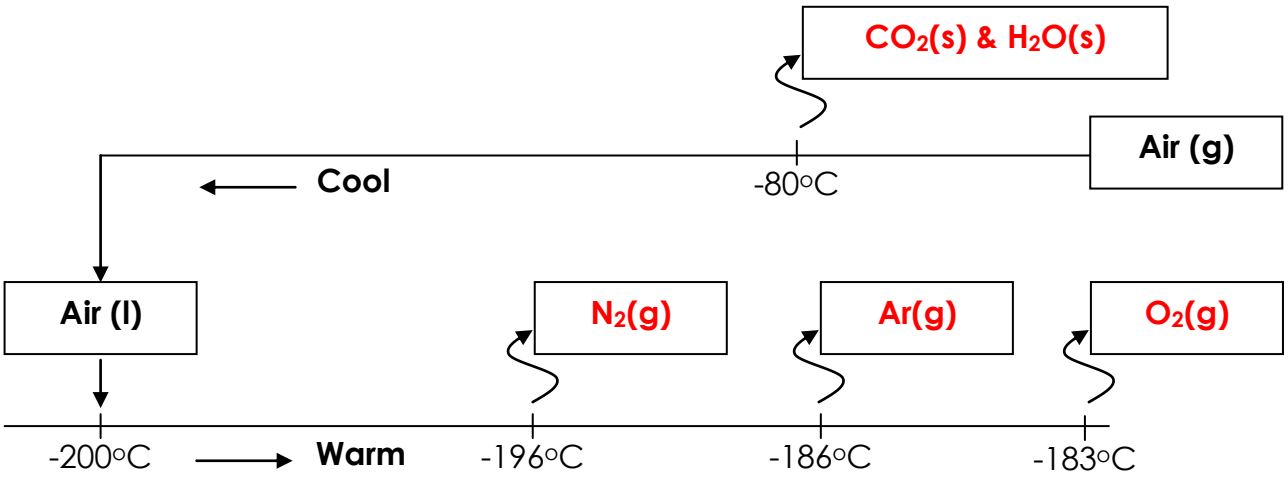
Suggested Answers on Note (Chapter 1) P.3



Suggested Answers on Note (Chapter 1) P.5

1. (a) Air
   (b) Liquid nitrogen will boil first because it has lower boiling point than oxygen.
   (c) Fractional distillation of liquid air.
   (d) It involves a physical change. Because there is a change of states only. No new substance is formed.

2. (a) It is a colourless gas at room temperature and pressure.
   It does not conduct electricity.
   It has very low melting point and boiling point.
   (b) Put a glowing splint into a test tube containing oxygen, it relights.
   (c) It involves a chemical change because the splint burns and forms new substances, such as carbon dioxide.

Suggested Answers on Note (Chapter 1) P.17

Sodium chloride + silver nitrate ⟶ silver chloride + sodium nitrate
(White precipitate)

$NaCl(aq) + AgNO_3(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

Suggested Answers on Note (Chapter 1) P.20

	Colour change in the presence of water
Anhydrous copper(II) sulphate	**Change from white to blue**
Dry cobalt(II) chloride paper	**Change from blue to pink**

Suggested Answers on Note (Chapter 1) P.21

1. (a) Dilute nitric acid

   (b) To prevent the formation of other insoluble silver compounds, which may affect the results.

   (c) (i) White precipitate is formed.
   (ii) Potassium chloride + silver nitrate → Silver chloride + potassium nitrate
   $KCl(aq) + AgNO_3(aq) \longrightarrow AgCl(s) + KNO_3(aq)$

2. (a) Dip the tip of a clean platinum wire into a sample of common salt. Then put the tip of platinum wire in a non-luminous flame. A golden yellow flame appears.

