

**Zinc chloride.** 1096600. [7646-85-7].

01/2008:40102

See *Zinc chloride* (0110).

**Zinc chloride-formic acid solution.** 1096601.

Dissolve 20 g of *zinc chloride R* in 80 g of an 850 g/l solution of *anhydrous formic acid R*.

**Zinc chloride solution, iodinated.** 1096602.

Dissolve 20 g of *zinc chloride R* and 6.5 g of *potassium iodide R* in 10.5 ml of *water R*. Add 0.5 g of *iodine R* and shake for 15 min. Filter if necessary.

*Storage:* protected from light.

**Zinc iodide and starch solution.** 1096502.

To a solution of 2 g of *zinc chloride R* in 10 ml of *water R* add 0.4 g of *soluble starch R* and heat until the starch has dissolved. After cooling to room temperature add 1.0 ml of a colourless solution containing 0.10 g *zinc R* as filings and 0.2 g of *iodine R* in *water R*. Dilute the solution to 100 ml with *water R* and filter.

*Storage:* protected from light.

*Test for sensitivity.* Dilute 0.05 ml of *sodium nitrite solution R* to 50 ml with *water R*. To 5 ml of this solution add 0.1 ml of *dilute sulphuric acid R* and 0.05 ml of the zinc iodide and starch solution and mix. The solution becomes blue.

**Zinc oxide.** 1096700. [1314-13-2].

See *Zinc oxide* (0252).

**Zinc powder.** Zn. (*A*, 65.4). 1096800. [7440-66-6].

*Content:* minimum 90.0 per cent of Zn (*A*, 65.4).

A very fine, grey powder, soluble in *dilute hydrochloric acid R*.

**Zinc sulphate.** 1097000. [7446-20-0].

See *Zinc sulphate* (0111).

**Zirconyl chloride.** A basic salt corresponding approximately to the formula  $\text{ZrCl}_2\text{O} \cdot 8\text{H}_2\text{O}$ . 1097100. [15461-27-5].

*Content:* minimum 96.0 per cent of  $\text{ZrCl}_2\text{O} \cdot 8\text{H}_2\text{O}$ .

White or almost white, crystalline powder or crystals, freely soluble in water and in alcohol.

*Assay.* Dissolve 0.600 g in a mixture of 5 ml of *nitric acid R* and 50 ml of *water R*. Add 50.0 ml of 0.1 M *silver nitrate* and 3 ml of *dibutyl phthalate R* and shake. Using 2 ml of *ferric ammonium sulphate solution R2* as indicator, titrate with 0.1 M *ammonium thiocyanate* until a reddish-yellow colour is obtained.

1 ml of 0.1 M *silver nitrate* is equivalent to 16.11 mg of  $\text{ZrCl}_2\text{O} \cdot 8\text{H}_2\text{O}$ .

**Zirconyl nitrate.** A basic salt corresponding approximately to the formula  $\text{ZrO}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$ . 1097200. [14985-18-3].

A white or almost white powder or crystals, hygroscopic, soluble in water. The aqueous solution is a clear or at most slightly opalescent liquid.

*Storage:* in an airtight container.

**Zirconyl nitrate solution.** 1097201.

A 1 g/l solution in a mixture of 40 ml of *water R* and 60 ml of *hydrochloric acid R*.

## 4.1.2. STANDARD SOLUTIONS FOR LIMIT TESTS

**Acetaldehyde standard solution (100 ppm  $\text{C}_2\text{H}_4\text{O}$ ).** 5000100.

Dissolve 1.0 g of *acetaldehyde R* in *2-propanol R* and dilute to 100.0 ml with the same solvent. Dilute 5.0 ml of the solution to 500.0 ml with *2-propanol R*. Prepare immediately before use.

**Acetaldehyde standard solution (100 ppm  $\text{C}_2\text{H}_4\text{O}$ ) R1.** 5000101.

Dissolve 1.0 g of *acetaldehyde R* in *water R* and dilute to 100.0 ml with the same solvent. Dilute 5.0 ml of the solution to 500.0 ml with *water R*. Prepare immediately before use.

**Aluminium standard solution (200 ppm Al).** 5000200.

Dissolve in *water R* a quantity of *aluminium potassium sulphate R* equivalent to 0.352 g of  $\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ . Add 10 ml of *dilute sulphuric acid R* and dilute to 100.0 ml with *water R*.

