Aim

To prepare:

1. **A mixture**
2. **A compound**

Use iron filings and sulphur powder and distinguish between these based on:

(i) Appearance i.e., homogeneity and heterogeneity.
(ii) Behaviour towards a magnet
(iii) Behaviour towards carbon disulphide as a solvent.
(iv) Effect of heat.

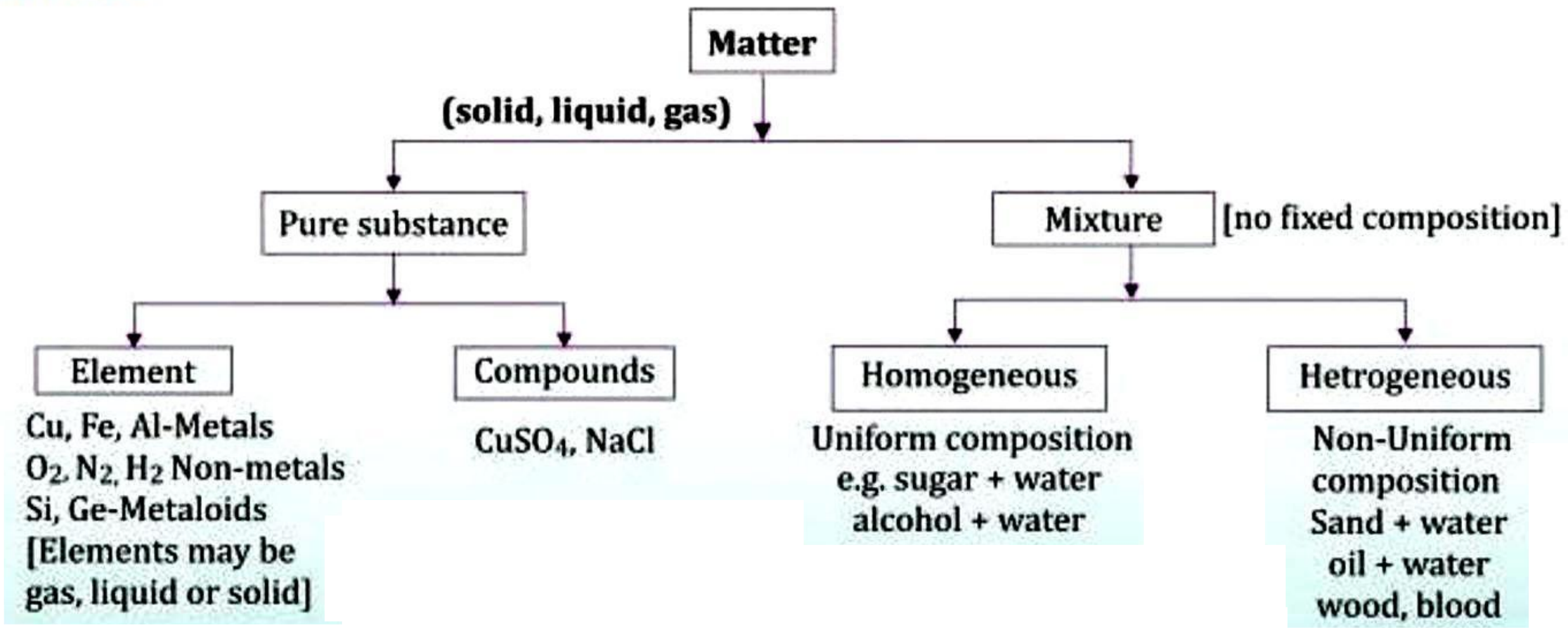
MATERIALS AND APPARATUS REQUIRED

Test tubes, test tube stand, test tube holder, hard glass test tube, Bunsen burner, tripod stand, wire gauze, magnet, China dish and a watch glass

CHEMICALS REQUIRED

Iron filings, sulphur powder, carbon disulphide.

THEORY



Mixture: When two or more than two substances mix in any proportion physically and do not show any chemical change, retain their individual properties, then they form a mixture.

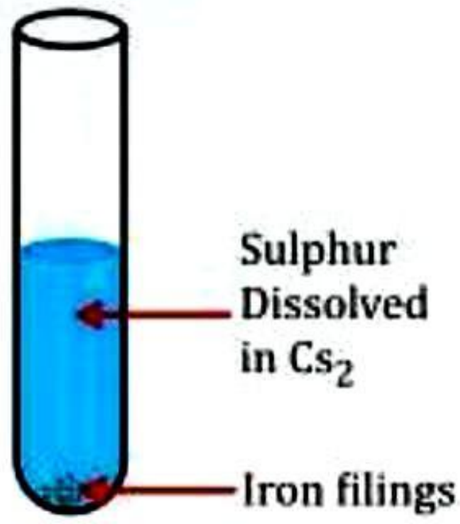
Compound: When two or more two substances combine chemically in a fixed ratio, such that they can be separated only by chemical means, then a compound is formed.

