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A study on physic-chemical characteristics of ground water quality

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Abstract

A Systematic study has been carried out to explore the physico–chemical characteristics of ground water samples of Allahabad city. Water samples were collected from different locations of the city area by dividing into different zones. And analyzed for P^H, conductivity, total hardness, total alkalinity, sulphates, chlorides , fluoride, sodium and potassium etc. the study indicates the need for periodic monitoring and GIS based study of ground water in the study area.

Key Words: Physicochemical, ground water quality, pollutants and hardness.

Introduction

Groundwater is ultimate, most suitable fresh water, resource with nearly balanced concentration of the salt for human consumption. Water is one the essential components for the sustenance of life on earth. Among the various source of water, ground water is considered to be the safe for drinking purposes. The water which is being used for industries, agriculture and human needs adds continuously contaminants to the ground water. Groundwater is used intensively for irrigation and industrial purposes, a variety of land and water-based human activities are causing pollution of this precious resource. Its over-exploitation is causing aquifer contamination in certain instances, people around the world are using ground water as a source of drinking water and even today, more than half of the world's population depends on it for survival. Ground water constitutes 97% of global fresh water and many regions, ground water sources are the single largest supply for serving drinking water to the community. Moreover, for many communities it may be the only economically viable option for drinking. Thus the availability of clean ground water is most essential, as it serves as the basic and critical component in different spheres of human life for a large number of habitations. But, at present, the quality of ground water in many parts of the country, particularly shallow ground water, is changing as a result of

human activities. So there is urgent need to identify current sources of pollution and to develop low cost water purification technologies/system which is economically viable and adoptable to the community.

The most common and wide spread threat associated with water is contamination, either directly or indirectly, by sewage, by industrial effluents, by other wastes or by human or animal excrement. If such contamination is recent, and if among the contributors, there are carriers of communicable enteric diseases, some of the living casual agents may be present. The drinking water so contaminated or its use in the preparation of certain foods may result in further cases of infection. Studies on different physico-chemical parameters of different ground and surface water yielded useful data for the understanding of the nature of the water environment and it throws a flood of light on the changes which have been brought about the intense of human interference.

Materials and Methods

Experimental Section:

Allahabad is located at 25.45^0 N 81.84^0E in the southern part of the Uttar Pradesh at an elevation of 98 meters (322 Feet) and stands at the confluence of the Ganga and Yamuna. The Reason was known in antiquity as the vast country. To its south – west is the Budelkhand Region , To its east and south east is the Bagelkhand region , to its North& North-East is the Awadh Region and to its. West is the lower doab of which it is a part. Allahabad stands at a strategic point geographically and culturally. An important part of the Gange & Yamuna Doab region. It is the last point of the Yamuna River and is the last frontier of the Indian west.

The present study was carried out at Allahabad city with the aim of assessing the drinking water quality. The study also indicates the possible source of contamination in drinking water. Water samples were collected from various ground water sources located in figure -1 a map view of sampling locations of the study area.

In order to study the ground water quality of the study area a total no of 30 each samples of ground water were collected in the month of May – June, (summer) and July – August, (mansoon) both and analyzed for physico chemical parameters like : P^H was measured with the help of P^H of electronic India which is standardized with P^H buffer no. 4,7 and 9.2, TDS was estimated by evaporation method at 180^0C, total alkalinity , total hardness , chloride , NO_3^-, SO_4^-, PO_4 and F^- were analyzed by standard procedure mentioned in IS 10500: 1991 and APHA (1995) .The elemental Na and K analysis is carried out by digital flame photometer.

Samples collected for physico-chemical analysis in a poly propylene plastic bottles, the samples were collected, analyzed in chemical laboratory with in four hours of their collection. The sampling has been carried out in the month of July- August- (Mansoon) and May- June (Summer) 2008. All physico chemical prameters were analyzed according to the standard methods for water and waste water examination 19^{th} edition (APHA).