**Aluminium standard solution (100 ppm Al).** 5000203.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing 8.947 g of *aluminium chloride R* in 1000.0 ml of *water R*.

**Aluminium standard solution (10 ppm Al).** 5000201.

Immediately before use, dilute with *water R* to 100 times its volume in a solution containing *aluminium nitrate R* equivalent to 1.39 g of  $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  in 100.0 ml.

**Aluminium standard solution (2 ppm Al).** 5000202.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *aluminium potassium sulphate R* equivalent to 0.352 g of  $\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$  and 10 ml of *dilute sulphuric acid R* in 100.0 ml.

**Ammonium standard solution (100 ppm  $\text{NH}_4$ ).** 5000300.

Immediately before use, dilute to 25 ml with *water R* 10 ml of a solution containing *ammonium chloride R* equivalent to 0.741 g of  $\text{NH}_4\text{Cl}$  in 1000 ml.

**Ammonium standard solution (2.5 ppm  $\text{NH}_4$ ).** 5000301.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *ammonium chloride R* equivalent to 0.741 g of  $\text{NH}_4\text{Cl}$  in 1000.0 ml.

**Ammonium standard solution (1 ppm  $\text{NH}_4$ ).** 5000302.

Immediately before use, dilute *ammonium standard solution* (2.5 ppm  $\text{NH}_4$ ) *R* to 2.5 times its volume with *water R*.

**Antimony standard solution (100 ppm Sb).** 5000401.

Dissolve *antimony potassium tartrate R* equivalent to 0.274 g of  $\text{C}_4\text{H}_4\text{KO}_7\text{Sb} \cdot \frac{1}{2}\text{H}_2\text{O}$  in 500 ml of 1M *hydrochloric acid* and dilute the clear solution to 1000 ml with *water R*.

**Antimony standard solution (1 ppm Sb).** 5000400.

Dissolve *antimony potassium tartrate R* equivalent to 0.274 g of  $\text{C}_4\text{H}_4\text{KO}_7\text{Sb} \cdot \frac{1}{2}\text{H}_2\text{O}$  in 20 ml of *hydrochloric acid R1* and dilute the clear solution to 100.0 ml with *water R*. To 10.0 ml of this solution add 200 ml of *hydrochloric acid R1* and dilute to 1000.0 ml with *water R*. To 100.0 ml of this solution add 300 ml of *hydrochloric acid R1* and dilute to 1000.0 ml with *water R*. Prepare the dilute solutions immediately before use.

**Arsenic standard solution (10 ppm As). 5000500.**

Immediately before use, dilute with *water R* to 100 times its volume a solution prepared by dissolving *arsenious trioxide R* equivalent to 0.330 g of  $\text{As}_2\text{O}_3$  in 5 ml of *dilute sodium hydroxide solution R* and diluting to 250.0 ml with *water R*.

**Arsenic standard solution (1 ppm As). 5000501.**

Immediately before use, dilute *arsenic standard solution (10 ppm As) R* to 10 times its volume with *water R*.

**Arsenic standard solution (0.1 ppm As). 5000502.**

Immediately before use, dilute *arsenic standard solution (1 ppm As) R* to 10 times its volume with *water R*.

**Barium standard solution (0.1 per cent Ba). 5000601.**

Dissolve *barium chloride R* equivalent to 0.178 g of  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  in *distilled water R* and dilute to 100.0 ml with the same solvent.

**Barium standard solution (50 ppm Ba). 5000600.**

Immediately before use, dilute with *distilled water R* to 20 times its volume a solution in *distilled water R* containing *barium chloride R* equivalent to 0.178 g of  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  in 100.0 ml.

**Barium standard solution (2 ppm Ba). 5005600.**

Immediately before use, dilute *barium standard solution (50 ppm Ba) R* to 25 times its volume with *distilled water R*.

**Bismuth standard solution (100 ppm Bi). 5005300.**

Dissolve *bismuth R* equivalent to 0.500 g of Bi in 50 ml of *nitric acid R* and dilute to 500.0 ml with *water R*. Dilute the solution to 10 times its volume with *dilute nitric acid R* immediately before use.

