.4	44.8
9	800	477.6	40.3
10	900	539.1	40.1

Contact time = 12 h, Dosage= 2g, pH = 6.8, Volume = 50 ml

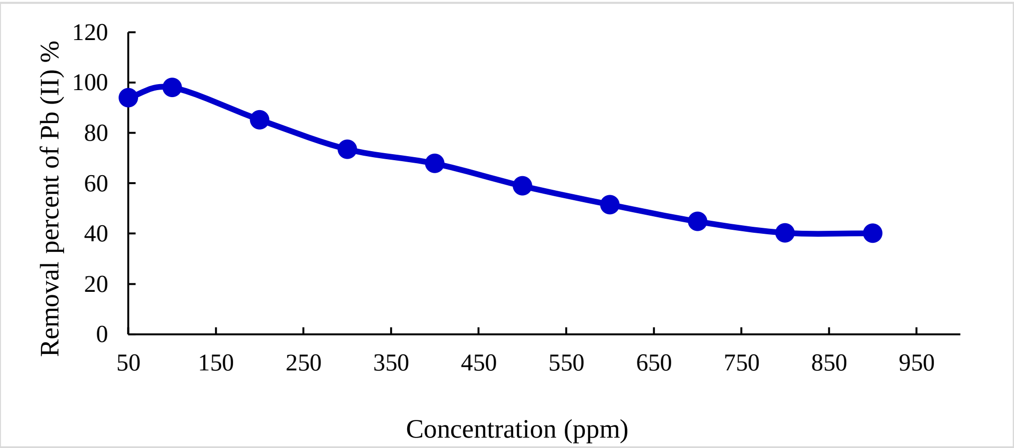

Figure 12: Removal percent of Pb(II) as a function of concentration

Conclusion

In this research, turbidity of samples (2, 4, 6, 7 & 8) on (July, 2017) and (November, 2017) and were found to be higher than value of EPA guideline standard (EPA, 2013). Turbidity of other samples were found in acceptable value of EPA guideline standard. Total alkalinity of samples (1, 2, 4, 6 & 8) on (July, 2017) and samples (1, 4, 6 & 8) on (November, 2017) were found to be higher than value of EPA guideline standard. Total alkalinity of samples (3, 5 & 7) on (July, 2017) and samples (2, 3, 5 & 7) on (November, 2017) were found in acceptable value of EPA guideline standard. Biochemical oxygen demand of samples (1, 2, 3, 4, 6 & 7) on (November, 2017) were found to be higher than value of EPA guideline standard and were found in acceptable value of EPA guideline standard. Chemical oxygen demand of all samples on (July, 2017) & (November, 2017) were higher than value of EPA guideline standard. Dissolved oxygen of samples (1, 2, 3, 7 & 8) (6-8.2 ppm) on (July, 2017) and samples (1, 2, 3 & 7) (6.8-7.8 ppm) on (November, 2017) were found to be higher than value of EPA guideline standard. Dissolved oxygen of samples (4, 5 & 6) on (July, 2017) and samples (4, 5, 6 & 8) on (November, 2017) were found in acceptable value of EPA guideline standard. The concentration of arsenic for sample (8) was found in exceeded level of EPA guideline standard on (July, 2017). According to the determination of arsenic concentration on (November, 2017), arsenic concentration for all samples were found in acceptable level value. The concentration of cadmium and mercury in all samples were not detected on (July, 2017) and (November, 2017). The concentration of lead in samples (1), (2), (3), (4), (5), (6) and (8) were found to be in the range of 0.011-0.03 ppm and higher than EPA guideline standard value (0.01 ppm). The concentration of lead in sample (1), (2), (3), (5) and (8) were found higher than EPA guideline standard value (0.01 ppm) on (November, 2017). The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample was studied on model solution at various contact time (0.5- 24) h. Adsorption of Pb(II) by KPT Kaolin was very fast at the initial state and adsorbed Pb(II) ion is slowly released into the solution. After 24 hours, the adsorption process reached equilibrium. The effect of dosage of KPT Kaolin samples (0.5 g -3.5 g) on sorption of Pb(II) ion was studied at initial pH 6.8. It was found that the percent Pb(II) adsorption efficiency increased with increasing dosage of Kaolin samples. The Pb(II) sorption efficiencies of Kyauk Pataung Kaolin sample was studied at various pH (4-9). It was found that, the removal percent of Pb(II) was at optimum pH 6.5. The Pb(II) sorption capacities of Kyauk Pataung Kaolin sample was studied at various concentrations of model solutions. The sorption efficiency become decrease as the concentration of metal ions increase and the sorption site decrease. It was found that, the removal percent of Pb(II) ions was 90%.

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