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*भारतीय मानक मसौदा*

जल से जुड़े शब्दों का शब्दकोश

भाग 1 जल, मल और औद्योगिक बहिःस्राव

(*पहला पुनरीक्षण*)

*Draft Indian Standard*

# Glossary of Terms Relating to Water

Part 1 Water, sewage and industrial effluents

{*First Revision* of IS 7022 (Part 1)}

ICS 01.040.13; 13.060.01

| **Water Quality Sectional Committee, CHD 36** | **Last Date of Comment: 08.06.2024** |
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## FOREWORD

(*Formal clause to be added later*)

Realizing the rapid pace of industrialization within the country it was considered expedient to take up formulation of standards on definition and classification of sewage and industrial effluent. The concerned committee, while formulating standards on different aspects covered under its scope felt that formulation of a standard glossary of water relating to sewage and industrial effluent was necessary. Commonly used scientific terms may have a different import when specifically used in relation to different types of water. That such a need for standardization of terminology for avoiding ambiguity and confusion in the use of the terms is vitally called for has been amply borne out through experience gained in the formulation of Indian Standards relating to sewage and industrial effluents.

This standard was originally published in 1973. Due to the changes in the respective fields such as Industry, Science and Technology that have happened, it has become necessary to review and update the existing glossary of terms.

Consequently, this first revision has been prepared to keep all the definitions up to date with the latest definitions given in various publications such as International Standards, national regulations etc. as well as incorporating few additional terms and deleting some terms depending on their usage and meaning in the present context.

Should any difference exist between the definitions in this standard and those in the individual standards, the latter shall prevail.

The Technical Committee responsible for formulation of this standard has decided to publish IS 7022 in 3 different parts. This part covers terms widely used in relation to water, sewage and industrial effluents in the fields of analysis and tests; industrial and domestic applications of water; treatment of water, sewage and industrial waste; and disposal of sewage and industrial wastes after treatment. The other parts of IS 7022 are as following:

Part 2 Water supply and sewerages

Part 3 Marine Water and Related Methods

## 1 SCOPE

This standard (Part I) defines the terms widely used in relation to water, sewage and industrial effluents.

## 2 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

**A**

### 2.1 Absorbance

**2.1.1** The logarithm to the base 10 of reciprocal of the relative transmittance, *T*.

$$A = \log_{10}\frac{1}{T} = -\log_{10} T$$

**2.1.2** Absorbance thus expresses the excess absorption over that of a specified reference or standard. It is implied that compensation has been effected for reflectance losses, solvent absorption losses, and refractive effect, if present, and that attenuation by scattering, is small compared with attenuation by absorption.

### 2.2 Absorption

Penetration of a liquid or gas into the body of another substance without chemical reaction.

### 2.3 Accretion

Process of sediment accumulation.

### 2.4 Accuracy

Closeness of agreement between an observed value and an accepted reference value. Where an accepted reference value is not available, accuracy is a description of a measure of the degree of conformity of a value generated by a specific procedure to the assumed or accepted true value.

**2.5 Acid**

A compound which dissociates in an aqueous solution to furnish hydrogen ions.

**2.6 Acidity**

The quantitative capacity of aqueous media to react with hydroxyl ions.

**2.7 Acidity, Free Mineral**

The quantitative capacity of aqueous media to react with hydroxyl ions to *p*H 4.3.

**2.8 Acid Mine Drainage**

Acidic drainage from bituminous coal mines, containing a high concentration of acidic sulphates, especially ferrous.

**2.9 Actinomycetes**

A type of micro-organism related to both bacteria and fungi which causes earthly and musty odours in water.

**2.10 Activated Carbon**

The Carbon particles are usually obtained by carbonization of cellulosic material in the absence of air and possessing a high adsorptive capacity. Commonly used for the removal of colour, taste, or odour in water.

**2.11 Activated Sludge Process**

A biological sewage treatment process in which a mixture of sewage and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated sewage (mixed liquor) by sedimentation, and wasted or returned to the process as needed. The treated sewage overflows the weir of the settling tank in which separation from the sludge takes place.

**2.12 Activity Standard**

Standardizing solution whose value is reported in terms of ionic activity. If electrode is calibrated using activity standards, the activity of the free unbound ion in the sample is determined

**2.13 Adsorption**

Taking up of gases, liquids or dissolved substances on the surface of solids without forming a chemical bond.

**2.14 Advanced Treatment**

The application to a treated waste water stream of any physical-chemical process or combination of processes to increase the removal of pollutants and render the water more suitable for reuse purposes.

**2.15 Aeration**

Dissolution of air in a liquid by bringing about intimate contact between air and the liquid by one of the following methods: spraying the liquid in air; bubbling air through the liquid; or by agitation of the liquid by passing through a packed tower or by cascading with the aim of transferring from the liquid phase to the gaseous phase or vice versa (*see* **2.244**).

**2.16 Aeration, Diffused Air**

Aeration produced in a liquid by air passed through a diffuser.

**2.17 Aeration Mechanical**

**2.17.1** The mixing, by mechanical means, of sewage and activated sludge in the aeration tank of the activated sludge process, to bring fresh surfaces of liquid into connect with the atmosphere.

**2.17.2** The introduction of atmospheric oxygen into a liquid by the mechanical action of paddle or spray mechanisms.

**2.18 Aeration Period**

The theoretical time, usually expressed in hours, that the mixed liquor is subjected to in aeration tank undergoing activated sludge treatment.

**2.19 Aeration Surface**

The absorption of air through the surface of a liquid.

**2.20 Aerator**

A device that promotes aeration.

**2.21 Aerobic**

Thriving only in the presence of oxygen.

**2.22 Aerobic Bacteria**

Bacteria that require oxygen for growth.

**2.23 Aerosol**

Any solid or liquid particles, with a nominal size range from 10 nm to 100 µm suspended in gas (usually air).

**2.24 Agglomeration or Flocculation**

The coalescence of dispersed suspended matter into larger particles or floes which settle rapidly. Frequently used as synonym for flocculation.

**2.25 Aggregate**

Granular material such as sand, gravel or crushed stone.

**2.26 Albuminoid**

Protein and protein-like substances such as collagen and keratin.

**2.27 Algae**

Major group of lower plants, generally aquatic photosynthetic of extremely varied morphology and physiology, mono-cellular plants with chlorophyll often masked by a brown and red pigment. Primitive plants, uni-celled or multi-celled, are capable of synthesizing their foodstuffs by photosynthesis.

**2.28 Algaecide**

Any substances that are highly toxic to algae and are used primarily to control algal growth in impounded waters, lakes, ponds, reservoirs, stock tanks, and irrigation conveyance ecosystems.

**2.29 Alkali**

Certain soluble compounds, principally of sodium, potassium, magnesium and calcium which give rise to hydroxyl ions in solution.

**2.30 Alkalinity**

The quantitative capacity of aqueous media to react with hydrogen ions.

**2.31 Alkalinity, Bicarbonate**

The Alkalinity is caused by bicarbonate ions.

**2.32 Alkalinity, Carbonate**

The Alkalinity is caused by carbonate ions.

**2.33 Alkalinity, Caustic**

The alkalinity is caused by hydroxyl ions.

**2.34 Amphoteric**

Capable of acting as an acid or a base.

**2.35 Anaerobic**

Thriving in the absence of oxygen.

**2.36 Anaerobic Bacteria**

Bacteria that do not use oxygen. Oxygen is toxic to them.

**2.37 Analyte**

A possible sample component whose presence and concentration is of interest.

**2.38 Analyte Addition**

Variation of the known addition measurement technique in which the sample is added to a reagent containing the ion being measured. The electrode is placed in the reagent, and the sample concentration is calculated from the change in electrode potential after the addition of the sample.