MIXTURE

Iron Filings | Sulphur Powder | Mixture of iron filings and sulphur powder

Separation of Iron and Sulphur from its Mixture

Mixture of iron filings and sulphur powder



COMPOUND

Heating of iron filings and sulphur powder

Separation of Iron and Sulphur from their compound

Mixture of iron fillings and sulphur powder

(A)

(B)

PROCEDURE

1. Preparation of a mixture of iron and sulphur powder.
2. Take a pinch of iron filings and two pinches of sulphur powder and mix them thoroughly. The product obtained is a mixture of iron and sulphur. Keep it in a watch glass (A).
3. Preparation of the compound of iron and sulphur.
4. Take a pinch of iron filling and a pinch of sulphur powder in a hard glass test tube. Hold it in a test tube holder and heat it on the flame till the contents glow. The reaction between sulphur and iron filings is seen in the test tube and iron sulphide is formed. Transfer the compound formed in a watch glass (B).
5. The mixture of iron filing and sulphur powder can be heated in China dish.
6. Record your observations in the table.

OBSERVATIONS

	Experiment	OBSERVATIONS	Inference
1	**Observe for appearance**	Watch glass (A) shows a heterogeneous mixture and (B) shows a black mass of homogeneous substance.	(A) is the mixture which is heterogeneous and (B) is a homogeneous substance.
2	**Action with Magnet.** A bar magnet is rolled over both the watch glasses A and B.	Iron filings cling to the magnet from watch glass (A) but not in (B).	Constituents of the mixture (A) can be separated physically but not in (B) i.e., compound.
3	**Behaviour towards carbon disulphide.** Take components from watch glass (A) and (B) in separate test tubes and add carbon disulphide to them.	In test tube (A) sulphur dissolves in carbon disulphide and iron filings settle down. Whereas in the other test tube (B) nothing dissolves.	Components of the mixture can be separated by physical means. A is a mixture. B is compound.
4	**Effect of heat**	On heating, the mixture from watch glass (A) the components react together to form a compound, but no change is seen in the compound from watch glass (B).	The mixture components from watch glass (A) react together to form a chemical compound, but no change is seen in the compound from watch glass (B).

CONCLUSION

1. 'A' is a mixture which is prepared by mixing iron filings and Sulphur.
2. 'B' is a compound which is formed by strongly heating a mixture of iron filings and Sulphur. The chemical equation for this change is as follows:

   $Fe + S \xrightarrow{\Delta} FeS$ (black)
3. The mixture of iron filings and Sulphur is heterogeneous while the compound iron sulphide is homogeneous.
4. The properties of FeS are different from the properties of its constituents.

PRECAUTIONS

1. Heat the mixture of iron and sulphur in a hard glass tube or a China dish.
2. Avoid wasting the chemicals, use a very little amount of them.
3. Heating activity should be done carefully.
4. Carbon disulphide is flammable, keep it away from the flame.

VIVA VOCE

Q1. What is a mixture?

Ans. Two or more components, when present together in any ratio, without undergoing a chemical change, are called a mixture.

Q2. Give two examples of a mixture.

Ans. Sand and salt, aerated drinks.

Q3. What are the different types of a mixture based on their compositions?

Ans. Based on the composition mixtures are of two types: homogeneous and heterogeneous.

Q4. What is a compound?

Ans. When two or more substances are chemically combined in a fixed ratio, a compound is formed.

Q5. Give two examples of a compound.

Ans. Ethanol, glucose.

Q6. What is a homogeneous mixture?

Ans. A homogeneous mixture has a uniform distribution of components.

Q7. What is a heterogeneous mixture?

Ans. A mixture in which components are not distributed evenly is a heterogeneous mixture.

Q8. Give two examples of Homogeneous and Heterogeneous mixture type of mixture.

Ans. **Homogeneous mixture:** sugar solution, Sulphur in CS_2
Heterogeneous mixture: sand in water, milk in water.

Q9. How can mixtures be separated?

Ans. Mixtures can be separated by different physical methods based on the properties of the constituents, e.g., filtration, decantation, evaporation and magnetic separation.

Q10. Why can a mixture of iron and Sulphur be separated using a magnet?

Ans. Iron being magnetic and retaining its properties in a mixture, gets attracted towards the magnet and can, therefore, be separated from Sulphur which is not attracted towards the magnet.

Q11. Why is the mixing of iron and Sulphur a physical change?

Ans. Iron and Sulphur do not lose their properties, therefore, mixing iron and Sulphur is a physical change.

