

Air Pollution Regulations² (Amendment)

I, GORDON GLEN DENTON SCHOLES, the Minister of State for Territories, hereby make the following Regulations under the *Air Pollution Ordinance 1984*.

Dated 16 December 1985.

G. SCHOLES

Minister of State for Territories

Manner of testing for other than solid particles

1. Regulation 13 of the Air Pollution Regulations is amended by omitting "the Schedule" and substituting "Schedule 1".

2. The Air Pollution Regulations are amended by adding at the end the following regulations:

Manner of analysing petrol

"22. (1) The lead content of petrol shall be ascertained in accordance with Schedule 2.

"(2) The phosphorous content of petrol shall be ascertained in accordance with American Standard ASTM D-3231-83.

"(3) The sulphur content of petrol shall be ascertained in accordance with American Standard ASTM D-2622-82.

"(4) The motor octane number of petrol shall be determined in accordance with American Standard ASTM D-2700-84.

"(5) The research octane number of petrol shall be determined in accordance with American Standard ASTM D-2699-84.

Construction and marking of petrol pumps

"23. (1) A petrol pump used to dispense unleaded petrol into motor vehicles shall—

- (a) have a hose that is equipped with a nozzle that has an external diameter of not more than 21.34 millimetres; and
- (b) have the word 'UNLEADED' marked on the pump in letters not less than 20 millimetres in height; in a position that is clearly visible to the driver of a motor vehicle intending to obtain petrol from the pump.

“(2) A petrol pump used to dispense leaded petrol into motor vehicles shall—

- (a) have a hose that is equipped with a nozzle that has an external diameter of not less than 23.6 millimetres; and
- (b) have the words ‘CONTAINS LEAD’ marked on the pump in letters not less than 20 millimetres in height, in a position that is clearly visible to the driver of a motor vehicle intending to obtain petrol from the pump.”.

3. The Air Pollution Regulations are amended—

- (a) by omitting “THE SCHEDULE” and substituting “SCHEDULE 1”; and
- (b) by adding at the end the following Schedule:

SCHEDULE 2

Regulation 22

DETERMINATION OF LEAD CONTENT

PART I

DETERMINATION OF LEAD CONCENTRATION OF LEADED PETROL

This is a method for the determination of lead concentration of petrol in the range 0.10 gram per litre to 0.80 gram per litre by atomic absorption spectrometry. Samples above this range can be analysed by this method after dilution.

SAMPLING AND STORAGE: APPARATUS

Sample containers: Sample containers are to be cans of welded side seam construction. They are to have a capacity of between 4 and 6 litres and are to be fitted with a tap (petrol drain cock between 4 and 7 millimetres, or equivalent). The tap is to be between 80 and 120 millimetres from the bottom of the can.

The sample container is to have an opening at the top between 30 and 50 millimetres in diameter and is to be sealed with a screw cap to provide a vapour tight closure seal.

Storage containers: Storage containers are to be brown glass bottles of capacity between 400 and 600 millilitres and are to be sealed so as to provide a vapour tight closure seal.

Delivery tube: The delivery tube is to be a copper tube between 3 and 5 millimetres inside diameter and at least 300 millimetres in length. It must be able to be fitted to the taps on the sample containers to form a vapour tight joint.

Cleaning procedures: Glass storage containers are to be washed with a mixture of nitric acid and water in equal volumes, rinsed with distilled water and rinsed with acetone. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. Sample containers are to be rinsed with iso-octane, washed with soap solution and rinsed with distilled water. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. Delivery tubes are to be rinsed with iso-octane, washed with soap solution and rinsed with distilled water. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. When transferring a batch of samples from sample containers to storage containers, the delivery tubes are to be rinsed with iso-octane between each delivery.

Sampling from a bowser: The petrol is to be delivered directly from the nozzle of a bowser hose into the top opening of a sample container and filled to between 70–80 per cent of its capacity.

Sampling from a tank, delivery tank, tank vehicle or pipeline: Samples are to be taken in a manner which in the opinion of an authorised officer will result in a representative sample. Samples are to be transferred to a sample container for transport.

Transfer of petrol sample to storage container: Cool the sample container and its contents to a temperature of 0–8 degrees Celsius.

