

SCHEDULE 4

METHODS OF ANALYSIS

PART B

Chemical and indicator parameters

1.—(1) Subject to paragraph 3, for a parameter in Table 1, the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the parametric value for the parameter with—

- (a) a limit of quantification of 30 % or less of the parametric value; and
- (b) an uncertainty of measurement as specified in Table 1.

(2) The result of the analysis for a parameter in Table B or Table C must be expressed using at least the same number of significant figures as the parametric value for the parameter in the table.

2. The uncertainty of measurement specified in Table 1 must not be used as an additional tolerance to the parametric values.

3. Until 31st December 2019, the enforcing authority may, for a parameter in Table 2, use the corresponding ‘trueness’, ‘precision’ and ‘limit of detection’ in that table as an alternative set of performance characteristics (instead of using the limit of quantification and the uncertainty of measurement referred to in paragraph 1(1)).

TABLE 1

Minimum performance characteristic: uncertainty of measurement

<i>Parameter</i>	<i>Uncertainty of measurement</i> <i>(% of parametric value, except pH) (Note 1)</i>	<i>Notes(1)</i>
Aluminium	25	
Ammonium	40	
Antimony	40	
Arsenic	30	
Benzo(a)pyrene	50	Note 5
Benzene	40	
Boron	25	
Bromate	40	
Cadmium	25	
Chloride	15	
Chromium	30	
Conductivity	20	

(1) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

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<i>Parameter</i>	<i>Uncertainty of measurement</i> <i>(% of parametric value, except pH) (Note 1)</i>	<i>Notes(1)</i>
Copper	25	
Cyanide	30	Note 6
1,2-dichloroethane	40	
Fluoride	20	
Hydrogen ion concentration (in pH)	0.2	Note 7
Iron	30	
Lead	25	
Manganese	30	
Mercury	30	
Nickel	25	
Nitrate	15	
Nitrite	20	
Oxidisability	50	Note 8
Pesticides	30	Note 9
Polycyclic aromatic hydrocarbons	30	Note 10
Selenium	40	
Sodium	15	
Sulphate	15	
Tetrachloroethene	30	Note 11
Trichloroethene	40	Note 11
Trihalomethanes: total	40	Note 10
Total organic carbon	30	Note 12
Turbidity	30	Note 13

(1) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

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TABLE 2**Minimum performance characteristics: trueness, precision and limit of detection**

<i>Parameter</i>	<i>Trueness</i> <i>(% of parametric value, except for pH) (Note 2)</i>	<i>Precision</i> <i>(% of parametric value, except for pH) (Note 3)</i>	<i>Limit of detection</i> <i>(% of parametric value, except for pH) (Note 4)</i>	<i>Notes(2)</i>
Aluminium	10	10	10	
Ammonium	10	10	10	
Antimony	25	25	25	
Arsenic	10	10	10	
Benzo(a)pyrene	25	25	25	
Benzene	25	25	25	
Boron	10	10	10	
Bromate	25	25	25	
Cadmium	10	10	10	
Chloride	10	10	10	
Chromium	10	10	10	
Conductivity	10	10	10	
Copper	10	10	10	
Cyanide	10	10	10	Note 6
1,2-dichloroethane	25	25	10	
Fluoride	10	10	10	
Hydrogen ion concentration (in pH)	0.2	0.2		Note 7
Iron	10	10	10	
Lead	10	10	10	
Manganese	10	10	10	
Mercury	20	10	20	
Nickel	10	10	10	
Nitrate	10	10	10	
Nitrite	10	10	10	
Oxidisability	25	25	25	Note 8

(2) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

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<i>Parameter</i>	<i>Trueness</i> <i>(% of parametric value, except for pH) (Note 2)</i>	<i>Precision</i> <i>(% of parametric value, except for pH) (Note 3)</i>	<i>Limit of detection</i> <i>(% of parametric value, except for pH) (Note 4)</i>	<i>Notes(2)</i>
Pesticides	25	25	25	Note 9
Polycyclic aromatic hydrocarbons	25	25	25	Note 10
Selenium	10	10	10	
Sodium	10	10	10	
Sulphate	10	10	10	
Tetrachloroethene	25	25	10	Note 11
Trichloroethene	25	25	10	Note 11
Trihalomethanes: total	25	25	10	Note 10
Turbidity	25	25	25	

Notes to Table 1 and Table 2

Note 1: Uncertainty of measurement is a non-negative parameter characterising the dispersion of the quantity values being attributed to a measurand, based on the information used. The performance criterion for measurement uncertainty ($k = 2$) is the percentage of the parametric value stated in the table or better. Measurement uncertainty must be estimated at the level of the parametric value, unless otherwise specified.

Note 2: Trueness is a measure of systematic error, i.e. the difference between the mean value of the large number of repeated measurements and the true value. Further specifications are those set out in international standard ISO 5725 entitled “*Accuracy (trueness and precision) of measurement methods and results*”(3).

Note 3: Precision is a measure of random error and is usually expressed as the standard deviation (within and between batches) of the spread of results from the mean. Acceptable precision is twice the relative standard deviation. This term is further specified in international standard ISO 5725 entitled partly “*Accuracy (trueness and precision) of measurement methods and results*”.

Note 4: Limit of detection is either three times the standard deviation within a batch of a natural sample containing a low concentration of the parameter, or five times the standard deviation of a blank sample (within a batch).

Note 5: If the value of uncertainty of measurement cannot be met, the best available technique should be selected (up to 60 %).

Note 6: The method determines total cyanide in all forms.

Note 7: Values for trueness, precision and uncertainty of measurement are expressed in pH units.

(2) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

(3) This standard has been approved by the International Organization for Standardization (ISO). Under reference BS ISO 5725-1 to BS ISO 5725-6, these are published as UK standards by the British Standards Institution.

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Note 8: Reference method European standard EN ISO 8467:1995 entitled “*Water quality - Determination of permanganate index (ISO 8467:1993)*”(4).

Note 9: The performance characteristics for individual pesticides are given as an indication. Values for the uncertainty of measurement as low as 30 % can be achieved for several pesticides, higher values up to 80 % may be allowed for a number of pesticides.

Note 10: The performance characteristics apply to individual substances, specified at 25 % of the parametric value in Table B.

Note 11: The performance characteristics apply to individual substances, specified at 50 % of the parametric value in Table B.

Note 12: The uncertainty of measurement should be estimated at the level of 3 mg/l of the total organic carbon in accordance with European standard EN 1484:1997 entitled “*Water analysis - Guidelines for the determination of total organic carbon and dissolved organic carbon*”(5).

Note 13: The uncertainty of measurement must be estimated at the level of 1.0 nephelometric turbidity units in accordance with European standard EN ISO 7027-1:2016 entitled “*Water quality - Determination of turbidity - Part 1: Quantitative methods (ISO 7027-1:2016)*”(6).

(4) This standard was approved by the European Committee for Standardization (CEN) on 3rd November 1994. Under reference EN ISO 8467:1995, it is published as a UK standard by the British Standards Institution (ISBN 0 580 23435 5).

(5) This standard was approved by the European Committee for Standardization (CEN) on 6th April 1997. Under reference BS EN 1484:1997, it is published as a UK standard by the British Standards Institution (ISBN 0 580 28372 0).

(6) This standard was approved by the European Committee for Standardization (CEN) on 15th April 2016. Under reference BS EN ISO 7027-1:2016, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 81961 2).