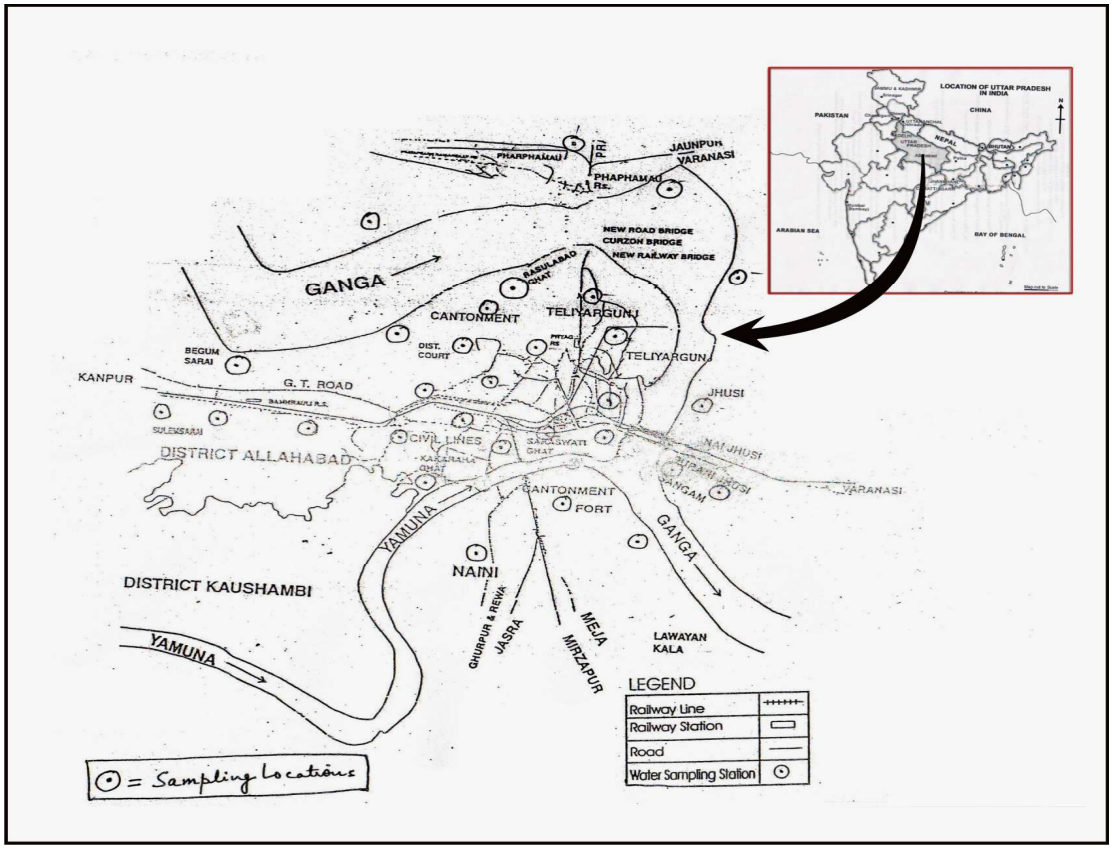

Figure-1: Sampling Locations of Study Area

Result and Discussion

Studies regarding to ground water quality analysis has been made by many authors like B.K.Gupta & R.R. Gupta (1999), M.R. Rajan and I. Paneerselvam (2005), S.B. Thakare et. al. 2005, Shikha Bisht et. al. (2007). They concluded that it is the high rate of exploration than its recharging in appropriate dumping of solid as well as liquid wastes, lack of strict enforcement of Law and loose governance are the cause of deterioration of ground water quality. Water quality criteria of various groundwater has been studied from different sources e.g. Tube wells, Dug wells and Bore wells etc. by a number of researchers. A few of them has been listed. Quality of well water near the Mae-Hia waste disposal site has been evaluated by Karnchanawong et al. (1993). Results of the physico chemical analysis of ground water samples of handpumps are presented in table no.1 and table no.2.

The sample analysed for physico-chemical parameters of ground water samples of hand pumps-summer season presented in table no. 01 in which P^H value of water samples ranges in between 6.88 -7.90 against the standard of WHO and IS 10500:1991.