Cool the storage container to a temperature of 0–8 degrees Celsius.

Attach the delivery tube to the tap of the sample container.

Remove the cap from the sample container and fill the storage container through tap and delivery tube. During this operation the delivery tube must reach within 15 millimetres of the bottom of the storage container.

Empty the storage container and allow to drain.

Refill the storage container in the same manner as above.

Pour off enough of the contents so that the storage container will be approximately 70–80 per cent full and seal immediately.

Store samples at 0–8 degrees Celsius.

REAGENTS

Methyl isobutyl ketone (MIBK), (4 Methyl—2 pentanone): A.R. grade.

Iodine solution: Dissolve 3.0 grams A.R. grade iodine in A.R. grade toluene and dilute to 100 millilitres with the same solvent. Store in a brown glass bottle.

Aliquat 336: Commercially available from General Mills Corporation, Minneapolis, USA.

Aliquat 336/MIBK solution (10 per cent): Dilute 100 millilitres of Aliquat 336 to 1 litre with MIBK.

Aliquat 336/MIBK solution (1 per cent): Dilute 10 millilitres of Aliquat 336 to 1 litre with MIBK.

Lead chloride (Pb Cl₂): 99 per cent minimum.

Stock lead solution (2.0 grams lead per litre): Dissolve 0.671 1 gram of lead chloride, previously dried at 105 degrees Celsius, for 3 hours in about 200 millilitres of Aliquat 336/MIBK solution (10 per cent). Dilute to mark in a 250 millilitres volumetric flask with Aliquat 336/MIBK solution (10 per cent), mix and store in a brown glass bottle.

Standard lead solutions (0.2, 0.4, 0.6, 0.8 gram lead per litre): Transfer accurately, by means of pipettes, 10, 20, 30, and 40 millilitres of the stock lead solution (2.0 grams lead per litre) to 100 millilitre volumetric flasks. Adjust volume of each to 50 millilitres by the addition of 40, 30, 20, and 10 millilitres respectively of Aliquat/MIBK solution (10 per cent) and dilute to the mark with MIBK. Mix well and store in brown glass bottles with teflon or polyethylene lined caps.

Iso-octane (2,2,4 trimethyl pentane): A.R. grade.

Nitric Acid (1+1): Mix equal volumes of concentrated A.R. grade nitric acid (S.G. 1.42) and distilled water.

Acetone: A.R. grade.

Reagents should be kept for the following periods:—

Iodine solution.	30 days.
Aliquat 336/MIBK (10 per cent)	30 days.
Aliquat 336/MIBK (1 per cent)	30 days.
Stock lead solution	30 days.
Standard lead solution	1 day.

Grades of reagents other than those indicated may be used, provided that it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination and provided the same source of reagent is used for all standards and blanks.

ANALYSIS

Deleading of glassware: rinse glassware with a volume of nitric acid (1+1).

Rinse with distilled water.

Rinse with acetone.

Oven dry at 40 degrees Celsius or higher.

Preparation of working standards:—

To each of 40 x 50 millilitre volumetric flasks containing 30 millilitres of MIBK add 1 millilitre of 1 of the standard lead solutions and 1 millilitre of iso-octane.

Add 0.1 millilitre of iodine solution, mix well and allow to react for at least 1 minute.

Dilute to volume with MIBK and mix.

Preparation of blank: To a 50 millilitre volumetric flask containing 30 millilitres MIBK, add 1 millilitre of iso-octane. Add 0.1 millilitre iodine solution, mix well and allow to react for at least 1 minute.

Add 5 millilitres of Aliquat/MIBK solution (1 per cent) and mix.

Dilute to volume with MIBK and mix.

Preparation of sample: To a 50 millilitre volumetric flask containing 30 millilitres of MIBK add 1 millilitre of petrol sample. Add 0.1 millilitre of iodine solution, mix well and allow to react for at least 1 minute. Add 5 millilitres of Aliquat/MIBK solution (1 per cent) and mix.

Dilute to volume with MIBK and mix. If a sample has a concentration of lead greater than 0.8 gram lead per litre, it must be diluted with iso-octane to fall within the range of 0.1 to 0.8 gram per litre.

