Core 1

(a) State two uses of water in the home.

1. ..........................................................................................................................................

2. ...........................................................................................................................................[2]

(b) State the boiling point of pure water.

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(c) Describe a chemical test for water.

Test ..........................................................................................................................................

Result .........................................................................................................................................[2]

The flow chart shows the stages in water purification.

(d) Air is blown into impure water to help remove dissolved iron compounds.

(i) How could you test for iron(III) ions in the water?

Test ..........................................................................................................................................

Result .........................................................................................................................................[2]

(ii) Which two gases make up most of the air?

.............................................................................................................................................. and ......................................................................................................................................[2]
Core 1

(e) When chlorine is added during the water purification process, the water becomes acidic.

(i) Why is chlorine added during the water purification process?

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(ii) Suggest why lime is added after chlorination.

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(f) The filter consists of a mixture of sand and stones.

Suggest how the filter helps purify the water.

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........................................................................................................................................[3]
Core 2

The gas inside the bulb is a mixture of argon and nitrogen.

(i) Explain why argon is used in light bulbs.

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(ii) Suggest a gas which could replace either argon or nitrogen in the light bulb.

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Alternative to practical 1
A student set up the experiment below to investigate the effect of water and air on iron wool.

![Diagram of iron wool in water with air pocket](image)

(a) Describe the appearance of the iron after 1 week.

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(b) Predict the level of the water in the tube after 1 week. Explain your prediction.

level of water ..........................................................................................................................

explanation .............................................................................................................................

...........................................................................................................................................[2]

(c) Suggest what would happen if the air in the tube after 1 week was tested with a lighted splint. Explain your suggestion.

result of test ..........................................................................................................................

explanation ..........................................................................................................................

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Extension 1

Suggest an explanation why exposure to atmospheric pollution changes basic lead(II) carbonate into lead(II) sulphate.

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Extension 1 (con'd)

(i) How could you show that the liquid collected contained water?

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Extension 2

The window was improved in Switzerland by filling the space between the sheets of glass with krypton which is one of the noble gases. Krypton is a poorer conductor of heat than air because it exists as single atoms rather than the diatomic molecules of oxygen and nitrogen.

(i) Give another use for a noble gas.

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(ii) Explain why krypton remains as separate atoms but nitrogen exists as diatomic molecules.

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Extension 3

Exhaust gases from a car include carbon dioxide, carbon monoxide and oxides of nitrogen. A catalytic converter does not decrease the emission of carbon dioxide but does decrease the amounts of carbon monoxide and of the oxides of nitrogen.

(i) Explain how oxides of nitrogen are formed.

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...........................................................................................................................................[2]

(ii) How does a catalytic converter decrease the emission of carbon monoxide and of the oxides of nitrogen?

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...........................................................................................................................................[2]
Core 1

a  any two uses
   e.g. washing, drinking, sanitation, growing plants etc

b  100 °C

c  test  add anhydrous / white copper sulphate or anhydrous / blue cobalt chloride
       result  copper sulphate goes blue / cobalt chloride goes pink

d(i)  test  add (sodium / potassium / other suitable) hydroxide or add ammonia
       result  brown / red-brown precipitate

(ii)  nitrogen, oxygen

e(i)  to kill bacteria / germs / to disinfect the water

(ii)  lime is alkaline
       to neutralise the acid / chlorine / to increase the pH

f  impure water contains some solids
    solids trapped on stones / sand
    water drains through
Core 2

(i) inert / unreactive

(ii) helium / neon / krypton / xenon / a noble gas
Alternative to Practical 1

a  rusty / brown

b  level of water  level rises / goes up tube  
    explanation  oxygen used up / 1/5 of way up tube / 20% oxygen

c  result  would go out / pops  
    explanation  oxygen absent / hydrogen present
Extension 1

Any three from
- acid rain
- sulphur dioxide
- burning of fossil fuels containing sulphur
- sulphuric acid

Air and Water
Extension 2

i  argon   filling electric bulbs  
    helium in balloons (not hot air balloons)  
    neon in lights  
    inert atmosphere for welding  

ii any three of these

  krypton has complete energy level or has 8e  
     does not form bonds  
     does not need to lose or gain electrons  

  nitrogen has incomplete energy level  
     has five electrons in outer level  
     needs to share to complete 8e  
     needs 3e more  
     forms a bond
Extension 3

i from oxygen and nitrogen (in air) 
   high temperature in engine

ii to form carbon dioxide 
    and nitrogen