The sampling point no. PHSP-20 is having higher limit the significance of P^H is related to the H^+ and OH^- concentration of drinking water in addition to this the temperature range was obtained 29^0C to 31.5^0C which is further compared with the standard value range, which shows the sampling location sources PHSP-4 and PHSP-22 are having higher temperature values as delineated in table-1 of summer.

Turbidity of ground water samples were obtained after analysis of water samples showing range from 0.4 to 6 in table-1 which is further compared with the available standard WHO 1996 and IS : 10500: 1991.

The conductivity of ground water samples which was analyzed for physico chemical parameter was found 446-2264µs/cm as compared with standard values. The ground water sample no. PHSP-10 and PHSP-6 are showing higher and lower values of total conductivity in the collected ground water samples.

Samples analyzed for TDS (Total dissolve solid) are showing value range 330-1240 mg/L, as compared with the standard value which is 500mg/L.The sampling location number PHSP-10 is having higher TDS values in collected ground water samples.

The Total Alkalinity was found to be in the range of 300-660 mg/L in ground water samples which are presented in table -1, which on further compared with the standard values 200mg/L. The sampling Location No. PHSP-1 and PHSP-19 are having high alkalinity value of Alkalinity in ground water samples.

The total hardness of ground water samples was found in the range of 136 - 624 mg/L which is further compared with the Standard value range 300 mg/L. Sampling point location number PHSP-10 is having higher value of total hardness in ground water samples.

The cations like Ca & Mg were analyzed in ground water samples are showing value range from Ca 24-67 mg/L & Mg 13-127 mg/L this is further compared with standard values.In which the sampling location no. PHSP-12 and PHSP-10 are having higher range value of Ca and Mg respectively.

The value of chloride (Cl^-) obtained 14- 326 mg/L as presented in table-1 which is further compared with the standard values 250mg/L. Collected ground water sampling location number PHSP-13 is having high Chloride (Cl^-) concentration in drinking water.
Sulphate (SO_4) was analyzed in ground water samples is having value range from 13-183 mg/L which on further compared with standard value range 200 mg/L in which ground water sampling location no. PHSP-10 is having high SO_4 values.

The results were obtained from table -1 for Nitrate (NO_3) ranges from 0.25 -0.98 mg/L. Which were on further compared with standard values range 45g/L, shows ground water sampling location no. PHSP-22 is having higher value of Nitrate.

The values of Phosphate (PO_4) ranges from 0.04 to 0.12 mg/L. This on further compared with standard values showing ground water sampling location no. PHSP-7and PHSP-27 are having less and high value Phosphate PO_4 in ground water samples.

Fluoride is an important element analyzed for physico chemical analysis of water found to be 0.10 to 1.29 mg/L. which is further compared with standard value 1.0 mg/L. Ground water samples no. PHSP-5 and PHSP-17 are having less and higher concentration fluoride in the collected ground water samples as compare with standart limits.

Na & K were analyzed for physicochemical analysis of ground water samples are having range (Na 15 – 135 mg/L and K 2 - 54.5mg/L) which was compared with standard values of sodium &

potassium .Sampling location no.PHSP-24 and PHSP-11, 12. Are having sodium and potassium higher value range.

The sample analyzed for physico-chemical parameters of ground water hand pumps mansoon season are presented in table-2, in which P^H value of collected water samples are in the range of 7.05 to 8.03 against the standard value range 7.0 to 8.6.The sampling location no. PHSP-20 is having higher concentration of P^H and the significance of P^H is related to the H^+ and OH^- concentration of water:

The temperature range was obtained in the range of 26 ^{0}C to 29 ^{0}C which on further compared with the standard value range.The sampling location no. PHSP-11and PHSP-21 are having higher values of temperature as delineated in table-2 of season mansoon.
Turbidity of ground water samples were obtained after analysis of water samples showing range from 0.5 to 6 NTU in table-2, which on further compared with available standards of WHO 1996 and IS: 10500: 1991.

The conductivity of groundwater samples which was analyzed for physico chemical parameter found to be 754-2540 µs/cm. As compare with the standard value. The ground water sample no. PHSP -9 and PHSP-5 are showing higher and lower values of total conductivity in ground water samples.