**2.39 Analytical Column**

The ion exchange column is used to separate the ions of interest according to their retention characteristic prior to detection.

**2.40 Anion**

A negatively charged ion.

**2.41 Anion Exchange Chromatography**

Type of liquid chromatography in which anionic analytes are separated by differential retention on an anion exchange resin and detected by an appropriate detection mechanism.

**2.42 Anion-Exchange Material**

Ion-exchange material is capable of the reversible exchange of negatively charged ions.

**2.43 Anion-Exchange Membrane**

The membrane containing fixed cationic charges and mobile anions that can be exchanged with other anions present in an external fluid in contact with the membrane.

**2.44 Anode**

Positive electrode.

**2.45 Anti-scalant**

Compound added to water that inhibits the precipitation of sparingly soluble inorganic salts.

**2.46 Atomic Absorption**

Absorption of electromagnetic radiation by an atom resulting in the elevation of electrons from their ground states to excited states.

**2.47 Aquifer**

Water-bearing formation (bed or stratum) of permeable rock, sand or gravel capable of yielding significant quantities of water.

**2.48 Available Dilution —** *see* **2.145**.

**2.49 Available Oxygen —** *see* **2.245**.

**B**

**2.50 Back-Siphonage**

The flowing back of contaminated or polluted water from a plumbing fixture or cross-connection into a water supply line due to a lowering of pressure in the water line.

**2.51 Bacteria**

Primitive micro-organisms, generally free of pigment, which is reproduced by dividing into one, two, or three planes. They occur as single cells, groups, chains, or filaments. They may be grown by special culturing out of their native habitat.

**2.52 Bacteria, Aerobic**

Bacteria which thrive only in the presence of oxygen.

**2.53 Bacteria, Anaerobic**

Bacteria which thrive only in the absence of oxygen.

**2.54 Bacteria Bed**

A bed of sand, gravel, broken stone, or other media through or over which sewage or effluent flows or trickles, and depends on biological action for its effectiveness (*see* **2.173**).

**2.55 Bacteria, *Coli-aerogenes*** — *see* **2.56**.

**2.56 Bacteria, Coliform Group**

A group of bacteria, predominantly inhabitants of the intestine of man and other vertebrates but also found on vegetation, including all aerobic and facultative anaerobic Gram-negative, non-spore forming bacilli that ferment lactose with gas formation. Formerly referred to as *B. coli* and bacteria of *coli-aerogenes* group. Their presence is indicative of faecal pollution.

**2.57 Bacteria, Facultative**

Bacteria which can grow in the presence or absence of oxygen.

**2.58 Bacteria, Iron**

Bacteria which assimilate iron and excrete its compounds in their life processes, thereby contributing to corrosion.

**2.59 Bacteria, Non-pathogenic**

Bacteria which do not induce disease in man or the higher animals.

**2.60 Bacteria, Pathogenic**

Bacteria that produce disease.

**2.61 Bacteria Saprophytic**

Bacteria that thrive upon dead organic matter.

**2.62 Bacteria, Sulphate-Reducing**

Bacteria which assimilate oxygen from sulphate compounds thereby reducing them to sulphide.

**2.63 Bactericide**

An agent, physical or chemical, for the destruction of bacteria.

**2.64 Bacteriophage**

A viral agent that dissolves specific bacterial cells.

**2.65 Base Exchange Softener —** *see* **2.331**.

**2.66 *B. Coil* —** *see* **2.56**.

**2.67 Benthic Region**

The bottom of a body of water. This region supports the benthos, a type of life that not only lives upon but contributes to the character of the bottom.

**2.68 Benthos**

Aquatic bottom dwelling, organisms. These include (a) sessile animals, such as sponges, barnacles, mussels, oysters, some of the worms, and many attached algae; (b) creeping forms, such as insects, snails, and certain clams; and (c) burrowing forms which include most clams and worms.

**2.69 Berkefeld Filter —** *see* **2.166**.

**2.70 Beta Energy, Maximum**

The maximum energy of the beta-particle energy spectrum produced during beta decay of a given radioactive species.

NOTE — Since a given beta-particle emitter may decay to several different quantum states of the product nucleus, more than one maximum energy may be listed for a given species.

**2.71 Bioassay**

A determination of the concentration of a given material by comparison with a standard preparation; or the determination of the quantity necessary to affect a test animal under stated laboratory conditions.

**2.72 Biochemical**

Resulting from biological growth of activity, and measured by or expressed in terms of the ensuing chemical change.

**2.73 Biochemical Oxygen Demand (BOD)**

The quantity of oxygen required for the oxidation of organic matter by bacterial action in the presence of oxygen. It is a measure of the strength of organic matter in terms of its ability to deplete oxygen in water. Generally, the standard test consists of measuring the oxygen depletion at 20 °C for 5 days.

**2.74 Biochemical Process —** *see* **2.76**.

**2.75 Biocides**

Substances that kill all living organisms.

**2.76 Biological Process**

The process by which the life activities of bacteria and other micro-organisms in search for food, break down complex organic materials into simple, more stable substances. Self-purification of sewage, polluted streams, sludge digestion, and so-called secondary sewage treatments result from this process. Also called the ‘biochemical process’.

**2.77 Biological Tests**

Examination for the purpose of determining the presence, identity, numbers, or effects of the presence of any organism in industrial water.

**2.78 Biodegradable plastic**

The plastic material should not leave behind any microplastics, or visible, distinguishable, or toxic residue, which has adverse environmental impacts.

**2.79 Biomass**

Any material that is or was a living organism or excreted from a micro-organism.

**2.80 Bioremediation**

Biological degradation treatment of waste sludge and soils to break down organics and hydrocarbons.

**2.81 Bleed-Off**

**2.81.1** To drain a liquid or gas, or to bleed accumulated air from a water line, or to drain a tap or a container of accumulated water.

**2.81.2** The exuding, percolation, or seeping of a liquid through a surface.

**2.82 Bloom, Lake**

Large masses of microscopic and macroscopic plant life, such as green algae, occurring in bodies of water.

**2.83 Blowdown**

Draining off a portion of the contents of a boiler with a view to reduce the concentration of total solids in the boiler.

**2.84 Boiler Water**

Water is present in a boiler when steaming is, or has been taking place (*see* **2.202**).

**2.85 Breakpoint Chlorination**

The point at which the water chlorine demand is satisfied and any further chlorine is chlorine, residual.

**2.86 Broad Irrigation —** *see* **2.211**.

**2.87 Buffer**

A substance that tends to resist changes in the *p*H of a solution.

**2.88 Buffer Action**

The action of certain substances in resisting a change in hydrogen ion concentration.

**C**

**2.89 Carbon, Activated –** *see* **2.10**.

**2.90 Carbonate Hardness**

The hardness in water is caused by bicarbonates and carbonates of calcium and magnesium.

**2.91 Carrier**

A person who, though showing no clinical signs of a disease, carries (and disseminates) large quantities of pathogenic organisms.

**2.92 Carry Over**

Entrainment of liquid or solid particles from the boiling liquid in the evolved vapour; also the particles so entrained.

**2.93 Cascade**

**2.93.1** A stretch of stream, intermediate between a rapids and a waterfall, where the drop in elevation of the stream bed is considerable but not sufficient to cause the water to fall vertically.

**2.93.2** A sudden drop installed in a water way to produce agitation and aeration of the liquid flowing over.

**2.94 Cation**

A positively charged ion.

**2.95 Cation Exchange Material**

An ion-exchange material is capable of reversible exchange of positively charged ions.

**2.96 Caustic Embrittlement** — *see* **2.157**.

**2.97 Cesspool**

An underground impervious pit into which raw household sewage or other untreated liquid waste is discharged for temporary storage and from solution to form closed ring soluble complexes.