**Cadmium standard solution (0.1 per cent Cd). 5000700.**

Dissolve *cadmium R* equivalent to 0.100 g of Cd in the smallest necessary amount of a mixture of equal volumes of *hydrochloric acid R* and *water R* and dilute to 100.0 ml with a 1 per cent V/V solution of *hydrochloric acid R*.

**Cadmium standard solution (10 ppm Cd) . 5000701.**

Immediately before use, dilute *cadmium standard solution (0.1 per cent Cd) R* to 100 times its volume with a 1 per cent V/V solution of *hydrochloric acid R*.

**Calcium standard solution (400 ppm Ca). 5000800.**

Immediately before use, dilute with *distilled water R* to 10 times its volume a solution in *distilled water R* containing *calcium carbonate R* equivalent to 1.000 g of  $\text{CaCO}_3$  and 23 ml of 1 M *hydrochloric acid* in 100.0 ml.

**Calcium standard solution (100 ppm Ca). 5000801.**

Immediately before use, dilute with *distilled water R* to 10 times its volume a solution in *distilled water R* containing *calcium carbonate R* equivalent to 0.624 g of  $\text{CaCO}_3$  and 3 ml of *acetic acid R* in 250.0 ml.

**Calcium standard solution (100 ppm Ca) R1. 5000804.**

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *anhydrous calcium chloride R* equivalent to 2.769 g of  $\text{CaCl}_2$  in 1000.0 ml of *dilute hydrochloric acid R*.

**Calcium standard solution (100 ppm Ca), alcoholic. 5000802.**

Immediately before use, dilute with *alcohol R* to 10 times its volume a solution in *distilled water R* containing *calcium carbonate R* equivalent to 2.50 g of  $\text{CaCO}_3$  and 12 ml of *acetic acid R* in 1000.0 ml.

**Calcium standard solution (10 ppm Ca). 5000803.**

Immediately before use, dilute with *distilled water R* to 100 times its volume a solution in *distilled water R* containing *calcium carbonate R* equivalent to 0.624 g of  $\text{CaCO}_3$  and 3 ml of *acetic acid R* in 250.0 ml.

**Chloride standard solution (50 ppm Cl). 5004100.**

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *sodium chloride R* equivalent to 0.824 g of NaCl in 1000.0 ml.

**Chloride standard solution (8 ppm Cl). 5000900.**

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *sodium chloride R* equivalent to 1.32 g of NaCl in 1000.0 ml.

**Chloride standard solution (5 ppm Cl). 5000901.**

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *sodium chloride R* equivalent to 0.824 g of NaCl in 1000.0 ml.

**Chromium liposoluble standard solution (1000 ppm Cr). 5004600.**

A chromium (metal) organic compound in an oil.

**Chromium standard solution (0.1 per cent Cr). 5001002.**

Dissolve *potassium dichromate R* equivalent to 2.83 g of  $\text{K}_2\text{Cr}_2\text{O}_7$  in *water R* and dilute to 1000.0 ml with the same solvent.

**Chromium standard solution (100 ppm Cr). 5001000.**

Dissolve *potassium dichromate R* equivalent to 0.283 g of  $\text{K}_2\text{Cr}_2\text{O}_7$  in *water R* and dilute to 1000.0 ml with the same solvent.

**Chromium standard solution (0.1 ppm Cr). 5001001.**

Immediately before use, dilute *chromium standard solution (100 ppm Cr) R* to 1000 times its volume with *water R*.

**Cobalt standard solution (100 ppm Co). 5004300.**

Dissolve *cobalt nitrate R* equivalent to 0.494 g of  $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$  in 500 ml of 1M *nitric acid* and dilute the clear solution to 1000 ml with *water R*.

**Copper liposoluble standard solution (1000 ppm Cu). 5004700.**

A copper (metal) organic compound in an oil.

**Copper standard solution (0.1 per cent Cu). 5001100.**

Dissolve *copper sulphate R* equivalent to 0.393 g of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in *water R* and dilute to 100.0 ml with the same solvent.

**Copper standard solution (10 ppm Cu). 5001101.**

Immediately before use, dilute *copper standard solution (0.1 per cent Cu) R* to 100 times its volume with *water R*.