Preparation of instrument: Optimize the atomic absorption spectrometer for lead at 283.3 nanometres. Using the blank adjust the gas mixture (acetylene/air) and aspiration rate to obtain an oxidising (lean, blue) flame. Aspirate the 0.8 gram lead per litre working standard to give maximum response. Aspirate the blank and adjust the instrument to zero. Measure the absorbances of the 0.2, 0.4, 0.6, and 0.8 gram lead per litre working standards. Aspirate samples and record absorbance values. Aspirate MIBK between each measurement.

Calculations: Plot on a graph absorbance versus concentration represented by the working standards. Read concentration of lead in the petrol samples directly from the graph.

PART II

DETERMINATION OF LEAD CONCENTRATION OF UNLEADED PETROL

This method is applicable to the determination of lead concentration in petrol in the range of 0.002 gram per litre to 0.02 gram per litre by atomic absorption spectrometry.

Samples above that range can be determined by this method after dilution.

SAMPLING AND STORAGE—APPARATUS

- (a) *Sample containers:* Sample containers are to be cans of welded side seam construction. They are to have a capacity of between 4 and 6 litres and are to be fitted with a tap (petrol drain cock between 4 and 7 millimetres, or equivalent). The tap is to be between 80 and 120 millimetres from the bottom of the can. The sample container is to have an opening at the top between 30 and 50 millimetres in diameter and is to be sealed with a screw cap to provide a vapour tight closure seal.
- (b) *Storage containers:* Storage containers are to be brown glass bottles of capacity between 400 and 600 millilitres and are to be sealed so as to provide a vapour-tight closure seal.
- (c) *Delivery tube:* The delivery tube is to be a copper tube between 3 and 5 millimetres inside diameter and at least 300 millimetres in length. It must be able to be fitted to the taps on the sample containers to form a vapour tight joint.

- (d) *Cleaning procedures:* Glass storage containers are to be washed with a mixture of nitric acid and water in equal volumes, rinsed with distilled water and rinsed with acetone. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. Sample containers are to be rinsed with iso-octane, washed with soap solution and rinsed with distilled water. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. Delivery tubes are to be rinsed with iso-octane, washed with soap solution and rinsed with distilled water. They are to be dried by placing in a drying cabinet at 40 degrees Celsius or higher. When transferring a batch of samples from sample containers to storage containers, the delivery tubes are to be rinsed with iso-octane between each delivery.
- (e) *Sampling from a bowser:* The petrol is to be delivered directly from the nozzle of a bowser hose into the top opening of a sample container and filled to approximately three-quarters of its capacity.
- (f) *Sampling from a tank, delivery tank, tank vehicle or pipeline:* Samples are to be taken in a manner which in the opinion of an authorised officer will result in a representative sample. Samples are to be transferred to a sample container for transport.
- (g) *Transfer of petrol sample to storage containers:* Cool the sample container and its contents to a temperature of 0-8 degrees Celsius. -
 Attach the delivery tube to the tap of the sample container.
 Remove the cap from the sample container and fill the storage container through tap and delivery tube. During this operation the delivery tube must reach within 15 millimetres of the bottom of the storage container.
 Empty the storage container and allow to drain.
 Refill the storage container in the same manner as above.
 Pour off enough of the contents so that the storage container will be approximately three-quarters full and seal immediately.
 Store samples at 0-8 degrees Celsius.