**2.98 Chelating Agent**

Chemical compounds which have the property of withdrawing ions from solution to form closed ring soluble complexes.

**2.99 Chemical Oxygen Demand (COD)**

The amount of oxygen, expressed in mg per litre (mg/l), consumed under specified conditions in the oxidation of the organic and oxidizable inorganic matter contained in an industrial waste water, corrected for the influence of chlorides.

**2.100 Chlorination**

The application of chlorine to water, sewage, or industrial wastes, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

**2.101 Chlorination, Break-Point**

The application of chlorine to water, sewage, or industrial wastes containing free ammonia to the point at which free residual chlorine is a minimum.

**2.102 Chlorine, Combined Available Residual**

That portion of the total residual chlorine remaining in water, sewage, or industrial wastes at the end of a specified contact period, which will react chemically and biologically as chloramines or organic chloramines.

**2.103 Chlorine Demand**

The difference between the amount of chlorine added to water, sewage, or industrial wastes and the amount of residual chlorine remaining at the end of a specified contact period. The demand for any given water varies with the amount of chlorine applied, time of contact, and temperature.

**2.104 Chlorine, Free Available Residual**

That portion of the total residual chlorine remaining in water, sewage, or industrial wastes at the end of a specified contact period, which will react chemically and biologically as a hypochlorous acid or hypochlorite ion.

**2.105 Chlorine Requirement —** *see* **2.106**.

**2.106 Chlorine, Residual**

The total amount of chlorine (combined and free available chlorine) remaining in water, sewage or industrial wastes at the end of a specified contact period following chlorination.

**2.107 Clarifier**

A tank or basin in which water, sewage, or other ‘liquids containing settleable solids, is retained for a sufficient time, and in which the velocity of Bow is sufficiently low, to remove by gravity a part of the suspended matter. Circular sedimentation tanks are also known as clarifiers.

**2.108 Clean River —** *see* **2.289**.

**2.109 Coagulant**

A material that removes colloidal substances present in water, sewage, etc., in the form of a precipitate comprising floc particles more or less gelatinous in character.

**2.110 Coagulation**

**2.110.1** The process of converting colloidal or finely divided suspended matter into particles of such size as can be settled reasonably rapidly by the addition of an appropriate chemical coagulation, by biological processes, or by other means.

**2.110.2** The process of adding a coagulant and necessary other reacting chemicals.

**2.111 Colloids**

Finely divided solids (particle size varying from $10^{-8}$ to $10^{-7}$) which will not settle but may be removed by coagulation or biochemical action.

**2.112 Composting**

The biological breakdown of organic solids to stabilize them, producing a humic substance valuable as a fertilizer base.

**2.113 Condensate**

Water is obtained by evaporation and subsequent condensation of steam; usually water of high purity, unmixed with any other water.

**2.114 Condenser**

An apparatus for removing heat from a vapour (steam) so as to cause it to revert to the liquid state (water).

**2.115 Conditioning**

Treatment of water exclusive of disinfection to produce a water free of taste, odours, and other undesirable qualities. The term is more specially used for the treatment of boiler feed water.

**2.116 Contact Period**

The time allowed for a sterilizing agent to act on the water under treatment before the water is fed to supply. Occasionally the term is also used for any other reaction period.

**2.117 Contamination**

A general term signifying the introduction into the water of micro-organisms, chemicals, wastes, or sewage, which renders the water unfit for its intended use.

**2.118 Cooling Coil**

A coil of pipe or tubing contains a flowing stream of hot liquid which is cooled by heat transfer to a cold liquid outside.

**2.119 Cooling Water**

Water is used for cooling, mainly for steam condensers or internal combustion engines.

**2.120 Corrosion**

Chemical attack, as of metals, by which the metal is converted to a compound and thus deteriorated.

**2.121 Counter Background**

In the measurement of radioactivity, the counting rate resulting from factors other than the radioactivity of the sample and reagents used.

NOTE

Counter background varies with the location, and shielding of the detector and the electronics: it includes cosmic rays, contaminating radioactivity, and electrical noise.

### 2.122 Counter Beta-Particle Efficiency

In the measurement of radioactivity, that fraction of beta particles emitted by a source which is detected by the counter.

### 2.123 Counter Efficiency

In the measurement of radioactivity, that fraction of the disintegrations occurring in a source which is detected by the counter.

### 2.124 Counter, Proportional

An instrument whose response to radiation is based upon the collection of the ions formed by the interaction of the radiation with the counter materials, plus a proportionate number of secondary ions formed by gas amplification.

### 2.125 Count, Standard Plate

The number of colonies of bacteria grown on selected solid media at a given temperature and incubation period is usually expressed as the number of bacteria per millilitre of sample.

### 2.126 Critical Concentration Range

In bioassay, the interval between the highest concentration at which all test animals survive for 48 h and the lowest concentration at which all test animals die within 24 h.

### 2.127 Crustacean

Mostly, aquatic animals have rigid outer coverings, jointed appendages, and gills. Examples are crayfish, crabs, barnacles, water fleas, and sow bugs.

### 2.128 Culture

Any organic life which has been intentionally developed by use of suitable food and environment.

### 2.129 Culture Medium

A nutrient medium for the growth of organic life for study.

### 2.130 Curie

A unit of radioactivity is equivalent to $3.700 \times 10^{10}$ atomic disintegrations per second or $2.220 \times 10^{12}$ atomic disintegrations per minute. A microcurie is one millionth of a curie ($10^{-6}$ curie); a picocuric, one-millionth of a microcurie ($10^{-12}$ curie).

## D

### 2.131 Deaeration

The process of removing air from a liquid in which it is dissolved, usually for control of corrosion.

### 2.132 Dechlorination

The partial or complete removal of residual chlorine from water by any chemical or physical process.

**2.133 Deferrization**

The removal, usually with the aid of aeration, of iron from water.

**2.134 Defluoridation**

Removal of fluorides from water.

**2.135 Demineralization**

Reduction of the content of ionic species and dissolved inorganic substances in water by a physical, chemical, or biological process.

Or

The complete removal of anions and cations from water, usually by the use of ion-exchange materials.

**2.136 Deoxygenation**

The partial or complete removal of dissolved oxygen from water, either under natural conditions or deliberately by physical or chemical processes.

Or

The depletion of the dissolved oxygen in a liquid. Under natural conditions, associated with the biochemical oxidation of organic matter present.

**2.137 Dephenolation**

The removal of phenols from gas liquor and other similar waste waters.

**2.138 Desalination**

A means of obtaining potable water from sea water, employed mainly in arid parts of the world and by some ships.

**2.139 Detention Period**

The theoretical time required to displace the contents of a tank or unit at a given rate of discharge (volume divided by rate of discharge).

**2.140 Detritus**

The heavier solid matter in sewage is usually mainly inorganic.

**2.141 Diatom**

Microscopic unicellular or colonial algae constituting the class Bacillarieae and having silicified cell walls. They are of great importance in self-purification of natural waters and as food for ‘many other forms of aquatic life.

**2.142 Diffuser**

A porous or perforated plate or tube through which air is forced and divided into minute bubbles for diffusion in liquids. Commonly made of carborundum, alundum, silica sand, PVC, or nylon.

**2.143 Digestion**

The anaerobic decomposition of organic matter, resulting in partial gasification, liquefaction, and mineralization.

**2.144 Dilution**

**2.144.1** An operation of disposing of sewage, industrial waste, or sewage treatment plant effluent by discharging it into a stream or body of water.

**2.144.2** The ratio of the volume of flow of a receiving stream to the total volume of sewage or sewage treatment plant effluent or industrial effluent discharged into it.

**2.145 Dilution Factor**

The ratio, usually expressed in percentage, of the quantity of untreated sewage or partly or completely treated effluent, to the average quantity of diluting water available effectively at the point of disposal or at any point under consideration. The factor is sometimes taken as the reciprocal. Also called 'available dilution'.