**Copper standard solution (0.1 ppm Cu). 5001102.**

Immediately before use, dilute *copper standard solution (10 ppm Cu) R* to 100 times its volume with *water R*.

**Ferrocyanide standard solution (100 ppm Fe(CN)<sub>6</sub>).** 5001200.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *potassium ferrocyanide R* equivalent to 0.20 g of K<sub>4</sub>Fe(CN)<sub>6</sub>·3H<sub>2</sub>O in 100.0 ml.

**Ferricyanide standard solution (50 ppm Fe(CN)<sub>6</sub>).** 5001300.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *potassium ferricyanide R* equivalent to 0.78 g of K<sub>3</sub>Fe(CN)<sub>6</sub> in 100.0 ml.

**Fluoride standard solution (10 ppm F).** 5001400.

Dissolve in *water R* *sodium fluoride R* previously dried at 300 °C for 12 h, equivalent to 0.442 g of NaF, and dilute to 1000.0 ml with the same solvent (1 ml = 0.2 mg F). Store in a polyethylene container. Immediately before use, dilute the solution to 20 times its volume with *water R*.

**Fluoride standard solution (1 ppm F).** 5001401.

Immediately before use, dilute *fluoride standard solution (10 ppm F) R* to 10 times its volume with *water R*.

**Formaldehyde standard solution (5 ppm CH<sub>2</sub>O).** 5001500.

Immediately before use, dilute with *water R* to 200 times its volume a solution containing 1.0 g of CH<sub>2</sub>O per litre prepared from *formaldehyde solution R*.

**Germanium standard solution (100 ppm Ge).** 5004400.

Dissolve *ammonium hexafluorogermanate (IV) R* equivalent to 0.307 g of (NH<sub>4</sub>)<sub>2</sub>GeF<sub>6</sub> in a 0.01 per cent V/V solution of *hydrofluoric acid R*. Dilute the clear solution to 1000 ml with *water R*.

**Glyoxal standard solution (20 ppm C<sub>2</sub>H<sub>2</sub>O<sub>2</sub>).** 5003700.

In a 100 ml graduated flask weigh a quantity of *glyoxal solution R* corresponding to 0.200 g of C<sub>2</sub>H<sub>2</sub>O<sub>2</sub> and make up to volume with *ethanol R*. Immediately before use dilute the solution to 100 times its volume with the same solvent.

**Glyoxal standard solution (2 ppm C<sub>2</sub>H<sub>2</sub>O<sub>2</sub>).** 5003701.

Immediately before use, dilute *glyoxal standard solution (20 ppm C<sub>2</sub>H<sub>2</sub>O<sub>2</sub>) R* to 10 times its volume with *ethanol R*.

**Hydrogen peroxide standard solution (10 ppm H<sub>2</sub>O<sub>2</sub>).** 5005200.

Dilute 10.0 ml of *dilute hydrogen peroxide solution R* to 300.0 ml with *water R*. Dilute 10.0 ml of this solution to 1000.0 ml with *water R*. Prepare immediately before use.

**Iodide standard solution (10 ppm I).** 5003800.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *potassium iodide R* equivalent to 0.131 g of KI in 100.0 ml.

**Iron standard solution (0.1 per cent Fe).** 5001605.

Dissolve 0.100 g of Fe in the smallest amount necessary of a mixture of equal volumes of *hydrochloric acid R* and *water R* and dilute to 100.0 ml with *water R*.

**Iron standard solution (250 ppm Fe).** 5001606.

Immediately before use, dilute with *water R* to 40 times its volume a solution containing 4.840 g of *ferric chloride R* in a 150 g/l solution of *hydrochloric acid R* diluted to 100.0 ml.

**Iron standard solution (20 ppm Fe).** 5001600.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *ferric ammonium sulphate R* equivalent to 0.863 g of FeNH<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub>·12H<sub>2</sub>O and 25 ml of *dilute sulphuric acid R* in 500.0 ml.

**Iron standard solution (10 ppm Fe).** 5001601.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *ferrous ammonium sulphate R* equivalent to 7.022 g of Fe(NH<sub>4</sub>)<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub>·6H<sub>2</sub>O and 25 ml of *dilute sulphuric acid R* in 1000.0 ml.

