**STUDY OF WATER QUALITY BY MEASURING THE VARIOUS PARAMETERS OF DIFFERENT BRANDS OF DRINKING WATER COMMONLY AVAILABLE IN PAKISTAN**

**O.P.F GIRLS COLLEGE**

**F-8/2,ISLAMABAD**

**PAKISTAN**

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**STUDENTS PARTICIPATED**

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**ABSTRACT**

Drinking water quality standards describes the quality parameters set for drinking water. It must be wholesome and this is defined in law by standards for a wide range of substances, organisms and properties of water in regulations. There is good agreement amongst worldwide on the science behind the setting of health based standards for drinking water and this expert evidence is documented by the World Health Organisation in the Guidelines for Drinking Water Quality. The standards are strict and include wide safety margins. They cover:

 • Chemicals such as nitrate and pesticides

 • Metals such as lead and copper

 • The way water looks and how it tastes

Drinking water quality is deteriorating continually due to biological contamination from human

waste, chemical pollutants from industrial and agricultural inputs. Piped water also gets contaminated because pipes are laid very close to sewage lines or open drains and cause many serious water borne diseases. It is found that 45% of infant deaths have been attributed to diarrohea and about 60% to overall infectious waterborne diseases in Pakistan. According to the (WHO) 25-30% of the diseases are gastro-intestinal in nature . The Poor quality of drinking water has forced a large cross-section of citizens to buy bottled water. As a consequence of this increasing market a mushroom growth of bottled water industry in the country is witnessed during the last few years. However many of the mineral water companies were found selling contaminated water.A class started with questions that what are the possible factors which affect the quality of water and its ability to use it for drinking purposes. Some students say climate change also affects some aspects of water quality like turbidity, pH , macro-invertebrate health , dissolved oxygen ,salinity etc

 In this regard the Globe Team of O.P.F Girls College F-8/2 ,Islamabad, under the supervision of the Principal Madam Shahina Masood planned to carry out a research survey of different drinking water brands available in Pakistan.

 **Globe Sampling Methodology**

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| --- | --- |
| **Number of Brands collected** | 05 |
| City under observation | Rawalpindi,Islamabad |
| Members of the Globe team | 20 |
| Tests conducted | 10 |

**Globe Water Classification System**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Brand Name** | **Globe code given to sample** | **City** | **Date of colle-ction** | **Size**  | **Composition** **Given on the bottle****mg/L** | **Manufacturers Address** |
| **Mai Dubai** | A1 | Islamabad | 05-02-2018 | 330mL | Calcium20,Magnesium10,Sodium3.5,potassium5,Chloride50,Sulfate20,Bicarbonate18.5,Nitrate0.2,Carbonate<1Fluoride0,Total hardness91,Total dissolved solids12.7 | MaiDubai IL,L.CIP.O Box 230 UAE |
| **Nestle** | A2 | Rawal-pindi | same | 1.5L | Sodium7-30,Magnesium4-15,Sulphate 12-50,Calcium 40-70,Potassium 0.02-5,Chloride 77-150,Total minerals 160-350,pH6.5-8.5 | Nestle Pakistan Ltd.308-upper Mall,Lahore |
| **Aquafina** | A3 | Islamabad | same | 1.5L | Sodium13,Magnesium13,Potassium1,Chloride20,sulphate52,Nitrate<0.1,CaCO354,total minerals105 | Haidri Beverages Private Limited CDA IndustrialTriangle Kahuta Road Islamabad, |
| **Murree Sparklets** | A4 | Islamabad | same | 1.5L | Sodium 7-50,Calcium30-100,Magnesium7-50,Sulphate5-150,Bicarbonates130-260,Chloride5-200,Fluoride0.1-0.7,TDS170-270 | Murree brewery Plot10/2,PhaseIII Industrial Estate,Hattar |
| **Kinley** | A5 | Rawal-pindi | same | 1.5L | Calcium 1-50,Magnesium 15-30,Potassium 1-10,,Sodium2-25,Chloride1-120,Sulfate50-100,Fluoride0.1-0.7,TDS500,pH6.5-7.5 | The Coca Cola Company,Coca-Cola Beverages Ltd(CCBPL),5-E-II,Gulberg III,Lahore,Pakistan. |

