Claims

1. An apparatus for the treatment of air, wherein air having a first concentration of carbon monoxide enters the apparatus and breathable air having a second concentration of carbon monoxide exits the apparatus, said first concentration being higher than said second concentration, the apparatus comprising a gas treatment means, comprising:
   i) a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide and
   ii) a source of a volatile nitrogen-containing compound.

2. An apparatus according to claim 1, wherein the catalyst comprises from 0.5 to 10% of palladium, by weight.

3. An apparatus according to claim 1 or claim 2, wherein said catalyst is made by a method in which a mixed oxide and hydroxide containing iron and palladium is precipitated from an acid solution containing soluble iron and palladium compounds.

4. An apparatus according to claim 1 or claim 2, wherein said iron oxide and palladium is supported on a porous support material.

5. An apparatus according to any one of the preceding claims, wherein the catalyst comprises particles having a size in the range from 300 – 1000 μm.

6. An apparatus according to any one of the preceding claims, wherein the catalyst is present as a bed of particles and said catalyst bed has a maximum thickness in the direction of the air flow of less than 10mm.

7. An apparatus according to any one of the preceding claims, wherein the catalyst is present in a coating.

8. An apparatus according to any one of the preceding claims, wherein said source of source of volatile nitrogen-containing compound comprises an absorbent material impregnated with amine, or ammonia.

9. An apparatus according to claim 8, wherein said absorbent material comprises an activated carbon in the form of a bed of particles, a cloth or foam.

10. An apparatus according to any one of the preceding claims, containing no hopcalite.

11. An apparatus according to any one of the preceding claims, wherein no guard bed for the removal of catalyst poisons is located between the catalyst and the source of volatile nitrogen-containing compound.

12. An apparatus according to any one of the preceding claims, in the form of a filter assembly.

13. An apparatus according to any one of the preceding claims, in the form of a gas filter, filter cartridge, gas mask, self-contained self-rescuer, escape hood, personal breathing apparatus or air scrubbing system.

14. An apparatus according to any one of the preceding claims, capable of reducing the concentration of carbon monoxide in an oxygen-containing gas from 3600 ppm to less than 500 ppm over a continuous period of 10 minutes at 20 °C at a linear air flow rate of 9 cm / second.

15. A method of treating air to form breathable air comprising the step of passing a stream of air containing a first concentration of carbon monoxide through a gas treatment means comprising:
    i) a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide and
    ii) a source of a volatile nitrogen-containing compound
    such that at least a portion of carbon monoxide contained in said air is oxidised and that the air downstream of said gas treatment means contains a second concentration of carbon monoxide which is less than said first concentration.

16. A method according to claim 15, wherein when the stream of air containing said first concentration of carbon monoxide is passed through said gas treatment means at 20 °C for 15 minutes and said first concentration of carbon monoxide is at least 3600ppm the maximum instantaneous value of said second concentration of carbon monoxide is less than 500ppm.

17. A method according to claim 16, wherein, when the first concentration of carbon monoxide is 3600 ppm and the air stream is passed through the gas treatment apparatus for a continuous period of 15 minutes at a linear velocity of 9 cm per second, the CT value of CO in the air downstream of the gas treatment means is less than 6000 ppm minutes.

18. A method of treating air to form breathable air comprising the step of contacting a stream of air containing a first concentration of carbon monoxide with a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide such that at least a portion of carbon monoxide contained in said air is oxidised and that the air downstream of said gas treatment means contains a second concentration of carbon monoxide which is less than said first concentration, wherein said air is also brought into contact with a volatile nitrogen-containing compound.

Claims

1. An apparatus for the treatment of air, wherein air having a first concentration of carbon monoxide enters the apparatus and breathable air having a second concentration of carbon monoxide exits the apparatus, said first concentration being higher than said second concentration, the apparatus comprising a gas treatment means, comprising:
   i) a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide and
   ii) an absorbent material impregnated with an amine or ammonia.

2. An apparatus according to claim 1, wherein the catalyst comprises from 0.5 to 10% of palladium, by weight.

3. An apparatus according to claim 1 or claim 2, wherein said catalyst is made by a method in which a mixed oxide and hydroxide containing iron and palladium is precipitated from an acid solution containing soluble iron and palladium compounds.

4. An apparatus according to claim 1 or claim 2, wherein said iron oxide and palladium is supported on a porous support material.

5. An apparatus according to any one of the preceding claims, wherein the catalyst comprises particles having a size in the range from 300 - 1000 µm.

6. An apparatus according to any one of the preceding claims, wherein the catalyst is present as a bed of particles and said catalyst bed has a maximum thickness in the direction of the air flow of less than 10mm.

7. An apparatus according to any one of the preceding claims, wherein the catalyst is present in a coating.

8. An apparatus according to claim 1, wherein said absorbent material comprises an activated carbon in the form of a bed of particles, a cloth or foam.

9. An apparatus according to any one of the preceding claims, containing no hopcalite.

10. An apparatus according to any one of the preceding claims, wherein no guard bed for the removal of catalyst poisons is located between the catalyst and the absorbent material impregnated with an amine or ammonia.

11. An apparatus according to any one of the preceding claims, in the form of a filter assembly.

12. An apparatus according to any one of the preceding claims, in the form of a gas filter, filter cartridge, gas mask, self-contained self-rescuer, escape hood, personal breathing apparatus or air scrubbing system.

13. An apparatus according to any one of the preceding claims, capable of reducing the concentration of carbon monoxide in an oxygen-containing gas from 3600 ppm to less than 500 ppm over a continuous period of 10 minutes at 20 °C at a linear air flow rate of 9 cm / second.

14. A method of treating air to form breathable air comprising the step of passing a stream of air containing a first concentration of carbon monoxide through a gas treatment means comprising:

i) a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide and

ii) an absorbent material impregnated with an amine or ammonia

such that at least a portion of carbon monoxide contained in said air is oxidised and that the air downstream of said gas treatment means contains a second concentration of carbon monoxide which is less than said first concentration.

15. A method according to claim 14, wherein when the stream of air containing said first concentration of carbon monoxide is passed through said gas treatment means at 20°C for 15 minutes and said first concentration of carbon monoxide is at least 3600ppm the maximum instantaneous value of said second concentration of carbon monoxide is less than 500ppm.

16. A method according to claim 15, wherein, when the first concentration of carbon monoxide is 3600 ppm and the air stream is passed through the gas treatment apparatus for a continuous period of 15 minutes at a linear velocity of 9 cm per second, the CT value of CO in the air downstream of the gas treatment means is less than 6000 ppm minutes.

17. A method of treating air to form breathable air comprising the step of contacting a stream of air containing a first concentration of carbon monoxide with a catalyst for the oxidation of carbon monoxide comprising palladium and iron oxide such that at least a portion of carbon monoxide contained in said air is oxidised and that the air downstream of said gas treatment means contains a second concentration of carbon monoxide which is less than said first concentration, wherein said air is also brought into contact with an absorbent material impregnated with an amine or ammonia.