**Iron standard solution (8 ppm Fe).** 5001602.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing 80 mg of *iron R* and 50 ml of *hydrochloric acid R* (220 g/l HCl) in 1000.0 ml.

**Iron standard solution (2 ppm Fe).** 5001603.

Immediately before use, dilute *iron standard solution (20 ppm Fe) R* to 10 times its volume with *water R*.

**Iron standard solution (1 ppm Fe).** 5001604.

Immediately before use, dilute *iron standard solution (20 ppm Fe) R* to 20 times its volume with *water R*.

**Lead liposoluble standard solution (1000 ppm Pb).** 5004800.

A lead (metal) organic compound in an oil.

**Lead standard solution (0.1 per cent Pb).** 5001700.

Dissolve *lead nitrate R* equivalent to 0.400 g of Pb(NO<sub>3</sub>)<sub>2</sub> in *water R* and dilute to 250.0 ml with the same solvent.

**Lead standard solution (0.1 per cent Pb) R1.** 5005400.

Dissolve in *dilute lead-free nitric acid R* a quantity of *lead nitrate R* equivalent to 0.400 g of Pb(NO<sub>3</sub>)<sub>2</sub> and dilute to 250.0 ml with the same solvent.

**Lead standard solution (100 ppm Pb).** 5001701.

Immediately before use, dilute *lead standard solution (0.1 per cent Pb) R* to 10 times its volume with *water R*.

**Lead standard solution (10 ppm Pb).** 5001702.

Immediately before use, dilute *lead standard solution (100 ppm Pb) R* to 10 times its volume with *water R*.

**Lead standard solution (10 ppm Pb) R1.** 5001706.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing 0.160 g of *lead nitrate R* in 100 ml of *water R*, to which is added 1 ml of *lead-free nitric acid R* and dilute to 1000.0 ml.

**Lead standard solution (10 ppm Pb) R2.** 5005401.

Dilute *lead standard solution (0.1 per cent Pb) R1* to 100 times its volume with *dilute lead-free nitric acid R*. Use within 1 week.

**Lead standard solution (2 ppm Pb).** 5001703.

Immediately before use, dilute *lead standard solution (10 ppm Pb) R* to 5 times its volume with *water R*.

**Lead standard solution (1 ppm Pb).** 5001704.

Immediately before use, dilute *lead standard solution (10 ppm Pb) R* to 10 times its volume with *water R*.

**Lead standard solution (0.5 ppm Pb).** 5005402.

Dilute *lead standard solution (10 ppm Pb) R2* to 20 times its volume with *dilute lead-free nitric acid R*. Use within 1 day.

**Lead standard solution (0.25 ppm Pb).** 5006000.

Immediately before use, dilute *lead standard solution (1 ppm Pb) R* to 4 times its volume with *water R*.

**Lead standard solution (0.1 ppm Pb).** 5001705.

Immediately before use, dilute *lead standard solution (1 ppm Pb) R* to 10 times its volume with *water R*.

**Magnesium standard solution (0.1 per cent Mg).** 5001803.

Dissolve *magnesium sulphate R* equivalent to 1.010 g of  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  in *distilled water R* and dilute to 100.0 ml with the same solvent.

**Magnesium standard solution (100 ppm Mg).** 5001800.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *magnesium sulphate R* equivalent to 1.010 g of  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  in 100.0 ml.

**Magnesium standard solution (10 ppm Mg).** 5001801.

Immediately before use, dilute *magnesium standard solution (100 ppm Mg) R* to 10 times its volume with *water R*.

**Magnesium standard solution (10 ppm Mg) R1.** 5001802.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing 8.365 g of *magnesium chloride R* in 1000.0 ml of *dilute hydrochloric acid R*.

**Manganese standard solution (1000 ppm Mn).** 5005800.

Dissolve *manganese sulphate R* equivalent to 3.08 g of  $\text{MnSO}_4 \cdot \text{H}_2\text{O}$  in 500 ml of *1 M nitric acid* and dilute the solution to 1000 ml with *water R*.

**Manganese standard solution (100 ppm Mn).** 5004500.

Dissolve *manganese sulphate R* equivalent to 0.308 g of  $\text{MnSO}_4 \cdot \text{H}_2\text{O}$  in 500 ml of *1 M nitric acid* and dilute the clear solution to 1000 ml with *water R*.