   (b) Dissolve a small amount of common salt in distilled water. Then, add acidified silver nitrate solution to the solution of common salt. A white precipitate appears.
   Sodium chloride + silver nitrate → silver chloride + sodium nitrate

   (c) Heat a sample of common salt in a test tube strongly. When there are colourless droplets condensed on the inner mouth of test tube, put a piece of anhydrous cobalt chloride paper on the droplets. The paper changes from blue to pink.

Suggested Answers on Note (Chapter 1) P.27 – 28

calcium carbonate ——heat——→ calcium oxide + carbon dioxide

$CaCO_3(s) \xrightarrow{heat} CaO(s) + CO_2(g)$

carbon dioxide + water ⟶ carbonic acid

$CO_2(g) + H_2O(l) \longrightarrow H_2CO_3(aq)$

calcium carbonate + rain water ⟶ calcium hydrogencarbonate

$CaCO_3(s) + H_2CO_3(aq) \longrightarrow Ca(HCO_3)_2(aq)$

Acid rain.

$SO_2(g) + H_2O(l) \longrightarrow H_2SO_3(aq)$
$SO_3(g) + H_2O(l) \longrightarrow H_2SO_4(aq)$
$2NO_2(g) + H_2O(l) \longrightarrow HNO_2(aq) + HNO_3(aq)$

Rain water reacts with calcium carbonate to form compounds of calcium

$H_2SO_3(aq) + CaCO_3(s) \longrightarrow CaSO_3(aq) + CO_2(g) + H_2O(l)$
$H_2SO_4(aq) + CaCO_3(s) \longrightarrow CaSO_4(aq) + CO_2(g) + H_2O(l)$
$2HNO_2(aq) + CaCO_3(s) \longrightarrow Ca(NO_2)_2(aq) + CO_2(g) + H_2O(l)$
$2HNO_3(aq) + CaCO_3(s) \longrightarrow Ca(NO_3)_2(aq) + CO_2(g) + H_2O(l)$

Suggested Answers on Note (Chapter 1) P.29 – 31

calcium oxide + water ⟶ calcium hydroxide (+ heat)

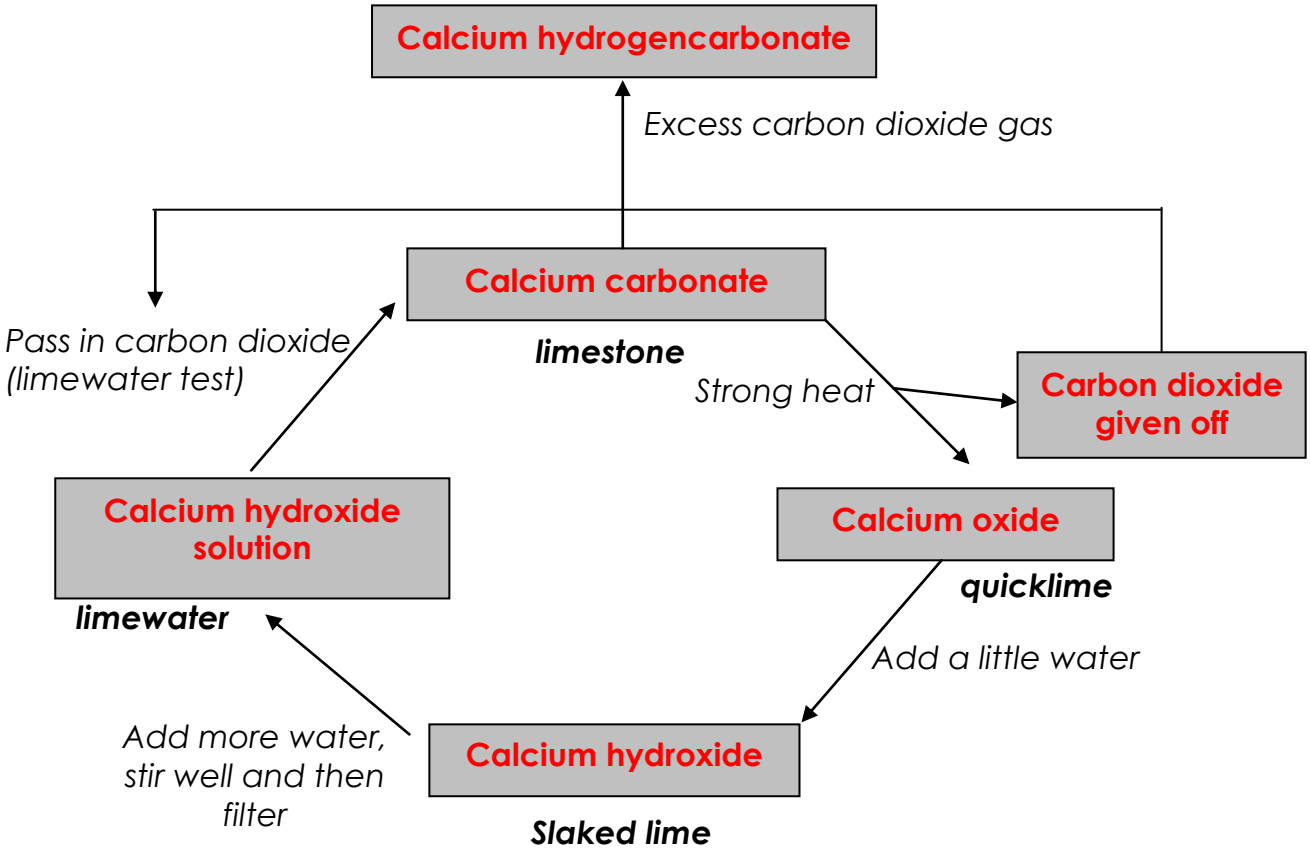
$CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq)$