Sample analyzed for TDS (Total dissolve solid) are showing value range 430-2132 mg/L, as compared with the standard value 500mg/L. The sampling location number PHSP-9 is having higher TDS value in ground water.

The Total Alkalinity was found in the range of 250-550 mg/L in hand pumps ground water samples presented in table-2, which is further compared with the standard values 200 mg/L shows the sampling location No. PHSP-19 and PHSP-20 are having high alkalinity value.

The total hardness of ground water samples was found to be 80-480 mg/L as shown in table-2, which is further compared with the Standard value range 300 mg/L shows sampling location number PHSP-9 is having higher value of total hardness in the collected ground water samples.

The cations like Calcium (Ca) and Magnesium (Mg) were analyzed in ground water samples are showing value range from Ca 8-47 & Mg 12-103.Which is on further capered with the standard value range.The samples location no. PHSP-12 and PHSP-9 of the collected ground water samples are having higher value range.

The ground water samples which were collected for physicochemical analysis of chloride (Cl^-) the value of chloride obtained 21-279 mg/L as presented in table no. 2 which is further compared with the standard value 250 mg/L. Ground water samples location no. PHSP-9 is having high chloride (Cl^-) concentration in drinking water.

Sulphate (SO_4) was analyzed in ground water samples is having value range 13-195 mg/L. which is further compared with the standard value range 200mg/L. Ground water samples no. PHSP-9 is having high SO_4 value in the collected ground water samples.

The results were obtained from table-2 for NO_3 (Nitrate) ranges from 0.11 -0.84mg/L. Which were on comparison with standard values found 45g/l Shows ground water samples no. PHSP-15 is having higher values.

The value of Phosphate (PO_4) ranges from 0.02 to 0.08 mg/L, which was further compared with the standard values. Collected ground water samples nos. PHSP-7, 14, 23 and 27 are having less and high value PO_4 in ground water samples.

Concentration in ground water samples analyzed for Fluoride found to be 0.02 to 1.67 mg/L which is on further compared with the standard value 1.0 mg/L, ground water samples no. PHSP-17and PHSP-27 is having low concentration of fluoride as compared with WHO limit.

Sodium (Na) & Potassium (K) were analyzed for physicochemical analysis of ground water samples are having range values (Na 10-230mg/L, K 2-51mg/L) which is further compared with standard value, showing collected ground water sample nos. PHSP-19, 25 and PHSP-12 are showing low and high concentration of sodium & Potassium as compared with the standard value range.

So, contamination of drinking water has become a major concern to the Environmentalist in the developing countries. As more and more people are exposed to contamination of drinking water, many issues arise that not only involve premeditating the contaminated water, but also preventing similar situations from occurring future. Water Quality Index (WQI) provides a single number (like a grade) that expresses overall water quality at a certain location and time based on several water quality parameters. The main objective of a Water Quality index is to turn complex water quality data into information that is understandable and useable by the population of the area. Water Quality Index based on some very important parameters can provide a simple indicator of water quality. It gives the public a general idea of the possible problems with water in a particular region.Decision makers in environmental fields face difficult challenges of anticipating the potential biophysical and socio economic impacts of managements and policy interventions over regions that may vary dramatically in terms of climates, soils, topography, land use and other factors. Leung (1997) addressed on a host of conceptual and theoretical systems.

However, a water index based parameters can provide a future solutions of water quality which can be consist of WQI calculation and GIS system.

TABLE - 1 :Water Quality-HandPumps (Physico-chemical)