**Mercury standard solution (1000 ppm Hg).** 5001900.

Dissolve *mercuric chloride R* equivalent to 1.354 g of  $\text{HgCl}_2$  in 50 ml of *dilute nitric acid R* and dilute to 1000.0 ml with *water R*.

**Mercury standard solution (10 ppm Hg).** 5001901.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *mercuric chloride R* equivalent to 0.338 g of  $\text{HgCl}_2$  in 250.0 ml.

**Nickel liposoluble standard solution (1000 ppm Ni).** 5004900.

A nickel (metal) organic compound in an oil.

**Nickel standard solution (10 ppm Ni).** 5002000.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *nickel sulphate R* equivalent to 4.78 g of  $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$  in 1000.0 ml.

**Nickel standard solution (5 ppm Ni).** 5005900.

Immediately before use dilute *nickel standard solution (10 ppm Ni) R* to twice its volume with *water for chromatography R*.

**Nickel standard solution (0.2 ppm Ni).** 5002002.

Immediately before use, dilute *nickel standard solution (10 ppm Ni) R* to 50 times its volume with *water R*.

**Nickel standard solution (0.1 ppm Ni).** 5002001.

Immediately before use, dilute *nickel standard solution (10 ppm Ni) R* to 100 times its volume with *water R*.

**Nitrate standard solution (100 ppm  $\text{NO}_3$ ).** 5002100.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *potassium nitrate R* equivalent to 0.815 g of  $\text{KNO}_3$  in 500.0 ml.

**Nitrate standard solution (10 ppm  $\text{NO}_3$ ).** 5002101.

Immediately before use, dilute *nitrate standard solution (100 ppm  $\text{NO}_3$ ) R* to 10 times its volume with *water R*.

**Nitrate standard solution (2 ppm  $\text{NO}_3$ ).** 5002102.

Immediately before use, dilute *nitrate standard solution (10 ppm  $\text{NO}_3$ ) R* to 5 times its volume with *water R*.

**Palladium standard solution (500 ppm Pd).** 5003600.

Dissolve 50.0 mg of *palladium R* in 9 ml of *hydrochloric acid R* and dilute to 100.0 ml with *water R*.

**Palladium standard solution (20 ppm Pd).** 5003602.

Dissolve 0.333 g of *palladium chloride R* in 2 ml of warm *hydrochloric acid R*. Dilute the solution to 1000.0 ml with a mixture of equal volumes of *dilute hydrochloric acid R* and *water R*. Immediately before use dilute to 10 times its volume with *water R*.

**Palladium standard solution (0.5 ppm Pd).** 5003601.

Dilute 1 ml of *palladium standard solution (500 ppm Pd) R* to 1000 ml with a mixture of 0.3 volumes of *nitric acid R* and 99.7 volumes of *water R*.

**Phosphate standard solution (200 ppm  $\text{PO}_4$ ).** 5004200.

Dissolve *potassium dihydrogen phosphate R* equivalent to 0.286 g of  $\text{KH}_2\text{PO}_4$  in *water R* and dilute to 1000.0 ml with the same solvent.

**Phosphate standard solution (5 ppm  $\text{PO}_4$ ).** 5002200.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *potassium dihydrogen phosphate R* equivalent to 0.716 g of  $\text{KH}_2\text{PO}_4$  in 1000.0 ml.

**Platinum standard solution (30 ppm Pt).** 5002300.

Immediately before use, dilute with *1 M hydrochloric acid* to 10 times its volume a solution containing 80 mg of *chloroplatinic acid R* in 100.0 ml of *1 M hydrochloric acid*.

**Potassium standard solution (0.2 per cent K).** 5002402.

Dissolve *dipotassium sulphate R* equivalent to 0.446 g of  $\text{K}_2\text{SO}_4$  in *distilled water R* and dilute to 100.0 ml with the same solvent.

**Potassium standard solution (600 ppm K).** 5005100.

Immediately before use, dilute with *water R* to 20 times its volume a solution containing *dipotassium sulphate R* equivalent to 2.676 g of  $\text{K}_2\text{SO}_4$  in 100.0 ml.