calcium hydroxide + carbon dioxide ⟶ calcium carbonate + water

$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

calcium carbonate + carbon dioxide + water ⟶ calcium hydrogencarbonate

$CaCO_3(s) + CO_2(g) + H_2O(l) \longrightarrow Ca(HCO_3)_2(aq)$



Test for carbonate ions (CO_3^{2-})

$CO_2(g) + Ca(OH)_2(aq) \longrightarrow CaCO_3(s) + H_2O(l)$

$CO_3^{2-}(aq) + 2H^+(aq) \longrightarrow H_2O(l) + CO_2(g)$

Suggested Answers on Note (Chapter 1) P.31 – 33

1. (a) Water + Carbon dioxide ⟶ Carbonic acid
$H_2O(l) + CO_2(g) \longrightarrow H_2CO_3(aq)$

(b) Lime water is made of calcium carbonate. Carbonic acid reacts with calcium carbonate to form soluble calcium hydrogencarbonate which can be drained away by rain water.
Carbonic acid + Calcium carbonate ⟶ Calcium hydrogencarbonate
$H_2CO_3(aq) + CaCO_3(s) \longrightarrow Ca(HCO_3)_2(aq)$

2. (a) Nitrogen dioxide, sulphur dioxide and sulphur trioxide

(b) Nitrogen dioxide: car exhaust / factories / incinerators / power station.
Sulphur dioxide and sulphur trioxide: factories / incinerators / power stations which use sulphur-containing fuels.

(c) Nitrogen dioxide + Water ⟶ Nitric acid + Nitrous acid
$2NO_2(g) + H_2O(l) \longrightarrow HNO_3(aq) + HNO_2(aq)$

Sulphur dioxide + Water ⟶ Sulphurous acid
$SO_2(g) + H_2O(l) \longrightarrow H_2SO_3(aq)$

Sulphur trioxide + Water ⟶ Sulphuric acid
$SO_3(g) + H_2O(l) \longrightarrow H_2SO_4(aq)$

(d) Calcium carbonate + Nitric acid ⟶ Calcium nitrate + Carbon dioxide + Water
$2HNO_3(aq) + CaCO_3(s) \longrightarrow Ca(NO_3)_2(aq) + CO_2(g) + H_2O(l)$