City : Allahabad Season: Summer

Sr. NO.	Sampling ID No.	P^H	Temp ℃	Turb. (NTU)	Cond (µs/ CM)	TDS	T.ALK.	T.HARD.	Ca	Mg	Cl	SO	NO	PO P	F	Na	K
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	PHSP-1	7.22	30	2.5	1385	806	660	212	31	33	99	67	0.9	0.05	0.13	100	3
2	PHSP-2	7.24	30	2	1400	812	650	208	31	32	99	68	0.92	0.05	0.16	102	3
3	PHSP-3	7.47	31	0.5	1158	582	330	308	37	52	40	46	0.8	0.07	1.0	64	2
4	PHSP-4	7.5	31.5	0.8	1165	584	330	312	36	54	42	47	0.82	0.06	0.9	65	2.5
5	PHSP-5	7.42	30	1.5	455	332	370	224	34	34	28	14	0.25	0.08	0.1	15	9.5
6	PHSP-6	7.5	30.5	2	446	330	375	224	34	34	28	13	0.25	0.08	0.13	16	9
7	PHSP-7	7.22	30.5	0.6	1074	675	500	228	32	36	113	40	0.6	0.04	0.36	110	4
8	PHSP-8	7.24	30.5	1	1070	678	500	228	33	35	115	40	0.64	0.04	0.33	112	4
9	PHSP-9	6.8	30	5	2250	1238	390	620	40	126	128	181	0.96	0.07	0.1	120	44
10	PHSP-10	6.88	30.5	6	2264	1240	395	624	40	127	128	183	0.92	0.08	0.13	124	45
11	PHSP-11	7.31	29	4	1460	836	320	412	66	60	156	87	0.7	0.05	0.5	65	54.5

12	PHSP-12	7.25	30	3.5	1450	840	320	412	67	59	157	86	0.72	0.05	0.54	67	54.5
13	PHSP-13	7.51	30	0.5	711	372	400	140	35	13	326	29	0.52	0.09	0.1	29	47
14	PHSP-14	7.5	30.5	1	718	375	400	148	35	15	325	30	0.54	0.09	0.16	30	48.5
15	PHSP-15	7.27	30.5	0.6	1472	848	400	384	42	68	156	72	0.7	0.05	0.61	90	4
16	PHSP-16	7.29	30	0.9	1481	850	400	380	42	67	156	72	0.68	0.05	0.65	93	4.5
17	PHSP-17	7.37	31	0.5	887	494	430	284	37	47	50	35	0.75	0.1	1.29	48	2
18	PHSP-18	7.37	31	0.5	887	498	435	280	37	46	50	34	0.75	0.09	0.32	50	2
19	PHSP-19	7.79	30	0.6	1136	810	660	136	24	18	14	24	0.28	0.08	0.53	50	2
20	PHSP-20	7.9	30	0.4	1134	805	660	140	25	19	14	24	0.26	0.08	0.56	50	2.5
21	PHSP-21	7.3	31	1	1450	872	370	280	40	44	113	46	0.95	0.09	0.75	75	4
22	PHSP-22	7.38	31.5	0.9	1442	872	370	276	38	44	112	46	0.98	0.08	0.72	76	4.5
23	PHSP-23	7.05	31	3	1266	734	420	290	44	44	99	40	0.78	0.08	0.82	55	3
24	PHSP-24	7.08	30.5	2.5	1260	736	430	290	44	44	99	42	0.75	0.08	0.8	54	3
25	PHSP-25	7.35	30	0.6	1223	724	400	380	35	72	135	103	0.9	0.06	1.17	80	5
26	PHSP-26	7.32	30	0.7	1228	726	390	384	35	71	132	105	0.88	0.07	1.2	79	4.5

27	PHSP-27	7.55	30	0.6	1240	660	460	260	38	40	92	53	0.9	0.12	0.46	63	2
28	PHSP-28	7.52	30.5	0.8	1245	660	455	260	39	40	92	54	0.92	0.11	0.43	61	2.5
29	PHSP-29	7.02	30	0.7	1203	662	300	270	35	45	79	24	0.88	0.05	0.36	135	2
30	PHSP-30	7.07	30.5	0.8	1200	662	305	274	35	44	82	24	0.84	0.06	0.36	135	2

TABLE - 1 :Water Quality-HandPumps (Physico-chemical)