REAGENTS

- (h) *Methyl isobutyl ketone (MIBK), (4 Methyl-2 pentanone):* A.R. grade.
- (i) *Iodine solution:* Dissolve 3.0 grams A.R. grade iodine in A.R. grade toluene and dilute to 100 millilitres with the same solvent. Store in a brown glass bottle.
- (j) *Aliquat 336 (tricapryl methyl ammonium chloride) Aliquat 336/MIBK solution (10 per cent):* Dilute 1000 millilitres of Aliquat 336 to 1 litre with MIBK.
- (k) *Aliquat 336/MIBK solution (1 per cent):* Dilute 10 millilitres of Aliquat 336 to 1 litre with MIBK.
- (l) *Lead chloride ($Pb Cl_2$):* 99 per cent minimum purity.
- (m) *Stock lead solution (2.0 grams lead per litre):* Dissolve 0.6711 gram of lead chloride, previously dried at 105 degrees Celsius for 3 hours, in about 200 millilitres of Aliquat 336/MIBK solution (10 per cent). Dilute to mark in a 250 millilitres volumetric flask with Aliquat 336/MIBK solution (10 per cent). Mix well and store in a brown glass bottle.
- (n) *Stock lead solution (0.2 gram lead per litre):* Transfer accurately by means of a pipette 25 millilitres of the stock lead solution (2.0 grams lead per litre) to a 250 millilitre volumetric flask. Dilute to mark with Aliquat 336/MIBK solution (10 per cent). Mix well and store in a brown glass bottle.
- (o) *Standard lead solutions (0.004, 0.01, 0.02 gram lead per litre):* Transfer accurately by means of a pipette 2.0, 5.0 and 10.00 millilitres of the stock lead solution (0.2 gram lead per litre) to 100 millilitre volumetric flasks. Adjust the volume of each to 10 millilitres by addition of Aliquat/MIBK (10 per cent solution). Dilute to the mark on the volumetric flask with MIBK. Mix well and store in brown glass bottles with teflon or polyethylene caps.

- (p) *Iso-octane* (2,2,4 trimethyl pentane): A.R. grade.
- (q) *Nitric Acid* (1 + 1): Mix equal volumes of concentrated A.R. grade nitric acid (S.G. 1.42) and distilled water.
- (r) *Acetone*: A.R. grade.
- (s) *Reagents should only be kept for the following periods:—*

Iodine solution	30 days
Aliquat 336/MIBK (10 per cent)	30 days
Aliquat 336/MIBK (1 per cent)	30 days
Stock lead solutions	30 days
Standard lead solution	1 day

ANALYSIS

- (t) *Deleading of glassware*: Rinse glassware with dilute nitric acid (1 + 1).
Rinse with distilled water.
Rinse with acetone.
Oven dry at 40 degrees Celsius or higher.
- (u) *Preparation of working standards*: To three 50 millilitre flasks, each containing 30 millilitres of MIBK, separately add 5 millilitres of the standard lead solution and 5 millilitres of iso-octane.
Add 0.1 millilitre of iodine solution, mix well and allow to react for at least 1 minute.
Dilute to volume with MIBK and mix.
- (v) *Preparation of blank*: To a 50 millilitre volumetric flask containing 30 millilitres MIBK, add 5 millilitres of iso-octane. Add 0.1 millilitre solution, mix well and allow to react for at least 1 minute.
Add 5 millilitres of Aliquat/MIBK solution (1 per per* cent) and mix.
Dilute to volume with MIBK and mix.
- (w) *Preparation of sample*: To a 50 millilitre volumetric flask containing 30 millilitres of MIBK add 5 millilitres of petrol sample. Add 0.1 millilitre of iodine solution, mix well and allow to react for at least 1 minute. Add 5 millilitres of Aliquat/MIBK solution (1 per cent) and mix.
Dilute to volume with MIBK and mix. If a sample has a concentration of lead greater than 0.02 gram lead per litre, it must be diluted with iso-octane to fall within the range of 0.004 to 0.02 gram per litre.
- (x) *Preparation of the atomic absorption spectrometer instrument*: Optimise the instrument for lead at 283.3 nanometres. Using the blank adjust the gas mixture (acetylene/air) and aspiration rate to obtain an oxidising (lean, blue) flame. Aspirate the 0.02 gram lead per litre working standard to give maximum response. Aspirate the blank and adjust the instrument to zero. Measure the absorbances of the 0.004, 0.01 and 0.02 gram lead per litre working standards. Aspirate samples and record absorbance values. Aspirate MIBK between each measurement.

CALCULATIONS

- (y) Plot a graph of absorbance versus concentration represented by zero and the working standards. Read the concentrations of the sample solutions from the graph obtained from the working standards or directly from the spectrometer readout if this facility is available.

NOTES

1. Notified in the *Commonwealth of Australia Gazette* on 20 December 1985.
2. Regulations 1984 No. 24.