**2.146 Discharge**

**2.146.1** As applied to a stream, the rate of flow, or volume of water flowing at a given place and within a given period of time.

**2.146.2** The act involved in water or other liquid passing through an opening or along a conduit or channel.

**2.146.3** The water or other liquid that emerges from an opening or passes along a conduit or channel.

**2.147 Disease, Water-Borne**

A disease caused by organisms or toxic substances which are carried and thus propagated by water. The most common water-borne diseases are hepatitis, typhoid, cholera, dysentery, and other such intestinal disturbances.

**2.148 Disinfection**

The killing of the larger portion (but not necessarily all) of the harmful and objectionable micro-organisms in, or on, a medium by means of chemicals, heat, etc.

**2.149 Dissolved Matter**

That matter, exclusive of gases, which is dispersed in water to give a single phase of homogeneous liquid.

**2.150 Dissolved Oxygen —** *see* **2.248**.

**2.151 Dissolved Solids —** *see* **2.333**.

**2.152 Domestic Use of Water —** *see* **2.376**.

**E**

**2.153 *E. coli* —** *see* **2.160**.

**2.154 Effluent**

**2.154.1** A liquid that flows out of a containing space.

**2.154.2** Sewage, water, or other liquid, partially or completely treated, or in its natural state, as the case may be, flowing out of a reservoir, basin, or treatment plant or part thereof.

**2.155 Electrical Conductivity**

The reciprocal of the resistance in ohms measured between, opposite faces of a centimetre cube ($cm^3$) of an aqueous solution at a specified temperature.

NOTE

The electrical conductivity shall be expressed in micromhos per centimetre at t °C. The actual resistance (*R*) of the cell is measured in ohms. The conductance, *1/R* is directly proportional to the cross-sectional area (*A*), inversely proportional to the length of the path (*L*), and directly proportional to the constant (*K*). The latter is the conductivity measured between opposite faces of a centimetre cube.

Mathematically,

$$\frac{1}{R} = \frac{KA}{L}, or\ K = \frac{L}{AR} = \frac{cm}{cm^2 \times ohms} = mhos\ per\ cm$$

The numerical value of this expression multiplied by 1 000 000 is the electrical conductivity in micromhos per centimeter.

### 2.156 Elutriation of Sludge

A process of washing of sludge with water either mechanically or with diffused air.

### 2.157 Embrittlement Cracking

A form of metal failure that occurs in steam boilers at riveted joints and at tube ends, the cracking being predominately inter-crystalline.

NOTE

This form of cracking, which has been known as 'Caustic embrittlement' is believed to result from the action of certain constituents of concerned boiler water upon steel under stress.

### 2.158 Entrainment

The carrying over of drops of liquid from an evaporator or boiler due to the vapour velocity being greater than the rate of settling of the drops.

### 2.159 Equalizing Basin

A holding basin in which, by retention, variation in flow and composition of a liquid are averaged out.

### 2.160 *Escherichia coli (E. coli)*

A species of genus Escherichia bacteria, a normal inhabitant of the intestine of man and all vertebrates. This species is classified among the coliform group (*see* **2.56**).

### 2.161 Estuary

Commonly, an arm of the sea is at the lower end of a river. Estuaries are often enclosed by land except at channel entrance points.

### 2.162 Eutrophication

The enrichment of water in streams by substances contained in effluents or in the run-off from agricultural land, especially phosphorus and nitrogen compounds. It can greatly accelerate the growth of plants and other life, causing depletion of oxygen and danger to fish.

## F

### 2.163 Filamentous

Having the shape of a fine thread-like body or structure.

**2.164 Film, Microbial**

The gelatinous film of zoological growths covering the media or spanning the interstices of a biological bed.

**2.165 Filter**

A device or structure for removing solids from water, sewage, or other liquids. The liquid is passed through a filtering medium which may consist of a granular material such as sand, infusorial or diatomaceous earth, anthracite, etc. finely woven cloth, unglazed porcelain, or even specially prepared paper.

**2.166 Filter, Berkefeld**

A household apparatus for filtering water through a diatomaceous earth called kieselguhr.

**2.167 Filter Medium**

The material with which a filter is filled, for example, sand, paper, cloth, etc.

**2.168 Filter, Percolating —** *see* **2.173**.

**2.169 Filter, Rapid Sand**

A filter made up of sand, gravel, anthracite, etc., through which water is passed during treatment. It may be either of the gravity type open to the atmosphere or of the pressure type. Unlike a slow sand filter, it is capable of being back washed. The solids are removed mainly by mechanical action which may be assisted by a chemical floe.

**2.170 Filter Run**

The period of working of a sand filter between two successive cleaning or washing operations.

**2.171 Filter, Sedgewick-Rafter**

A cylindrical funnel is used as a filter for the concentration of organisms in the Sedgewick-Rafter method for the quantitative determination of microscopic organisms, that is, of a size larger than bacteria, in water.

**2.172 Filter, Slow Sand**

A filter in which water is passed slowly downwards, through a layer of fine sand or other suitable material, and in which mechanical removal of solids is assisted by biological action. The filter is cleaned by skimming a thin layer from the upper surface.

**2.173 Filter, Trickling**

A filter consisting of an artificial bed of coarse materials, such as broken stone, clinkers, slate, or other materials, over which the effluent is distributed and applied in drops, films, or spray, from troughs, drippers, moving distributors, or fixed nozzles, and through which it trickles to the underdrains, giving opportunity for the formation of biological films, which clarify and oxidize the effluent. These are also sometimes called percolating filters.

**2.174 Filtration**

The process of passing a liquid through a filtering medium (which may consist of granular material such as sand, magnetite, or diatomaceous earth, finely woven cloth, unglazed

porcelain, or specially prepared paper) for the removal of suspended or colloidal matter usually of a type that cannot be removed by sedimentation.

**2.175 Fixed Matter**

Residues remaining after ignition of particulate or dissolved matter or both.

**2.176 Floc**

Small gelatinous masses are formed in a liquid by the addition of coagulants or through biochemical processes, or by aggregation of microscopic and ultramicroscopic particles.

**2.177 Flocculation**

A process, mechanical or chemical, or both, by which small particles of solids in a liquid are aggregated into larger masses, thus making it easier for the removal of solids by sedimentation.

**2.178 Flotation**

The process of raising of suspended solids to the surface of a tank by use of air, gas evolution, bacterial decomposition, heat, or chemicals.

**2.179 Fluorescence**

The absorption of radiation at one wavelength, or range of wavelengths, and its re-emission as radiation of longer, visible wavelengths.

**2.180 Fluoridation**

The addition of suitable fluorides to public water supplies, usually for the prevention of dental caries.

**G**

**2.181 Gas, Sewage**

The gas is produced during the digestion of sewage sludge. Also called sludge digestion gas.

**2.182 Grease**

It includes fats, waxes, free fatty acids, calcium and magnesium soaps, mineral oils, and other non-fatty materials. The type of solvents used for its extraction should be stated.

**2.183 Grit**

Inorganic solids in sewage or effluents.

**2.184 Grit Chamber**

Basin in which grit is removed from the sewage or effluents.

**2.185 Grit Channel**

A channel through which grit-bearing effluent or sewage is allowed to flow to remove the grit.

**2.186 Ground Water —** *see* **2.391**.

**H**

**2.187 Half Life**

The period of time in which one half of the radioactive atoms of a given radionuclide decay; an unvarying characteristic of a radionuclide.

**2.188 Hardness**

That property of water is due mainly to the bicarbonates, chlorides, and sulphates of calcium and magnesium, which prevents the production of abundant lather with soap.