City : Allahabad Season: Summer

Sr. NO.	Sampling ID No.	P^H	Temp ℃	Turb. (NTU)	Cond (µs/ CM)	TDS	T.ALK.	T.HARD.	Ca	Mg	Cl	SO	NO	PO P	F	Na	K
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	PHSP-1	7.22	30	2.5	1385	806	660	212	31	33	99	67	0.9	0.05	0.13	100	3
2	PHSP-2	7.24	30	2	1400	812	650	208	31	32	99	68	0.92	0.05	0.16	102	3
3	PHSP-3	7.47	31	0.5	1158	582	330	308	37	52	40	46	0.8	0.07	1.0	64	2
4	PHSP-4	7.5	31.5	0.8	1165	584	330	312	36	54	42	47	0.82	0.06	0.9	65	2.5
5	PHSP-5	7.42	30	1.5	455	332	370	224	34	34	28	14	0.25	0.08	0.1	15	9.5
6	PHSP-6	7.5	30.5	2	446	330	375	224	34	34	28	13	0.25	0.08	0.13	16	9

7	PHSP-7	7.22	30.5	0.6	1074	675	500	228	32	36	113	40	0.6	0.04	0.36	110	4
8	PHSP-8	7.24	30.5	1	1070	678	500	228	33	35	115	40	0.64	0.04	0.33	112	4
9	PHSP-9	6.8	30	5	2250	1238	390	620	40	126	128	181	0.96	0.07	0.1	120	44
10	PHSP-10	6.88	30.5	6	2264	1240	395	624	40	127	128	183	0.92	0.08	0.13	124	45
11	PHSP-11	7.31	29	4	1460	836	320	412	66	60	156	87	0.7	0.05	0.5	65	54.5
12	PHSP-12	7.25	30	3.5	1450	840	320	412	67	59	157	86	0.72	0.05	0.54	67	54.5
13	PHSP-13	7.51	30	0.5	711	372	400	140	35	13	326	29	0.52	0.09	0.1	29	47
14	PHSP-14	7.5	30.5	1	718	375	400	148	35	15	325	30	0.54	0.09	0.16	30	48.5
15	PHSP-15	7.27	30.5	0.6	1472	848	400	384	42	68	156	72	0.7	0.05	0.61	90	4
16	PHSP-16	7.29	30	0.9	1481	850	400	380	42	67	156	72	0.68	0.05	0.65	93	4.5
17	PHSP-17	7.37	31	0.5	887	494	430	284	37	47	50	35	0.75	0.1	1.29	48	2
18	PHSP-18	7.37	31	0.5	887	498	435	280	37	46	50	34	0.75	0.09	0.32	50	2
19	PHSP-19	7.79	30	0.6	1136	810	660	136	24	18	14	24	0.28	0.08	0.53	50	2
20	PHSP-20	7.9	30	0.4	1134	805	660	140	25	19	14	24	0.26	0.08	0.56	50	2.5
21	PHSP-21	7.3	31	1	1450	872	370	280	40	44	113	46	0.95	0.09	0.75	75	4

Table 2 : Water Quality -Hand Pumps (Physico-chemical)

22	PHSP-22	7.38	31.5	0.9	1442	872	370	276	38	44	112	46	0.98	0.08	0.72	76	4.5
23	PHSP-23	7.05	31	3	1266	734	420	290	44	44	99	40	0.78	0.08	0.82	55	3
24	PHSP-24	7.08	30.5	2.5	1260	736	430	290	44	44	99	42	0.75	0.08	0.8	54	3
25	PHSP-25	7.35	30	0.6	1223	724	400	380	35	72	135	103	0.9	0.06	1.17	80	5
26	PHSP-26	7.32	30	0.7	1228	726	390	384	35	71	132	105	0.88	0.07	1.2	79	4.5
27	PHSP-27	7.55	30	0.6	1240	660	460	260	38	40	92	53	0.9	0.12	0.46	63	2
28	PHSP-28	7.52	30.5	0.8	1245	660	455	260	39	40	92	54	0.92	0.11	0.43	61	2.5
29	PHSP-29	7.02	30	0.7	1203	662	300	270	35	45	79	24	0.88	0.05	0.36	135	2
30	PHSP-30	7.07	30.5	0.8	1200	662	305	274	35	44	82	24	0.84	0.06	0.36	135	2

