Groundwater chemical Quality Tests (GQT)

Scope:

Organoleptic & Physical Parameters:
Appearance, True Colour Units, Odour, pH, Turbidity;
Electrical Conductivity (EC) &
Total Dissolved Solids (TDS) by gravimetry (TDSG).

Chemical Parameters:
Alkalinity: Phenolphthalein alkalinity (P-Alk), Total alkalinity (T-Alk),
Carbonates (CO_3), Bicarbonates (HCO_3) & Hydroxides (OH);
Total hardness of water (THW), Calcium (Ca) & Magnesium (Mg);
Carbonate hardness, Noncarbonate hardness; Ammonia, Nitrites (NO_2),
Nitrates (NO_3); Chloride, Fluoride, Sulfate, Iron & Manganese.

Total parameters: $7 + 13 = 20 + 5$ computed (CO_3, HCO_3 & OH alkalinity; CO_3 & $NonCO_3$ hardness)

Rationale:

Many consumers access water from multiple sources, to maximise total availability and minimise costs. Available water sources are often differentiated by designated use. For example; borewell water may be used exclusively for general purposes such as washing, gardening, etc. Farms, institutions and industries often have designated borewells for specific purposes for which physical and chemical profile is relevant. Sometimes consumers have access to a water source, and want to know its physical-chemical characteristics to plan appropriate use and/or to design water treatment systems. For example; mineral content is an important consideration in designing water treatment units. Water softener units may have to be incorporated to deal with excessive hardness of feedwater. Reverse osmosis (RO) units are required to treat saline water. The chemical Quality Tests are designed to address various water quality questions and concerns other than potability.

GQT is GPT minus the bacteriological parameters. In GQT we have packaged a broader set of physical and chemical parameters, to check for buffering capacity (alkalinity) hardness, nitrogenous substances, chloride and sulfate, iron & manganese, in addition to physical and sensory characteristics. Fluoride is included as fluorosis is endemic in some areas around Hyderabad. TDS value would be a point estimate based on actual weighment (gravimetry).

In the past, people have ordered GQT to check if borewell water is suitable for gardening, horticulture, various other domestic uses and know if a softener unit is needed or to check if an installed softener unit is working. Water treatment consultants and Gram Panchayats have ordered GQT, mostly of borewell water, to plan for a RO plant. Industrial clients have brought borewell water or RO-output to select appropriateness of equipment and to check if the chemical profile meets specific requirement of designated industrial process. Farmers have ordered GQT to know if their borewell water is suitable for irrigation, livestock and fisheries.

Occasionally, clients intend to use a water for drinking and order for GQT, despite our advice that bacteriological coliform tests are essential for determination of potability. If physical and chemical characteristics of a sample do not satisfy the guideline values for

drinking water, or indicate probable contamination, then it would be possible to say that the water is not potable. However, even if the physical and chemical characteristics test in a chemical Quality Test package are within acceptable/permissible limits for human consumption, we cannot say that the water is potable, without bacteriological testing to rule out faecal contamination.

Sample - Collection, Storage & Transportation:

Follow methods of sampling specified in IS3025pt1:1987 for chemical tests. One litre sample collected in a clean and dry clear or amber colour polypropylene bottle (CBWS/ABWS) is required for physical and chemical tests. Collect sample from the pump delivery pipe or a tap connected to the source. For open wells without any pump, use a clean bucket or pot to draw water. In case of step wells, ponds etc. plunge the bottle into the water elbow-deep, then turn it right side up to collect the sample from below the water surface. Transport the sample to laboratory as soon as possible, preferably within six hours. If immediate transport is not feasible, store the sample in a cool box and transport to laboratory, within 24 hours.

Information About Source, Context, Intended Use & Concerns:

Provide as much detail as you can about the source of water, sampling point, activities & environment around the sampling point, details of how the sampling point is linked to the source, recent maintenance event (servicing of water purifier, cleaning of overhead tank, sump, repair and renovation of plumbing, etc.) if any. Mention about intended use of the water, the reason why you are ordering the test, as well as doubts and concerns, if any. Occasionally, the IHS Laboratory may contact you for clarifications and additional information about the source and its environment, to help interpretation of test results.

Test Methods:

Organoleptic, physical and chemical characteristics of water sample are tested according appropriate parts of the IS3025 and/or American Public Health Association.

To pick up sample collection bottle and/or schedule collection of samples:
Email: ihslab@ihs.org.in; WhatsApp: +919848011251; Call:040- 23211013/4

References:

APHA. 2017. Standard Methods for the Examination of Water and Wastewater, 23rd Edition. Washington, DC: American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation.

IS3025Pt1: 1987. Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater. Part 1 Sampling. New Delhi: Bureau of Indian Standard (BIS); Indian Standard. Reaffirmed 2003.

IS3025 Relevant Parts: 1983. Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater. Parts, 4, 10, 21,46 etc. New Delhi: Bureau of Indian Standard (BIS); Indian Standard.