NOTE

Originally hardness was understood to be the capacity of water for precipitating soap. Soap is precipitated chiefly by calcium and magnesium ions commonly present in industrial water but may also be precipitated by ions of other polyvalent metals such as ions manganese and aluminium, and by hydrogen ions. It is commonly expressed in terms of the equivalent amount of calcium carbonate.

**2.189 Hardness, Carbonate —** *see* **2.90**.

**2.190 Hardness, Non-carbonate —** *See* **2.235**.

**2.191 Hardness, Total**

The sum of carbonate hardness and non-carbonate hardness.

**2.192 Humus**

A well stabilized sludge obtained in a sewage and waste water treatment plant similar in appearance to the dark or black carboniferous residue in the soil resulting from the decomposition of vegetable tissues of plants originally growing therein. The term is also applied to the sludge from secondary settling tanks in a trickling filter plant.

**2.193 Humus Tank —** *see* **2.354**.

**2.194 Hydrogen Cycle**

The operation of the cation exchange cycle wherein the removal of specified cations from the influent water is accomplished by exchange with an equivalent amount of hydrogen ion from the exchange material.

**I**

**2.195 Imhoff Tank —** *see* **2.355**.

**2.196 Incubation**

Maintenance of viable organisms in the nutrient medium at constant temperature for controlled growth or reproduction.

**2.197 Index, Pollutional**

A criterion by which the degree of pollution in a stream, as indicated by bacteria count, plankton, biochemical oxygen demand, or quantity of dissolved oxygen, may be measured.

**2.198 Index, Sludge Volume (SVI)**

The volume in millimetres occupied by rerated mixed liquor containing one gram of dry solids after settling for 30 min, is commonly referred to as the Mohlman index.

**2.199 Indicator**

The substance that gives a visible change; usually of colour, at a desired point in a chemical reaction.

**2.200 Industrial Use of Water —** *see* **2.377**.

**2.201 Industrial Waste Water**

Water is discharged from an industrial process as a result of formation or utilization in that process.

NOTE

Industrial waste water may have been utilized directly or indirectly, such as cooling water. Industrial waste water may be discharged into other processes, recovery systems, natural streams, or other receiving bodies.

**2.202 Industrial Water**

Water (including its impurities) is used directly or indirectly in industrial processes.

**2.203 Influent**

Sewage, water, or other liquid, raw or partly treated, flowing into a reservoir, basin, or treatment plant, or part thereof.

**2.204 Inhibitory Toxicity**

Any direct inhibitory action of pollutants on the rate of reproduction of diatoms that is demonstrable within 7 days or less of testing.

**2.205 Inoculate**

To introduce a small amount of substance into a solution for observation of its effect such as organic growth or crystal formation.

**2.206 Insecticide**

An agent, chemical or otherwise, for the control or destruction of insects, mainly used in agricultural operations.

**2.207 Ion**

An atom or radical in solution carrying an integral electrical charge either positive (cation) or negative (anion).

**2.208 Ion-Exchange**

A process by which certain ions of given charges may be absorbed from the solution and replaced into the solution by other ions of similar charge from the absorbent.

**2.209 Ion-Exchange Material**

An insoluble solid that has the ability to exchange reversibly certain ions in its structure, or attached to its surface as functional groups, with ions in a surrounding medium.

**2.210 Irrigation**

The artificial application of water to land for agricultural purposes. The application of sewage is termed ‘broad irrigation’.

**2.211 Irrigation, Broad**

The irrigation of crops with sewage. It differs from sewage farming in that sewage disposal is the primary object of broad irrigation, with the raising of crops being incidental, while the reverse is true of sewage farming.

**2.212 Irrigation Water** — *see* **2.392**.

**2.213 Jackson Candle Turbidity**

An empirical measure of turbidity in a special apparatus, based on the measurement of the depth of a column of water sample is just sufficient to extinguish the image of a burning standard candle observed vertically through the sample.

**L**

**2.214 Lagoon**

A large shallow pond for the treatment of liquid wastes; frequently it does not have a water-tight bottom.

**2.215 Lagoon, Sludge**

A relatively shallow basin or a natural depression, is used for the storage or digestion of sludge, and sometimes for its ultimate detention or dewatering.

**2.216 Langelier's Index**

An expression to indicate the hydrogen-ion concentration that a water should have, to be in equilibrium with its content of calcium carbonate.

**2.217 Liquor, Mixed**

A mixture of activated sludge and sewage in the aeration tank.

**2.218 Loading, BOD** — *see* **2.219**.

**2.219 Loading, Trickling, Filter**

**2.219.1** *Organic*

The kilograms of BOD on any other parameter for organic matter in the applied liquor per $m^3$ of filter bed volume per day.

**2.219.2** *Hydraulic*

The volume in $m^3$ of waste per hectare of filter bed per day.

**M**

**2.220 Median Inhibitory Limit ($IL_m$)**

The concentration of test material which decreases the amount of growth to 50 percent of that in the control within a test period of 7 days. It is the recommended measure or index of relative toxicity. Specifically, it is a concentration value derived by graphical interpolation and is based on the amount of growth made in 7 days in the test flasks as compared with that made in a control.

**2.221 Median Lethal Dose ($LD_{50}$)**

The minimum amount of the test material is lethal to 50 percent of a group of test organisms for a specified period.

**2.222 Median Tolerance Limit ($TL_m$)**

The concentration of the test material in a suitable diluent (experimental water) at which just 50 percent of the test animals are able to survive for a specified period of exposure.

**2.223 Metabolism**

The process by which food is used and wastes are formed in living matter.

**2.224 Microbial Film** — *see* **2.164**.

**2.225 Microbiological**

Pertaining to very small living matter and its processes.

**2.226 Micro-organism**

Minute organisms, either plant or animal, are invisible or barely visible to the naked eye.

**2.227 Microscopic**

Minute, very small; pertaining to a microscope.

**2.228 Mixed Bed**

A physical mixture of anion exchange material and cation exchange material.

**2.229 Mixed Liquor** — *see* **2.217**.

**2.230 Most Probable Number (MPN)**

In the testing of bacterial density by the dilution method, that number of organisms per unit volume which, in accordance with statistical theory, would be more likely than any other possible number to yield the observed test result or which would yield the observed test result with the greatest frequency. Expressed as the density of organisms per 100 ml.

**2.231 Moulds**

Filamentous fungi are composed of many cells.

**2.232 Municipal Use of Water** — *see* **2.378**.

**N**

**2.233 Nephelometry**

Measurement of the turbidity in liquids by the scattering of light.

**2.234 Nitrogen, Organic**

Nitrogen is combined with organic molecules such as proteins, amines, and amino acids.

**2.235 Non-carbonate Hardness**

Hardness in water caused by chlorides, sulphates, and nitrates of calcium and magnesium,

**O**

**2.236 Odour Intensity Index**

The number of times the concentration of the original sample is halved by addition of odour-free water to obtain the least definitely perceptible odour.

**2.237 Odour, Threshold Number**

The greatest dilution of the sample with odour-free water to yield the least definitely perceptible odour.

**2.238 Oily Matter**

Hydrocarbons, hydrocarbon derivatives, and all liquid or unctuous substances that have boiling points of 90 °C or above and are extractable from water at *p*H 5.0 or lower, using benzene as a solvent.

**2.239 Organisms, Microscopic**

Plants or animals microscopic in size or slightly larger, which do not require special culture and are easily studied with a microscope.

**2.240 Outfall**

The point or location where sewage or drainage discharges from a sewer, drain, or conduit.

**2.241 Oxidation Pond**

A pond, natural or artificial, into which partly treated sewage is discharged and in which natural purification processes take place under the influence of sunlight and air.

**2.242 Oxidation Process**

Any method of sewage or industrial effluent treatment for the oxidation of the putrescible organic matter; the usual methods are biological filtration and the activated sludge process.