City : Allahabad

Season: Mansoon

Sr. NO.	Sampling ID No.	P^H	Temp ℃	Turb (NTU)	Cond (µs/ CM)	TDS	T.ALK.	T.HARD.	Ca	Mg	Cl	SO	NO N	PO P	F	Na	K
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	PHSP-1	7.31	28	1.5	1676	933	530	300	10	67	116	66	0.71	0.03	0.65	105	4
2	PHSP-2	7.35	27	1.2	1660	920	540	308	10	69	112	62	0.7	0.03	0.65	102	4
3	PHSP-3	7.35	28	2	1197	778	360	116	8	23	88	73	0.79	0.06	0.72	55	2
4	PHSP-4	7.32	27.5	1.8	1185	770	360	120	9	24	88	71	0.76	0.05	0.7	56	2
5	PHSP-5	7.39	27	0.5	754	432	360	112	21	15	27	13	0.21	0.06	0.47	10	7
6	PHSP-6	7.45	27.5	0.5	776	430	350	112	20	15	25	13	0.24	0.06	0.42	10	7
7	PHSP-7	7.16	28	1	1221	875	430	84	13	13	58	61	0.49	0.02	0.42	148	2
8	PHSP-8	7.18	27.5	1	1210	870	420	80	12	12	55	60	0.48	0.03	0.44	145	2
9	PHSP-9	7.05	29	4	2540	2132	530	480	21	103	279	195	0.78	0.07	0.5	180	32
10	PHSP-10	7.05	28.5	4.5	2528	2128	520	472	21	102	270	193	0.75	0.07	0.55	175	30
11	PHSP-11	7.49	29	0.5	1396	722	390	220	45	26	102	86	0.73	0.04	0.75	66	50
12	PHSP-12	7.55	26	0.8	1408	722	400	224	47	26	99	83	0.7	0.04	0.75	68	51
13	PHSP-13	7.47	28.5	1	881	540	360	120	8	24	36	34	0.39	0.07	0.28	21	37

14	PHSP-14	7.48	28	0.6	870	534	360	116	8	23	36	32	0.38	0.08	0.29	20	35
15	PHSP-15	7.38	28	1.5	1804	1224	500	168	19	29	132	122	0.84	0.03	0.72	224	2
16	PHSP-16	7.42	27	1.5	1808	1220	510	168	20	29	130	124	0.8	0.03	0.75	230	3
17	PHSP-17	7.44	27	1	1432	1114	480	128	8	26	79	46	0.64	0.07	0.2	188	2
18	PHSP-18	7.42	27.5	1	1430	1116	480	132	9	26	79	46	0.64	0.07	0.2	190	3
19	PHSP-19	8.01	28.5	0.5	1186	984	550	108	10	20	21	19	0.11	0.06	1.55	55	3
20	PHSP-20	8.03	28	1	1190	684	550	108	10	20	21	18	0.13	0.06	1.5	57	3
21	PHSP-21	7.47	29	0.5	1385	932	350	200	13	41	123	66	0.79	0.06	0.72	4	3
22	PHSP-22	7.42	28.5	0.9	1392	934	360	196	13	40	123	66	0.79	0.06	0.72	81	4
23	PHSP-23	7.2	28	6	1401	998	400	188	13	38	106	47	0.79	0.08	0.65	47	2
24	PHSP-24	7.25	28.5	5.5	1400	980	390	184	12	37	102	44	0.75	0.07	0.6	45	2
25	PHSP-25	7.36	27.5	1	1624	1006	250	200	10	44	146	135	0.73	0.04	0.75	60	4
26	PHSP-26	7.36	27	2	1630	1014	260	200	10	43	150	136	0.78	0.05	0.72	62	4
27	PHSP-27	7.92	28.5	1	1240	864	320	88	10	16	71	68	0.67	0.08	1.67	71	9
28	PHSP-28	7.96	28.5	1.5	1250	862	320	84	10	14	71	68	0.65	0.08	1.6	71	9
29	PHSP-29	7.34	27.5	1	1504	910	270	184	14	36	88	27	0.81	0.06	0.55	148	2
30	PHSP-30	7.34	275	1.2	1510	912	270	180	13	36	88	29	0.82	0.07	0.57	148	3

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