**Potassium standard solution (100 ppm K).** 5002400.

Immediately before use, dilute with *water R* to 20 times its volume a solution containing *dipotassium sulphate R* equivalent to 0.446 g of  $\text{K}_2\text{SO}_4$  in 100.0 ml.

**Potassium standard solution (20 ppm K).** 5002401.

Immediately before use, dilute *potassium standard solution (100 ppm K) R* to 5 times its volume with *water R*.

**Selenium standard solution (100 ppm Se).** 5002500.

Dissolve 0.100 g of *selenium R* in 2 ml of *nitric acid R*. Evaporate to dryness. Take up the residue in 2 ml of *water R* and evaporate to dryness; carry out three times. Dissolve the residue in 50 ml of *dilute hydrochloric acid R* and dilute to 1000.0 ml with the same acid.

**Selenium standard solution (1 ppm Se).** 5002501.

Immediately before use, dilute with *water R* to 40 times its volume a solution containing *selenious acid R* equivalent to 6.54 mg of  $\text{H}_2\text{SeO}_3$  in 100.0 ml.

**Silver standard solution (5 ppm Ag).** 5002600.

Immediately before use, dilute with *water R* to 100 times its volume a solution containing *silver nitrate R* equivalent to 0.790 g of  $\text{AgNO}_3$  in 1000.0 ml.

**Sodium standard solution (1000 ppm Na).** 5005700.

Dissolve a quantity of *anhydrous sodium carbonate R* equivalent to 2.305 g of  $\text{Na}_2\text{CO}_3$  in a mixture of 25 ml of *water R* and 25 ml of *nitric acid R* and dilute to 1000.0 ml with *water R*.

**Sodium standard solution (200 ppm Na).** 5002700.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *sodium chloride R* equivalent to 0.509 g of  $\text{NaCl}$  in 100.0 ml.

**Sodium standard solution (50 ppm Na).** 5002701.

Dilute the *sodium standard solution (200 ppm Na) R* to four times its volume with *water R*.

**Strontium standard solution (1.0 per cent Sr).** 5003900.

Cover with *water R*, *strontium carbonate R* equivalent to 1.6849 g of  $\text{SrCO}_3$ . Cautiously add *hydrochloric acid R* until all the solid has dissolved and there is no sign of further effervescence. Dilute to 100.0 ml with *water R*.

**Sulphate standard solution (100 ppm  $\text{SO}_4$ ).** 5002802.

Immediately before use, dilute with *distilled water R* to 10 times its volume a solution in *distilled water R* containing *dipotassium sulphate R* equivalent to 0.181 g of  $\text{K}_2\text{SO}_4$  in 100.0 ml.

**Sulphate standard solution (10 ppm  $\text{SO}_4$ ).** 5002800.

Immediately before use, dilute with *distilled water R* to 100 times its volume a solution in *distilled water R* containing *dipotassium sulphate R* equivalent to 0.181 g of  $\text{K}_2\text{SO}_4$  in 100.0 ml.

**Sulphate standard solution (10 ppm  $\text{SO}_4$ ) R1.** 5002801.

Immediately before use, dilute with *alcohol (30 per cent V/V) R* to 100 times its volume a solution containing *dipotassium sulphate R* equivalent to 0.181 g of  $\text{K}_2\text{SO}_4$  in 100.0 ml of *alcohol (30 per cent V/V) R*.

**Sulphite standard solution (80 ppm  $\text{SO}_2$ ).** 5005500.

Dissolve 3.150 g of *anhydrous sodium sulphite R* in freshly prepared *distilled water R* and dilute to 100.0 ml with the same solvent. Dilute 0.5 ml to 100.0 ml with freshly prepared *distilled water R*.

**Sulphite standard solution (1.5 ppm  $\text{SO}_2$ ).** 5002900.

Dissolve *sodium metabisulphite R* equivalent to 0.152 g of  $\text{Na}_2\text{S}_2\text{O}_5$  in *water R* and dilute to 100.0 ml with the same solvent. Dilute 5.0 ml of this solution to 100.0 ml with *water R*. To 3.0 ml of the resulting solution, add 4.0 ml of *0.1 M sodium hydroxide* and dilute to 100.0 ml with *water R*.