**2.243 Oxygen Absorbed**

The quantity of oxygen taken up from potassium permanganate in solution by a liquid containing organic matter. Commonly regarded as an index of the organic matter. Time and temperature must be specified.

**2.244 Oxygenation**

Dissolution of oxygen in a liquid by bringing about intimate contact between the liquid and oxygen gas (*see* **2.15**).

**2.245 Oxygen, Available**

The quantity of atmospheric oxygen dissolved in the water of a stream. It is the quantity of dissolved oxygen available for the oxidation of organic matter in sewage.

**2.246 Oxygen Deficiency**

The additional quantity of oxygen required to satisfy the biochemical oxygen demand in a given liquid is usually expressed in mg/l.

**2.247 Oxygen Demand**

Oxygen is required for oxidation of inorganic matter, or for stabilization of decomposable organic matter by aerobic bacterial action.

**2.248 Oxygen, Dissolved (DO)**

The oxygen dissolved in sewage, water, or other liquid is usually expressed in mg/l or percent of saturation.

**2.249 Oxygen, Residual**

The dissolved oxygen content of a stream after deoxygenation has begun.

**2.250 Oxygen Saturation Capacity**

The maximum quantity of dissolved oxygen that a liquid exposed to the atmosphere can contain at a given temperature and pressure.

**2.251 Particulate Matter**

That matter, exclusive of gases, existing in the non-liquid state, which is dispersed in water to give a heterogeneous mixture.

**2.252 Part Per Million (ppm)**

A measure of proportion by weight and equivalent to a unit weight of solute per million unit weights of solution.

NOTE

A part per million is generally considered equivalent to a milligram per litre, but this is not precise. A part per million is equivalent to a milligram of solute per kilogram of solution.

**2.253 Pathogenic** — Causing disease.

**2.254 Pathogens**

Pathogenic or disease-producing organisms.

**2.256 *p*H**

The *pH* value of an aqueous solution is the logarithm of the reciprocal of the hydrogen ion concentration (expressed in g/l) of the solution.

**2.257 Phenolic Compounds**

Hydroxybenzene and its derivatives.

**2.258 Pitting**

Localized corrosion

**2.259 Plankton**

Plant or animal micro-organisms, discrete, and free-floating, having relatively small power of locomotion, or which drift in the water by wind or wave-action (*see* **2.239**).

**2.260 Polishing**

An advanced stage of treatment is used where a specially high quality of effluent is necessary.

**2.261 Polluted Water —** *see* **2.394**.

**2.262 Pollution**

Alteration of the physical, chemical, or biological properties of water, or discharge of any sewage or industrial waste or of any liquid, gaseous, or solid substances into water as may, or is likely to, create nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to animal life and health.

**2.263 Pollutional Load**

An expression of the quantity of the pollutants present in a waste water discharged into a receiving water, is commonly expressed on the basis of BOD.

**2.264 Population Equivalent**

The calculated population is expressed on the basis of BOD which would contribute the same amount of pollutants per day as the waste.

**2.265 Post-Chlorination**

The application of chlorine to water, sewage, or industrial wastes subsequent to any treatment, including pre-chlorination. The term refers only to a point of application.

**2.266 Potable Water —** *see* **2.395**.

**2.267 Pre-aeration**

A preparatory treatment of water or sewage comprising aeration to remove gases, add oxygen, or promote flotation of grease, and aid coagulation.

**2.268 Pre-chlorination**

**2.268.1** Chlorination of water prior to filtration.

**2.268.2** Chlorination of sewage prior to treatment.

**2.269 Pre-treatment**

**2.269.1** Any treatment of waste water before it is introduced into a waste water system or before primary treatment.

**2.269.2** In water treatment, any treatment is given before filtration.

**2.270 Primary Treatment —** *see* **2.363.**

**2.271 Priming**

**2.271.1** A carryover of water with a sudden generation of steam, like the bumping which sometimes occurs when water is boiled in an open vessel.

**2.271.2** The action of starting the flow in a pump or siphon by first filling it with water.

**2.272 Protozoa**

Microscopic, one-celled animals.

**Q**

**2.273 Quality Water** — *see* **2.396**.

**R**

**2.274 Radioactivity**

Spontaneous nuclear disintegration with emission of particulate or electromagnetic radiations.

**2.275 Re-aeration**

The absorption of oxygen by a liquid the dissolved content of which has been depleted.

**2.276 Reagent Background**

In the measurement of radioactivity of water samples, the counting rate is observed when a sample is replaced by mock sample salts or by reagent chemicals used for chemical separations.

NOTE

Reagent background varies with the reagent chemicals and analytical methods used and may vary with reagents from different manufacturers and from different processing lots.

**2.277 Re-carbonation**

The treatment of water softened by means of excess lime, with carbon dioxide or sodium bicarbonate to re-dissolve the excess lime and to prevent the water from having plumbo-solvency.

**2.278 Recirculation**

The return of effluent to the incoming flow to:

**2.278.1** Reduce its strength,

**2.278.2** Provide acclimatized seed,

**2.278.3** Freshen the incoming waste water,

**2.278.4** Maintain a high rate of loading, and

**2.278.5** Maintain the required hydraulic loading.

**2.279 Regeneration**

That part of the operating cycle of an ion-exchange process in which a specific chemical solution is passed through the ion-exchange bed to prepare it for a service run.

**2.280 Relative Density (Specific Gravity)**

The ratio of the weight in air of a given volume of the sample to the weight in air of an equal volume of reagent water, both being determined at the standard reference temperature.

**2.281 Reservoir, Impounded**

A reservoir wherein surface water is retained for a considerable period of time, ranging from several months upward, and released for use at a time when the ordinary flow of the stream is insufficient to satisfy requirements.

**2.282 Residual Oxygen —** *see* **2.249**.

**2.283 Respiration**

Exchange of gases between an organism and its environment resulting from the oxidation of substrate with the release of energy

NOTE

It may be accomplished either aerobically or anaerobically.

**2.284 Reverse osmosis**

Flow of water through a membrane from a more concentrated to a less concentrated solution, as a result of applying pressure to the more concentrated solution in excess of the normal osmotic pressure.

**2.285 Ridge and Furrow Tank**

Aeration tank for activated sludge in which the bottom of the tank is a series of ridges and furrows.

**2.286 Riparian**

Of, pertaining to, or situated, or dwelling on the bank of a river or other body of water.

**2.287 Riparian Rights**

The legal right which assures to the owner of land abutting upon a stream or other natural body of water the use of such water. It allows each riparian owner to require the waters of a stream to reach his land undiminished in quantity and unaffected in quality except for minor domestic uses. In general, it allows each riparian owner to make a reasonable use of the water upon his riparian land, the extent of such use being governed by the reasonable needs and requirements of other riparian owners and the quantity of water available.

**2.288 River**

A larger stream of water which serves as the natural drainage channel for a drainage basin of a considerable area. The term is a comparative one as to size; a stream termed ‘river’ in the arid section of the country would hardly be designated a ‘creek’ in the humid section.

**2.289 River, Clean**

A river that gives no sensible evidence of pollution and from which wholesome drinking water can be obtained by practicable methods of water purification.

**2.290 Rotifers**

Minutes, many-celled aquatic animals, free or attached, which are characterized by rotating movement of the head.

**S**

**2.291 Salinity**

The amount of salts (especially sodium chloride) in a water.

**2.292 Saprophytic Organism**

Any organism living on dead or decaying matter.

**2.293 Scale**

A deposit formed from solution directly in place upon a confining surface.

NOTE

Scale is a deposit that will usually retain its physical shape when mechanical means are used to remove it from the surface on which it is deposited. Scale, which may or may not adhere to the underlying surface, is usually crystalline and dense, frequently laminated, and occasionally columnar in structure.