Calcium carbonate + Nitrous acid ⟶ Calcium nitrite + Carbon dioxide + Water
$2HNO_2(aq) + CaCO_3(s) \longrightarrow Ca(NO_2)_2(aq) + CO_2(g) + H_2O(l)$

Calcium carbonate + Sulphurous acid ⟶ Calcium sulphite + Carbon dioxide + Water
$H_2SO_3(aq) + CaCO_3(s) \longrightarrow CaSO_3(aq) + CO_2(g) + H_2O(l)$

Calcium carbonate + Sulphuric acid ⟶ Calcium sulphate + Carbon dioxide + Water
$H_2SO_4(aq) + CaCO_3(s) \longrightarrow CaSO_4(aq) + CO_2(g) + H_2O(l)$

3. (a) Calcium carbonate $\longrightarrow$ Calcium oxide + Carbon dioxide
$CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$

(b) Colourless

(c) Lime water turns milky.
Calcium hydroxide + Carbon dioxide $\longrightarrow$ Calcium carbonate + Water
$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

(d) (i) The milky solution turns colourless again.

(ii) Calcium carbonate + Carbon dioxide + Water $\longrightarrow$ Calcium hydrogencarbonate
$CaCO_3(s) + CO_2 + H_2O \longrightarrow Ca(HCO_3)_2(aq)$

Suggested Answers on Note (Chapter 1) P.36 – 42

1. The atmosphere on Earth contains
   - less carbon dioxide;
   - more nitrogen;
   - more (or some) oxygen;
   - some water vapour.

   ANY THREE

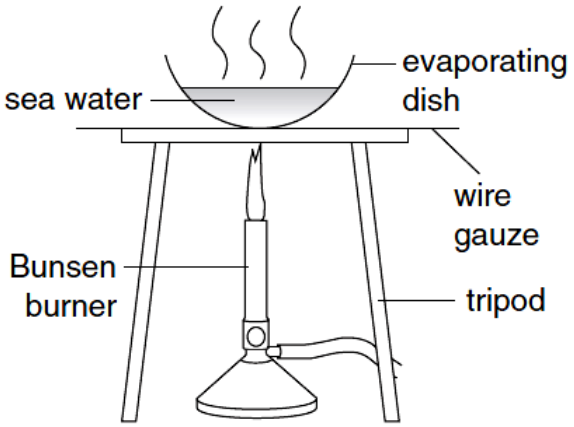
2. (a) Physical property
   (b) Chemical property
   (c) Physical property
   (d) Chemical property

3. (a) Filtration
   (b) Filter paper
   (c) Filter funnel
   (d) Filtrate
   (e) Residue
   (f) The particles of sodium chloride in sea water are much smaller than mud particles in muddy water.
   Hence particles of sodium chloride in sea water can pass through the tiny holes on the filter paper while mud particles cannot.

4. (a) Distillation
   (b) When sea water evaporates, water vapour escapes.
   If the water vapour is passed into another container and cooled, it will turn back into water.
   (c) Condenser
   (d) To ensure even boiling.

5. (a) (i) A white precipitate was observed.
   (ii) Chloride

   (b) (i)



   (ii) Use flame test.
   The solid gives a golden yellow flame.

6. (a) Electrolysis

(b)
- Manufacture of hydrochloric acid
- Sterilizing drinking water / swimming pool water
- Manufacture of PVC
- Manufacture of organic solvents
- Manufacture of bleach

ANY ONE

(c)
- Manufacture of bleach
- Manufacture of soaps and detergents

ANY ONE

7. (a)
- Extracting iron from iron ore
- As a material for the construction of road and buildings
- To neutralize acidity in soil and water
- To neutralize sulphur dioxide in flue gas from power stations
- Making glass

(b) Earth movements may cause chalk to sink. Higher pressure and heat cause the chalk to turn into much harder limestone.
The limestone deposit may stay below the Earth for a long time. Higher temperature and pressure may turn the limestone into marble.