**Thallium standard solution (10 ppm Tl).** 5003000.

Dissolve *thallous sulphate R* equivalent to 0.1235 g of  $\text{Tl}_2\text{SO}_4$  in a 9 g/l solution of *sodium chloride R* and dilute to 1000.0 ml with the same solution. Dilute 10.0 ml of the solution to 100.0 ml with the 9 g/l solution of *sodium chloride R*.

**Tin liposoluble standard solution (1000 ppm Sn).** 5005000.

A tin (metal) organic compound in an oil.

**Tin standard solution (5 ppm Sn).** 5003100.

Dissolve *tin R* equivalent to 0.500 g of Sn in a mixture of 5 ml of *water R* and 25 ml of *hydrochloric acid R* and dilute to 1000.0 ml with *water R*. Dilute the solution to 100 times its volume with a 2.5 per cent V/V solution of *hydrochloric acid R* immediately before use.

**Tin standard solution (0.1 ppm Sn).** 5003101.

Immediately before use, dilute *tin standard solution (5 ppm Sn) R* to 50 times its volume with *water R*.

**Titanium standard solution (100 ppm Ti).** 5003200.

Dissolve 100.0 mg of *titanium R* in 100 ml of *hydrochloric acid R* diluted to 150 ml with *water R*, heating if necessary. Allow to cool and dilute to 1000 ml with *water R*.

**Vanadium standard solution (1 g/l V).** 5003300.

Dissolve in *water R* *ammonium vanadate R* equivalent to 0.230 g of  $\text{NH}_4\text{VO}_3$  and dilute to 100.0 ml with the same solvent.

**Zinc standard solution (5 mg/ml Zn).** 5003400.

Dissolve 3.15 g of *zinc oxide R* in 15 ml of *hydrochloric acid R* and dilute to 500.0 ml with *water R*.

**Zinc standard solution (100 ppm Zn).** 5003401.

Immediately before use, dilute with *water R* to 10 times its volume a solution containing *zinc sulphate R* equivalent to 0.440 g of  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$  and 1 ml of *acetic acid R* in 100.0 ml.

**Zinc standard solution (10 ppm Zn).** 5003402.

Immediately before use, dilute *zinc standard solution (100 ppm Zn) R* to 10 times its volume with *water R*.

**Zinc standard solution (5 ppm Zn).** 5003403.

Immediately before use, dilute *zinc standard solution (100 ppm Zn) R* to 20 times its volume with *water R*.

**Zirconium standard solution (1 g/l Zr).** 5003500.

Dissolve *zirconyl nitrate R* equivalent to 0.293 g of  $\text{ZrO}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$  in a mixture of 2 volumes of *hydrochloric acid R* and 8 volumes of *water R* and dilute to 100.0 ml with the same mixture of solvents.

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## 4.1.3. BUFFER SOLUTIONS

**Buffered acetone solution.** 4000100.

Dissolve 8.15 g of *sodium acetate R* and 42 g of *sodium chloride R* in *water R*, add 68 ml of *0.1 M hydrochloric acid* and 150 ml of *acetone R* and dilute to 500 ml with *water R*.

**Buffer solution pH 2.0.** 4000200.

Dissolve 6.57 g of *potassium chloride R* in *water R* and add 119.0 ml of *0.1 M hydrochloric acid*. Dilute to 1000.0 ml with *water R*.

**Phosphate buffer solution pH 2.0.** 4007900.

Dissolve 8.95 g of *disodium hydrogen phosphate R* and 3.40 g of *potassium dihydrogen phosphate R* in *water R* and dilute to 1000.0 ml with the same solvent. If necessary adjust the pH (2.2.3) with *phosphoric acid R*.

**Sulphate buffer solution pH 2.0.** 4008900.

Dissolve 132.1 g of *ammonium sulphate R* in *water R* and dilute to 500.0 ml with the same solvent (Solution I). Carefully and with constant cooling stir 14 ml of *sulphuric acid R* into about 400 ml of *water R*; allow to cool and dilute to 500.0 ml with *water R* (Solution II). Mix equal volumes of solutions I and II. Adjust the pH (2.2.3) if necessary.

**Buffer solution pH 2.2.** 4010500.

Mix of 6.7 ml of *phosphoric acid R* with 50.0 ml of a 4 per cent solution of *dilute sodium hydroxide solution R* and dilute to 1000.0 ml with *water R*.