**2.294 Sale, Boiler**

An incrustation varying from a porous, friable crust to a dense very hard coating deposited on boiler heating surfaces due to precipitation of minerals out of solution from the water used.

**2.295 Scintillation**

The production of light photons by the interaction of radiation with a suitable material.

**2.296 Screen**

A device with openings, generally of uniform size, used to retain or remove suspended or floating solids in flowing water or sewage and to prevent them from entering an intake or passing a given point in a conduit. The screening element may consist of parallel bars, rods, wires, grating, wire mesh, or perforated plate, and the openings may be of any shape, although they are generally circular or rectangular. The device may also be used to segregate granular material, such as sand, crushed rock, and soil into various sizes.

**2.297 Scum**

The lighter solids that float to the top of water or sewage

**2.298 Secondary Treatment —** *see* **2.364**.

**2.299 Sedgewick-Rafter Filter —** *see* **2.171**.

**2.300 Sediment**

**2.300.1** Any material carried in suspension by water, which will ultimately settle to the bottom after the water loses velocity.

**2.300.2** Fine water-borne matter deposited or accumulated in the bed

**2.301 Sedimentation**

Gravitational settling of solid particles in a liquid system.

**2.302 Seeding, Sludge**

The inoculation of undigested sewage solids with sludge that has undergone decomposition, for the purpose of introducing favourable organisms, thereby accelerating the initial stage of digestion.

**2.303 Seepage Pit**

A covered pits designed to permit liquid wastes to seep into the surrounding soil.

**2.304 Self-Absorption**

The absorption of radiation particles or photons in the source itself

**2.305 Self-Purification**

The natural processes of purification of pollution in a moving or still body of water whereby the bacterial content is reduced, the BOD is largely satisfied, the organic content is stabilized, and the dissolved oxygen is returned to normal.

**2.306 Septicization**

A term applied to anaerobic decomposition whereby intensive growths of bacteria with the enzymes secreted by them liquefy and gasify solid organic matter.

**2.307 Septic Tank** — *see* **2.356**.

**2.308 Sequester**

To form a stable, water-soluble complex

**2.309 Settling Basin**

The reservoir receives water after chemical mixing to permit the settling of the floe.

**2.310 Sewage**

Largely the water supply of a community after it has been fouled by various uses. From the standpoint of source, it may be a combination of the liquid or water-carried wastes from residences, business buildings, and institutions, together with those from industrial establishments, and with such groundwater, surface water, storm, and water as may be present.

**2.311 Sewage Farming**

The raising of crops where sewage is applied to the land for irrigation and fertilization purposes.

**2.312 Sewage Gas —** *see* **2.181**.

**2.313 Sewer**

A pipe or conduit, generally closed, but normally not flowing full, for carrying sewage and other waste liquids.

**2.314 Sewerage**

A system of sewers constructed to convey sewage.

**2.315 Sewer, Public**

A common sewer controlled by public authority.

**2.316 Shock Load**

A sudden load or change in waste concentration which produces an adverse effect on the micro-organisms in the treatment unit.

**2.317 Skimming**

The removal of scum from the surface of a body of liquid.

**2.318 Slick**

A film of oil on a water surface or in the case of sewage discharged to the sea, the area of discoloration visible on the surface

**2.319 Slimes**

Substances of gelatinous nature, frequently derived from microbiological growth, found on the inner surface of a conduit, on a filter medium or elsewhere.

**2.320 Sludge**

A water-formed sedimentary deposit, usually in a very wet condition. It may include all suspended solids carried by the water. Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to remove it from the surface on which it deposits, but it may be baked in place and be hard and adherent.

**2.321 Sludge, Activated**

Mass of micro-organisms, flocculated and easily settleable, metabolizing organic material in a waste in activated sludge aeration tank. This is obtained in settling tanks after aeration and returned to the aeration tanks for maintaining adequate concentration of micro-organisms.

**2.322 Sludge Bed**

An area comprising natural or artificial layers of porous material upon which digested sewage or effluent sludge is dried by drainage and evaporation. A sludge bed may be open to the atmosphere or covered, usually with a greenhouse-type superstructure. Also called ‘sludge drying bed’

**2.323 Sludge Blanket**

A horizontal layer of solids is hydro-dynamically suspended within an enclosed body of water.

**2.324 Sludge Dewatering**

The process of removing a part of the water in sludge by any method, such as draining, evaporation, pressing, centrifuging, exhausting, passing between rollers, or acid flotation, with or without heat. It involves reducing from a liquid to a spadable condition rather than merely changing the density of the liquid (concentration) on the one hand or drying (as in a kiln) on the other.

**2.325 Sludge Volume Index —** *see* **2.198**.

**2.326 Sludge Drying Bed —** *see* **2.322**.

**2.327 Sludge Lagoon —** *see* **2.215**.

**2.328 Sludge Ripening**

The completion of the sludge digestion process.

**2.329 Sludge Thickener**

A type of sedimentation tanks in which the sludge is permitted to settle, usually equipped with scrapers travelling along the bottom of the tank which push the settled sludge to a sump, from which it is removed by gravity or by pumping.

**2.330 Sodium Cycle**

The operation of a cation exchange cycle wherein the removal of specified cations from the influent water is accomplished by exchange with an equivalent amount of sodium ion from the exchange material.

**2.331 Softener, Base Exchange**

Water softener using an ion-exchange material.

**2.332 Softening, Water**

The process of removing from water certain mineral substances causing hardness.

**2.333 Solids, Dissolved**

Solids that are present in solution

**2.334 Solids, Fixed**

Solids that remain after ignition.

**2.335 Solids, Settleable**

Suspended solids that can be removed by sedimentation.

**2.336 Solids, Suspended**

**2.336.1** The quantity of material deposited when a quantity of water, sewage, or other liquid is filtered through an asbestos mat in a Gooch crucible.

**2.336.2** Solids that either float on the surface of, or are in suspension in water, sewage, or other liquids; and which are largely removable by laboratory filtering.

**2.337 Solids, Total**

The solids in water, sewage, or other liquids; it included the suspended solids (largely removable by filter paper) and the unfilterable solids (those which pass through filter paper).

**2.338 Solids, Volatile**

The quantity of solids in water, sewage, or other liquid, lost on ignition of the total solids.

**2.339 Specific Gravity —** *see* **2.280**.

**2.340 Spores**

These are bodies produced within the cells of a considerable number of bacterial species under adverse environmental conditions. They are more resistant to heat, cold, osmosis, and chemicals than the vegetative cells producing them.

**2.341 Spray Ponds**

Ponds or basins in which cooling water is pumped and sprayed through nozzles, thereby reducing the temperature of the water by evaporation.

**2.342 Stabilization**

The aerobic treatment of decomposable organic matter.

**2.343 Standard Plate Count** — *see* **2.125**.

**2.344 Staphylococci**

A genus of sphere-shaped, pus-forming bacteria.

**2.345 Sterile**

Free from any viable organism, either active or dormant.

**2.346 Sterilization**

The destruction of all living organisms, ordinarily through the agency of heat or of some chemical.

**2.347 Stream**

A body of flowing water. The term is usually applied to a body of water flowing in a natural surface channel, but is also applied to a body of water flowing in a well-defined, open or closed conduit, a jet of water issuing from any opening, such as a nozzle, a fissure in rock, etc.

**2.348 Sullage**

Any liquid household or community waste not containing animal or human excreta.

**2.349 Super-chlorination**

The application of chlorine to water to provide free residual chlorine in which the residual is usually so large as to require de-chlorination.

**2.350 Surface Water —** *see* **2.397**.

**2.351 Suspended Matter**

**2.351.1** Solids in suspension in sewage or effluent.

**2.351.2** Commonly used for solids in suspension in sewage or effluent which can readily be removed by filtering in a laboratory.

