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HYGIENIC ASSESSMENT OF THE ORGANOLEPTIC AND PHYSICAL CHARACTERISTICS OF WATER

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Abstract: This article outlines the main principles for the hygienic assessment of the organoleptic and physical characteristics of drinking water. Colour, odour, taste, clarity, turbidity, temperature and other physical indicators are important when assessing whether water is acceptable for consumption. The article reviews methods used to determine these indicators, their relationship to water quality and consumer health, and the interpretation of assessment results. Organoleptic features may indicate certain types of contamination; however, water safety cannot be established by appearance, smell or taste alone. Therefore, organoleptic examination should be supplemented by physicochemical and microbiological analyses. The article also presents preventive recommendations for protecting water sources, collecting samples correctly, arranging laboratory tests and improving drinking-water quality.

Keywords: drinking water, organoleptic indicators, physical characteristics, colour, odour, taste, clarity, turbidity, temperature, hygienic assessment, water quality.

Introduction

Water is essential for human life and participates in physiological processes including nutrient transport, metabolic regulation and temperature control. Providing communities with sufficient and safe drinking water is a central public-health and environmental-hygiene responsibility. Water quality is influenced by the characteristics of its source, naturally occurring substances, contamination from the surrounding environment, treatment performance and conditions within the distribution system.

Organoleptic characteristics—especially colour, odour and taste—are readily perceived by consumers and can influence the acceptability of drinking water. Physical indicators, including temperature, turbidity, clarity and visible suspended particles, provide additional information about water conditions and treatment performance. Unexpected changes may indicate natural variation, corrosion or deposits in pipes, inadequate treatment, algal activity or contamination. However, water that looks clear and tastes normal may still contain pathogens or chemical contaminants that cannot be detected by the senses.

The purpose of this article is to describe the hygienic significance of the principal organoleptic and physical characteristics of drinking water, summarize approaches used to assess them, and present practical principles for interpreting results and preventing water-quality problems. Sensory

observations are screening indicators rather than substitutes for validated laboratory testing and risk-based monitoring.

Materials and Methods: This article was prepared as a narrative, source-based review of educational and methodological material concerning drinking-water hygiene, water-quality monitoring and the assessment of organoleptic and physical indicators. The approach was analytical and descriptive: the principal characteristics, common assessment approaches, potential interpretations and preventive measures were organized into a practical framework. No independent field survey, water sampling campaign, laboratory experiment or new measurement was conducted for this article.

In routine hygienic assessment, the source of the water, sampling point, date and time should be documented. Samples should be collected in suitable containers according to the requirements of the intended analysis. Where microbiological testing is planned, sterile containers and appropriate transport and holding conditions are necessary. Sampling procedures should minimize external contamination and preserve the characteristics being measured.

Initial observations may include colour, odour, visible particles and clarity. Taste should only be assessed where the sample is already considered suitable for sensory evaluation under the applicable safety procedure; water suspected of chemical or microbiological contamination must not be tasted. Temperature is commonly measured with a suitable thermometer, while turbidity is assessed using an appropriate calibrated instrument. Other measurements may be added according to the water source, suspected problem and applicable national standards.

Results should be recorded with the method used, measurement conditions and relevant quality-control information, then compared with current standards applicable to the water type and intended use. An unexpected result may justify repeat sampling, inspection of the source and distribution network, and additional physicochemical or microbiological analyses. Instrument calibration, representative sampling and correct sample storage are important for reliable interpretation.

Results: Colour is a visible property that may be affected by naturally occurring organic matter, iron or manganese compounds, suspended material and other substances. A sudden or unexplained change in colour can indicate a change in the source water, treatment process or distribution system. Visual assessment may be used as an initial screen; where necessary, standardized instrumental or colorimetric methods provide a more reproducible evaluation.

Odour may arise from volatile compounds, biological activity, algae, naturally occurring substances or materials introduced during treatment or distribution. Descriptions such as earthy, musty, sulphurous, decaying or chemical-like can help document an observation, but an odour alone cannot identify the substance responsible. An unfamiliar chemical odour should prompt caution: the water should not be tasted or assumed safe, and the relevant water-supply or public-health authority should be contacted.

Taste is influenced by dissolved minerals, gases and some organic or inorganic compounds, as well as by treatment and distribution conditions. Salty, bitter, metallic or otherwise unusual tastes

can indicate a change in water composition or acceptability. Taste is not an appropriate screening method for water of uncertain safety; it should only be evaluated when the sample is considered safe for sensory assessment under the relevant procedure.

Clarity describes the apparent transparency of water. Clear water is not necessarily microbiologically or chemically safe, and clarity should not be used as a stand-alone safety test. A reduction in clarity may be associated with an increase in particles or other changes requiring further investigation.

Physical characteristics: Temperature affects sensory properties and the solubility of gases and can influence some processes within a water-supply system. Temperature may also change during stagnation in pipes or storage. Measurements should be accompanied by the sampling location, time and relevant environmental conditions so that results can be interpreted and compared over time.

Turbidity results from particles that scatter light as it passes through water. It may increase because of soil particles, organic material, surface runoff, treatment-process problems or deposits disturbed within pipes. Turbidity is important for operational monitoring because particles can interfere with effective disinfection and may protect microorganisms from disinfectants. It should be measured with a suitable instrument and interpreted against the applicable standard or operational target.

Visible suspended matter, sediment and other particles should also be recorded. These observations can provide clues about source-water changes or problems in treatment and distribution. Nevertheless, no single physical indicator identifies all potential contaminants or determines whether water is safe to drink.

Discussion: Organoleptic and physical assessment is valuable because it can provide rapid, practical information about changes in water quality. Colour, odour and taste affect consumer acceptance, while turbidity and suspended particles can help indicate the performance of treatment processes or changes in the distribution network. An unexplained change should be treated as a signal for investigation rather than as proof of a particular contaminant or as a definitive measure of risk.

Turbidity deserves particular attention in water treatment because particles may reduce the effectiveness of disinfection. Effective treatment and appropriate microbiological monitoring are therefore important components of risk reduction. At the same time, some hazardous microorganisms and chemicals may be present without producing noticeable changes in colour, odour, taste or clarity. Sensory assessment must not replace laboratory analysis or a preventive, risk-based approach to managing the supply from source to consumer.

The reliability of an assessment depends on the quality of sampling and measurement. Incorrect containers, external contamination, unsuitable transport conditions, delays before analysis or uncalibrated instruments may distort results. Recording sampling conditions and using standardized methods make it easier to compare observations across locations and time periods. Where an abnormal result is found, repeat sampling and a broader sanitary investigation may be necessary before conclusions are drawn.

Preventive measures should include protecting water sources from sewage, household waste, fuel and other pollutants; maintaining sanitary protection zones; keeping wells and water-intake facilities in good condition; and ensuring that treatment and disinfection systems operate as intended. Water suppliers should monitor the distribution network and investigate unexpected changes in colour, odour or turbidity. Consumers who notice unusual characteristics should follow advice from the local water-supply or public-health authority rather than assume that the water is safe. Boiling may reduce some microbiological hazards, but it does not remove every chemical contaminant and should not be treated as a universal response to suspected pollution.

A limitation of this article is its narrative and methodological nature: it synthesizes general principles but does not present original water-quality measurements or a systematic quantitative review. Accordingly, no local prevalence estimates, measured values or causal associations are claimed. For practical use, findings must be interpreted according to current national sanitary requirements and the specific characteristics of the water supply under investigation.

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