**Globe hydrology Protocols and methods used for the analysis of water sample**

|  |  |  |
| --- | --- | --- |
| **Sr #** | **Parameters** | **Instruments used** |
| 01 | Appearence | Sensory test |
| 02 | Transparency | Transparency tube |
| 03 | Odour | Sensory test |
| 04 | Temperature | Hygrothermometer |
| 05 | Density |  |
| 06 | pH | Milwaukee pH meter |
| 07 | Conductivity | Electrical conductivity meter |
| 08 | Dissolved Oxygen | LaMotte Dissolved oxygen kit |
| 09 | Nitrate ion conc | Hach Nitrate test kit |
| 10 | Alkalinity in water | LaMotte Alkalinity test kit |

**Water Quality Permissible limits for bottled water**

**NGVS**: No guide line value set **WHO**: World health organization

**BDL**: Below detection limits **IBWA**: International bottled water association

**PSQCA**: Pakistan standards and quality control authority

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr#** | **Parameters** | **units** | **Permissible** | **limits** |  |
|  |  |  | WHO | IBWA | PSQCA |
| 01 | Appearance(Colour) | TCU | 15 | NGVS | 5 |
| 02 | Transparency |  - | - | - | - |
| 03 | Odour | - | Odourless | NGVS | Unobjectionable |
| 04 | Temperature | - | - | - | - |
| 05 | Density | - | - | - | - |
| 06 | pH | - | 6.5-8.5 | NGVS | 6.5-8.5 |
| 07 | Conductivity | µS/cm | NGVS | NGVS | NGVS |
| 08 | Dissolved Oxygen | mg/L |  - |  - |  - |
| 09 | Nitrate ion conc | mg/L | 10 | 10 | 10 |
| 10 | Alkalinity in water | mg/L | NGVS | NGVS | NGVS |
|  |  |  |  |  |  |

**Procedure**

The Globe Team of O.P.F Girls College F-8/2 , Islamabad consists of 15 students is a well - trained team .This project was designed and planned by the Globe Coordinator Madam Shahina Masood and the Globe teacher Ms. Saima Qureshi. Different brands of drinking water which are commonly available in Pakistan were collected and examined by the students under the supervision of Ms Saima Qureshi.

**Results:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name of the Brand** | **Appearance** | **Transp-arency****cm** | **Odour** | **Temp****⁰C** | **pH** | **Density****mg/****cm** | **Conduct-ivity****µS/cm** | **Conc** **of Dissolved Oxygen****mg/L** | **Conc of Nitrate Ion****mg/L** | **Alkalinity of Water****mg/L**  |
| **Mai Dubai** | **Clear** | >100 | Odourless | 18 | 7.5 | 0.999 | 330 | 9.6 | 0.088 | 10 |
| **Nestle** | **Clear** | >200 | Odourless | 18 | 7.6 | 0.998 | 330 | 9.6 | 0.058 | 17.5 |
| **Aqua Fina** | **Clear** | >200 | Odourless | 18 | 7.2 | 0.999 | 330 | 10 | 0.044 | 15 |
| **Murree Sparklets** | **Clear** | >200 | Odourless | 18 | 7.2 | 0.999 | 330 | 7.8 | 0.049 | 25 |
| **Kinley** | **Clear** | >200 | Odourless | 18 | 7.2 | 0.999 | 330 | 10 | 0.044 | 15 |

**CONCLUSIONS**

All the brands are pH and Nitrate ion safe , the Dissolved Oxygen level is also safe .But the health wise quality and standards requires to investigate the presence of microbes , bacteria and viruses that might be present in the bottled water .The Globe Team of O.P.F Girls College has investigated the common brands of drinking water by using all available resources and has arrived on this conclusion that all the above mentioned drinking water brands are safe with respect to the above mentioned parameters( pH,Dissolved Oxygen , Alkalinity,Nitrate ion tests) but the disease potential of these bottles needs further investigation in terms of Bacteriological contamination ,Arsenic and Sodium Contamination.