**2.352 Suspended Solids —** *see* **2.336**.

**T**

**2.353 Tank Detritus**

A tank or channel used in the primary treatment of sewage as a means of removing grit which otherwise might cause damage to machinery.

**2.354 Tank, Humus**

A Sedimentation tank following biological treatment of wage for collecting humus sludge.

**2.355 Tank, Imhoff**

A deep two-storeyed sewage tank originally patented by Karl Imhoff, consisting of an upper or continuous flow sedimentation chamber and a lower or sludge-digestion chamber. The floor of the upper chamber slopes steeply to trapped slots, through which solids may slide into the lower chamber. The lower chamber receives no fresh sewage directly but is provided with gas vents and with means for drawing digested sludge from near the bottom

**2.356 Tank, Septic**

A single storey settling tank in which the settled sludge is in immediate contact with the sewage flowing through the tank, while the organic solids are decomposed by anaerobic bacterial action.

**2.357 Tertiary Treatment —** *see* **2.365**.

**2.358 Total Matter**

The sum of the particulate matter and dissolved matter.

**2.359 Total Solids —** *see* **2.337**.

**2.360 Toxicity, Acute**

Any direct lethal action of pollution to fresh-water fish that is demonstrable within 96 h or less, following prescribed methods of test.

NOTE

The lethal action includes both internal and external effect, but excludes indirect action such as depletion of dissolved oxygen through chemical or biochemical oxidation of the test material.

**2.361 Transmittance**

The ratio of radiant power transmitted by the sample to the radiant power incident on the sample.

NOTE

In practice, the sample is often a liquid or a gas contained in an absorption cell. In this case, the transmittance is the ratio of the radiant power transmitted by the sample in its cell to the radiant power transmitted by some clearly specified reference material in its cell, when both are measured under the same instrument conditions such as spectral position and slit width. In the case of solids not contained in a cell, the radiant power transmitted by the sample is also measured in the presence of that transmitted by a clearly specified reference material. This ratio is called relative transmittance ($T$).

**2.362 Treatment, Advanced —** *see* **2.14.**

**2.363 Treatment, Primary**

A waste water treatment process employed to remove a substantial portion of gross settleable or floatable solids and the accompanying biochemical oxygen demand, utilising sedimentation and/or flotation with suitable mechanical devices

**2.364 Treatment, Secondary**

The treatment of sewage or industrial effluent by biological methods after primary treatment.

**2.365 Treatment, Tertiary**

Any waste water treatment process used after secondary treatment that employs physical, chemical or biological methods to further purify effluents of the secondary treatment for possible reuse.

**2.366 Trickling Filter —** *see* **2.173**.

**2.367 Tubercle**

Nodule formed in the process of corrosion in pipelines.

**2.368 Tuberculation**

The formation of tubercles.

**2.369 Turbidity**

Reduction of transparency of a sample due to the presence of particulate matter.

**2.370 Turbidity, Absolute**

The fractional decrease of incident monochromatic light through the sample, integrating both scattered and transmitted light.

NOTE

For a small amount of scattering experienced in essentially colourless solutions, absolute turbidity of a 1 cm layer corresponds to the extinction coefficient in the equation expressing Lambert's law.

### 2.371 Turbulent Flow

Flow in which the streamlines do not remain parallel to the axis of flow.

### 2.372 Turnover

Rapid breakdown of stratification in a body of fresh water (such as a lake or reservoir) by natural forces, often induced by winds.

### 2.373 Type A evaluation of uncertainty

Evaluation of a component of measurement uncertainty by a statistical analysis of measured quantity values obtained under defined measurement conditions

NOTE

For various types of measurement conditions, see repeatability condition of measurement, intermediate precision condition of measurement and reproducibility condition of measurement

### 2.374 Type B evaluation of uncertainty

Evaluation of a component of measurement uncertainty determined by means other than a type a evaluation of measurement uncertainty

### 2.375 Two Stage Purification

The purification of sewage is in two stages, for example first by activated sludge for aeration and second, by nitrification biological filters.

**U**

### 2.376 Use of Water, Domestic

The use of water primarily for household purposes, the watering of livestock, the irrigation of gardens, lawns, shrubbery, etc., surrounding a house or domicile.

### 2.377 Use of Water, Industrial

The use of water primarily in connection with industrial operations.

### 2.378 Use of Water, Municipal

The various uses to which water is put in developed urban areas, including domestic use, industrial use, street sprinkling, fire protection, etc. The term is an inclusive one, applied where the uses are varied.

**V**

### 2.379 Velocity, Self-Cleansing

The velocity at which the flow in a pipe is sufficiently rapid to prevent the deposition of solid matter.

### 2.380 Virus

A term generally used to denote a living organism that passes through filters that strain out bacteria physically, and which is invisible by ordinary microscopic methods.

### 2.381 Volatile Matter

That matter is changed under conditions of the test from a solid or a liquid state to a gaseous state.

**2.382 Volatile Solids —** *see* **2.338**.

**W**

**2.383 Wastes, Industrial**

The liquid wastes from industrial processes as distinct from domestic or sanitary sewage.

**2.384 Water**

A chemical compound consisting of two parts of hydrogen and one part of oxygen. It may have other solid, gaseous, or liquid materials in solution or suspension.

**2.385 Water, Boiler Feed**

Water is forced into a boiler to take the place of that which is evaporated in the generation of steam.

**2.386 Water Borne Disease —** *see* **2.147**.

**2.387 Water, Brackish**

Water with a salty taste due to a high concentration of dissolved salts.

**2.388 Watercourse**

A channel in which a flow of water occurs either continuously or intermittently and if the latter, with some degree of regularity. Such flow must be in a definite direction. Watercourses may be either natural or artificial.

**2.389 Water Formed Deposits**

Any accumulation of insoluble materials derived from water or formed by the reaction of water upon surfaces in contact with water.

NOTE — Deposits formed from or by water in all its phases may be further classified as scale, sludge, corrosion products, or biological deposits. The overall composition of a deposit or some part of a deposit may be determined by chemical or spectrographic analysis; the constituents actually present as chemical substances may be identified by microscopic or biological methods.

**2.390 Water, Fresh**

A water low in dissolved salts.

**2.391 Water, Ground**

Water in the ground beneath the surface. In a strict sense, the term applies only to water below the water table but in the general sense it covers water derived from wells and springs.

**2.392 Water, Irrigation**

Water which is artificially applied in the process of irrigation. It does not include precipitation.

**2.393 Water, Make-up**

Water added to the boiler feed system to make up for losses.

**2.394 Water, Polluted**

Water that contains sewage, industrial waste, or other harmful or objectionable substances.

**2.395 Water, Potable**

Water which does not contain objectionable pollution, contamination, minerals, or infection, and is considered satisfactory for domestic consumption.

**2.396 Water Quality**

A term used to describe the chemical, physical, and biological characteristics of water in respect of its suitability for a particular purpose. The same water may be of good quality for one purpose or use, and bad for another depending upon its characteristics and the requirements for the particular use.

**2.397 Water, Surface**

Water that flows over or rests upon the surface of the lithosphere. It may occur in either liquid or solid state.

**2.398 Water Treatment**

Any process which renders a raw water fit for a particular use.

**2.399 Water, Waste**

**2.399.1** In a legal sense, water that is actually wasted or not needed by the party wasting the water, or that which, after it has served the purpose for which it was utilized, has been permitted to run to waste or to escape; or which, from unavoidable causes, escapes from ditches, canals, or other conduits, or from reservoirs of the lawful owners of such structures.

**2.399.2** Water that contains contaminating waste products.

**Z**

**2.400 Zoogloea**

A jelly-like matrix developed by bacteria. The word is usually associated with activated sludge growth in biological beds.