8. (a) (i) Carbon dioxide

(ii) The gas turns limewater milky.

(b) (i) Add water to calcium oxide.

(ii) calcium oxide + water $\longrightarrow$ calcium hydroxide

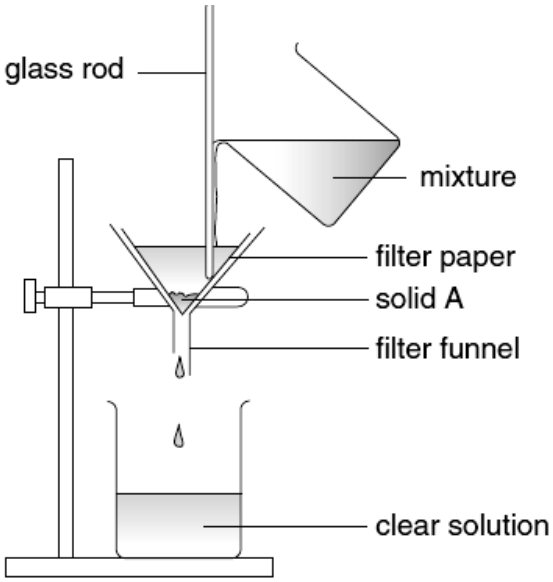
(c) (i) Add dilute hydrochloric acid to calcium carbonate.

(ii) Effervescence occurs. / Calcium carbonate dissolves in the dilute acid.

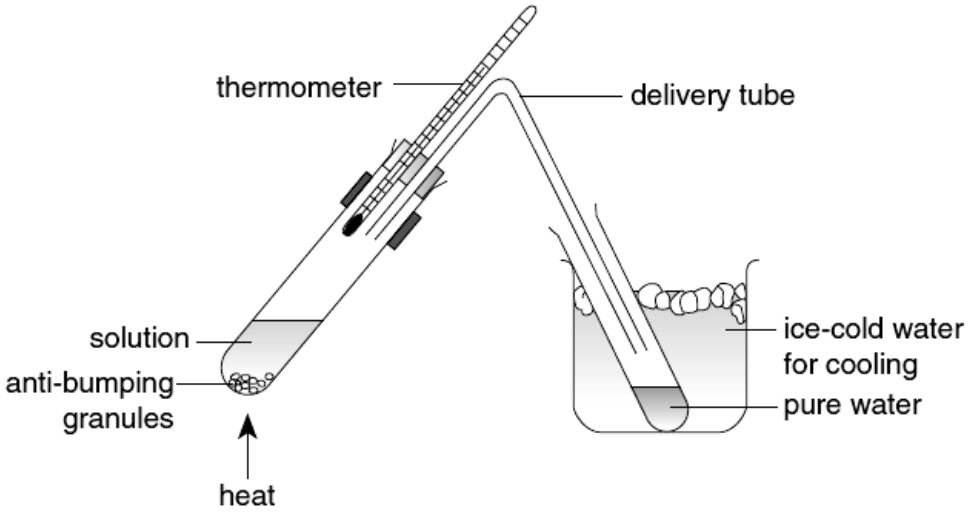
(iii) calcium carbonate + dilute hydrochloric acid $\longrightarrow$
calcium chloride + water + carbon dioxide

9. (a) Process 1: filtration
Process 2: distillation

(b) Process 1



Process 2



(c) Calcium carbonate

10. Carry out flame test to show the presence of calcium in the sample.
A sample containing calcium will give a brick-red flame.
Add dilute hydrochloric acid to the sample.
A carbonate reacts with dilute hydrochloric acid to give carbon dioxide gas.
The gas will turn limewater milky. The carbon dioxide gas can also be tested with a hydrogen carbonate indicator (which will change from red to yellow).