Q12. What happens when a mixture of iron and Sulphur is heated?

Ans. A black compound called iron sulphone (FeS) is formed.

Q13. Give the equation involved.

Ans. $Fe + S \xrightarrow{Heat} FeS$

Q14. Is this combination of iron and Sulphur a physical or a chemical change? Why?

Ans. It is a chemical change as both iron and Sulphur lose their properties.

Q15. How can you separate the components of a compound?

Ans. The components of a compound are separated by chemical methods.

Q16. Is the reaction between FeS and H_2SO_4 [$FeS + H_2SO_4 \rightarrow FeSO_4 + H_2S$], a chemical or a physical change?

Ans. It is a chemical change.

Q17. Which out of iron and Sulphur would be soluble in CS_2?

Ans. Sulphur is soluble in CS_2

Q18. Which out of Fe and S is metal and which is non-metal?

Ans. Fe is a metal, whereas Sulphur is a non-metal.

Q19. Is rusting of iron a physical or a chemical change?

Ans. Rusting of iron is a chemical process.

Q20. Give two examples of a chemical change in daily life.

Ans. Digestion and curdling of milk.

Q21. Is the melting of butter a physical or a chemical change?

Ans. The melting of butter is a physical change.

Q22. Why is FeS unaffected by a magnet?

Ans. FeS is a compound in which iron has lost its properties, so it is unaffected by a magnet.

Q23. Why does brass react with dilute hydrochloric acid and is corroded in rainy season to form $CuCO_3.Cu(OH)_2$?

Ans. Brass is an alloy of copper and zinc. It is a homogeneous mixture. The combining elements retain their properties. Hence the copper in the brass reacts with the carbonates in the air to form $CuCO_3.Cu(OH)_2$

Q24. Sample 'X' is a mixture of iron filings and sulphur and sample 'Y' is the substance obtained by heating sample 'X' strongly. Sample 'X' and 'Y' are separately shaken with carbon disulphide in two different test tubes. Which of the two samples is partly soluble and insoluble in carbon disulphide? Justify your answer.

Ans.
- After shaking sample X' (mixture) with carbon disulphide, the sulphur component dissolves in carbon disulphide while iron does not.
- Sample Y' i.e., iron sulphide (FeS, a compound) is insoluble in carbon disulphide.

Q25. How do you separate a mixture of sulphur, iron filings and salt?

Ans. Iron filings get attracted to the magnet and thus can be removed from the mixture using magnetic separation method. The remaining mixture when dissolved in water, sulphur being insoluble separates out on filtration. Salt dissolved in water is then separated by crystallisation.

Q26. The iron sulphide formed by heating iron filings and sulphur is treated with dil. sulphuric acid. A colourless gas is evolved. Name the gas and write two characteristics of it.

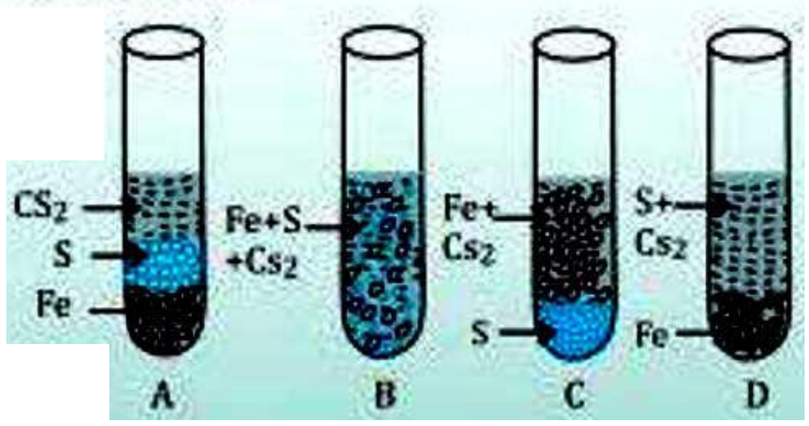
Ans. $FeS + H_2SO_4 \longrightarrow FeSO_4 + H_2S \uparrow$

H_2S gas is evolved. It is colourless and has a foul smell of rotten eggs.

Q27. Sample ' A ' is a mixture of iron filings and sulphur powder. Sample ' B ' is a compound of iron sulphide. Reema was asked to study the effect of heat on both the samples ' A ' and ' B '. Explain her observation.

Ans. On heating sample, A, grey solid mass of iron sulphide is formed whereas no change in colour of sample ' B ' is observed on heating the compound.

Q28. When a mixture of iron filings and sulphur is added to a test tube containing CS_2.What is observed?



Ans. Sulphur dissolves and iron gets deposited at the bottom of the tube.