Survey of Nitrates in Drinking Water

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Summary: Extensive investigations were carried out to determine quality of drinking water mainly in rural areas of Islamabad/Rawalpindi. Water samples collected from wells, tube wells, springs were analysed. Nitrate contents were found to be over the range of 1-57 ppm. The highest nitrate contents were found in wells.

Introduction

Nitrates are present in most waters. Their presence may be derived from different sources i-e decay of animal matters, vegetables, industrial discharges, sewage sludge, domestic effluents, refused dump leachates. The use of artificial nitrogenous fertilizers has also contributed to raise the level of nitrates in drinking waters. Besides this legumes are also a source of nitrogen in soils [2,4,6].

Nitrates in drinking water could become a cause of cyanosis (Methaemoglobinaemia) in babies. The United States National Research Council had decided that well waters containing more than 10 mg/l nitrates were unfit for consumption by infants [1]. Disease caused to infants due to nitrates is called "Blue Baby" disease. This has been reported to be confined to babies in the first eight weeks who were artificially fed. [1,2]. Some studies have shown that a level of 20-40 ppm had caused methaemoglobinaemia in babies [2].

Appreciable work has been carried out and data has been collected for nitrate contents in drinking waters of Pakistan [3,4,6,7,8]. It was intended to carry out some survey /analysis in and around Islamabad/ Rawalpindi.

In the present work it is intended to present data on nitrate contents in drinking waters of some areas in Islamabad and Rawalpindi.

Results and Discussion

Estimation of nitrates in drinking waters has been remained a matter of great concern to the researchers in particular to public health and sanitary engineers as increased nitrate contents have considerable health hazards and also responsible for

Table

Location	Nitrate (mg/l)
SPRING	
Bahara Kahou	10.40
KoltHathial	1.00
Saira Meel	28.00
Tret	27.30
Samli	22.70
Charra Pani	3.50
Chattar	1.70
Takia Mehram Shah	2.30
Salgran	5.00
Wah Cantt	17.00
Bhurban Murree	1.60
Nathia Gali	10.00
Khanaspur	7.00
Wah Garden	26.60
OPEN WELLS	
Village Chahan Mastal	1.50
Malpur	12.50
Bhara Kahou	57.00
Jang Bhagial	31.00
Kot Hathial	15.00
Phulgran	10.00
Dhoke Gala	9.00
Bawli	1.00
Dubairan	10.00
Chakian	11.00
TUBE WELLS	
NIST	17.40
NPSL	24.90
APWA School	26.60
Industrial Area 1/9	21.00
UGC Main Office	27.50
F/8-1	9.48
F/8-2	12.00
F/8-4	9.44
F/9-4	9.48
F/10-3	9.50
G/5-2	12.38
G/7-2	13.50
G/7-3-2	9.70
G/8 Markaz	10.01
G/8-1	9.48
G/8-4	12.67
G/9-1	9.75

Table continued

Location	Nitrate (mg/l)
	TUBE WELLS
G/9-3	9.75
G/9-4	9.83
G/10-1	9.75
G/10-2	10.01
G/10-3	10.01
H/8	9.70
H/8-2	10.00
H/9-1	9.83
H/9-2	10.00
H/9-3	10.00
H/9-4	8.00
I/11-2	8.00

depleting dissolved oxygen in rivers and stream waters so hindering their self purification process.

According to detailed reports by Siddique [4] nitrate contents in more than six hundred samples were found to be from 0 to 135 mg/l. In Rawalpindi wells located along nullah Leh were surveyed. These contained 0 to 44 mg/l nitrate contents [3]. In England more than 20 mg/l nitrates have been reported based on data collected after analysis of more than one thousand samples [2] In present studies (Table-1) it was found that highest nitrate contents were present in waters from wells. Higher nitrate contents in well waters are indicative of the probability that wells might derive nitrate contents from nearby polluting sources i-e sewage sludge, domestic effluents, animal and vegetable decay, industrial discharges, artificial fertillizers or refuse.

Experimental

Phenoldisulfonic acid method was adopted for the determination of nitrates. 50-ml sample was evaporated to dryness over a hot water bath in a casserole. Residue was rubbed thoroughly with 2-ml phenoldisulfonic acid reagent and diluted with 20 ml-distilled water. To it added 6-7 ml NH_4OH with continuous stirring. Yellow colour appeared by the reaction between nitrates and phenoldisulfonic acid obeys Beer's law. Transferred the solution in a 50 ml volumetric flask and diluted to the mark and mixed. By using spectronic 21 absorption was measured at wavelength 410-mμ. By consulting standard graph calculated nitrate contents in mg/l. Graph was constructed using standard nitrate solution [5].

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