

Strand 2: Mixture, elements and compounds

2.1: Mixtures

Section A

1. C
2. B
3. A
4. A
5. A
6. D
7. B
8. C
9. B
10. D
11. B

Section B

1.
 - (a) Solvent extraction.
 - (b) The groundnut seeds are crushed and mixed with a suitable solvent. The solvent dissolves the oil and separates it from the solid seed material. The mixture is then filtered to remove the solid material and the solvent is removed to obtain the oil.

Or

A suitable solvent is added to a mixture so that one component dissolves while the other does not. The soluble substance is then separated from the mixture and the solvent is removed by evaporation to obtain the final product.

 - (c) Extracting colour from flower petals, such as hibiscus, using a suitable solvent.
2.
 - (a) River water is a heterogeneous mixture because it contains different substances, such as water and suspended soil particles, which are not uniformly distributed.
 - (b) The water can be separated using filtration followed by distillation. Filter the water to remove suspended soil and other insoluble particles. Heat the filtered water so that the water changes into vapour. Cool the vapour in a condenser so that it condenses into clean water, leaving dissolved impurities behind.
 - (c) Boiling the water can make it safer by killing disease-causing microorganisms.
3. By using the solvent extraction method.
4.
 - (a) Solute is a substance that is dissolved in a solvent to form a solution. Solvent is a substance that dissolves the solute to form a solution.
 - (b) Homogeneous mixture - A mixture with a uniform composition throughout, where the components are not easily distinguished. Heterogeneous mixture - A mixture with a non-uniform composition, where the components can usually be distinguished.

- (c) Solution - A homogeneous mixture formed when a solute dissolves completely in a solvent. Mixture - A combination of two or more substances that are physically combined and retain their individual properties; the components may be homogeneous or heterogeneous.

5.

- (a) Fractional distillation
(b) Crude oil; separating air into gases such as oxygen and nitrogen
(c) Thermometer - Measures the temperature of the vapour leaving the fractionating column, helping identify the fraction being distilled based on its boiling point.
Liebig condenser - Cools and condenses the vapour into a liquid.
Bunsen burner - Provides heat to the mixture, causing its components to vaporise.

6.

- (a) Air is classified as a mixture because it contains two or more gases.
(b) Fractional distillation.
(c) Air is first cooled to a very low temperature to liquefy it. The liquid air is then gradually warmed in a fractionating column. The gases vaporise at different temperatures because they have different boiling points and are therefore collected separately.

7. Pour the salt solution into an evaporating dish; Heat the solution gently to evaporate some of the water; Allow the concentrated solution to cool so that salt crystals form.

8.

- (a) Fractional distillation.
(b) The separation is possible because the components of crude oil have different boiling points.
(c) A- Refinery gas, B- petrol, C- kerosene, D- diesel oil

2.2: Acids, bases and indicators

Section A

1. A
2. A
3. C
4. B
5. B
6. C
7. B
8. C
9. B
10. B

Section B

1.
 - (a) It is alkaline or basic.
 - (b) Wear protective gloves and safety goggles when handling it.
 - (c) It is used in the manufacture of soap and detergents.
- 2.

Indicator	Colour in a base	Colour in an acid
Methyl orange	Yellow	Red
Blue litmus paper	Blue	Red

3.

- (a) A base/alkaline substance can be added to reduce soil acidity.
- (b) Lime (calcium carbonate).
- (c) Lime neutralises the excess acidity in the soil, raising the soil pH towards a suitable level for plant growth. This improves the availability of essential nutrients to plants.

4. Acidic substances – rainwater, vinegar, lemon juice, hydrochloric acid

Basic substances- wood ash solution, sodium hydroxide

5.

- (a) Coloured flower petals, mortar and pestle, scalpel or knife, ethanol or propanone, beaker or cut plastic bottle.
- (b) Cut the coloured flower petals into small pieces using a scalpel or knife.
Place the pieces in a mortar and crush them using a pestle.
Add a small amount of ethanol or propanone while crushing to extract the coloured substance from the petals.
Continue crushing until a deep-coloured solution is obtained.
Decant the extract into a clean beaker or cut plastic bottle.
Dispose of the waste plant materials appropriately.
Preserve the extract for use as an acid–base indicator.

6.

- (a) Bee stings are acidic.
- (b) Baking soda is basic/alkaline. It reacts with and neutralises the acid in the bee sting, helping to reduce its effects and pain.

7.

Acids	Bases
They have sour taste.	They have bitter taste.
They turn blue litmus paper red.	They turn red litmus paper blue.
They are soluble in water.	
Have a pH below 7.	Have a pH above 7
Solutions of acid in water conduct electricity.	Solutions of bases in water conduct electricity.
They are corrosive when concentrated.	They have slippery feel when touched.

8.

- (a) Blue litmus paper turns red. Red litmus paper remains red.

- (b) Car battery liquid contains sulphuric acid, so it is acidic. Acids turn blue litmus red, while red litmus remains red in an acidic solution.

9.

(a) Applications of acids:

- Hydrochloric acid in the stomach kills germs and provides an acidic medium for protein digestion.
- Vinegar is used in preservation of foods.
- Carbonic acid is used to preserve drinks such as sodas.
- Sulphuric acid is used in car batteries.
- Nitric (V) acid and sulphuric (VI) is used to manufacture fertilisers.
- Citric acid is used to add flavour in processed foods.
- Nitric acid is used to make dyes and paints.

(b) Applications of bases:

- Magnesium hydroxide, magnesium carbonate and calcium carbonate is used to make antacid tablets.
- Calcium hydroxide also known as lime is added to acidic soils to reduce acidity.
- Sodium hydroxide and potassium hydroxide are used to manufacture soaps and detergents.
- Ammonia solution is used in the manufacture of disinfectants for cleaning surfaces and removing stains.
- Ammonia is used in the manufacture fertilisers.