Mixture & Compound – Experiment, Viva Voce

Experiment

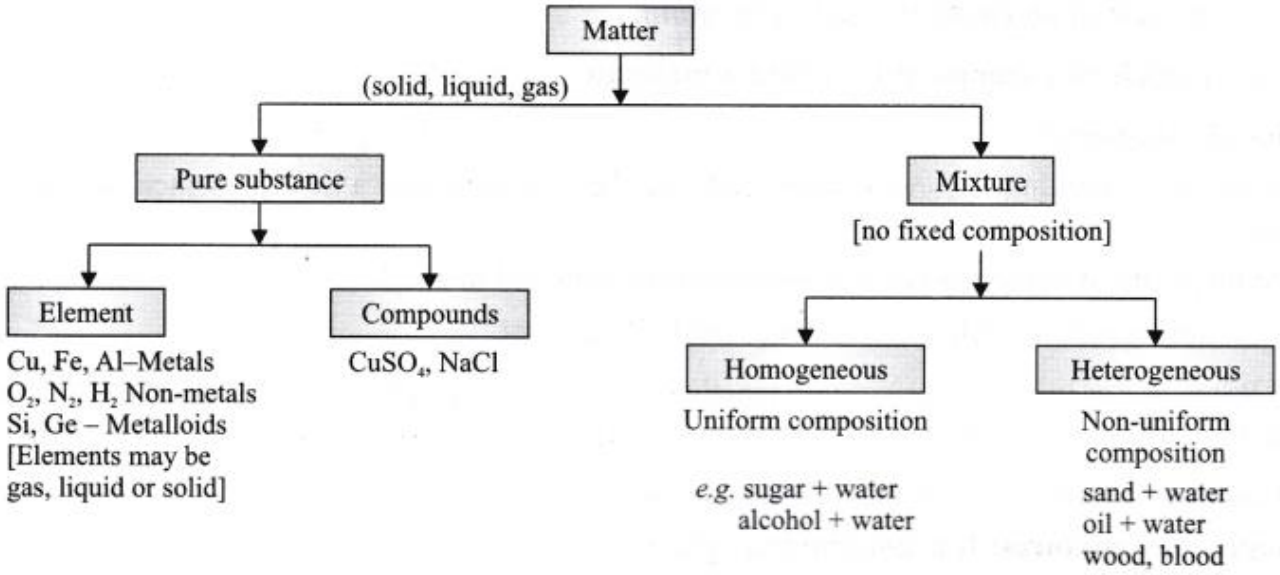
Aim
To prepare:

1. a mixture
2. a compound

Using iron filings and sulphur powder and distinguish between these on the basis of:

1. Appearance i.e., homogeneity and heterogeneity.
2. Behaviour towards a magnet
3. Behaviour towards carbon disulphide as a solvent.
4. Effect of heat.

Theory



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

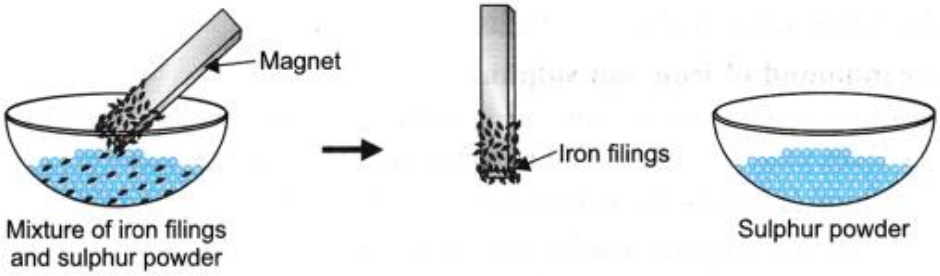
Differences between Mixture and Compound:

S.No.	Mixtures	Compound
1.	Components mix physically.	Components mix chemically.
2.	Constituents mix in any ratio.	Constituents mix in fixed ratio.
3.	The constituents retain their properties.	The constituents do not retain their properties.
4.	Separation of constituents can be done physically.	Separation of constituents is done chemically.

Mixture

Separation of Iron and Sulphur from its Mixture

I.



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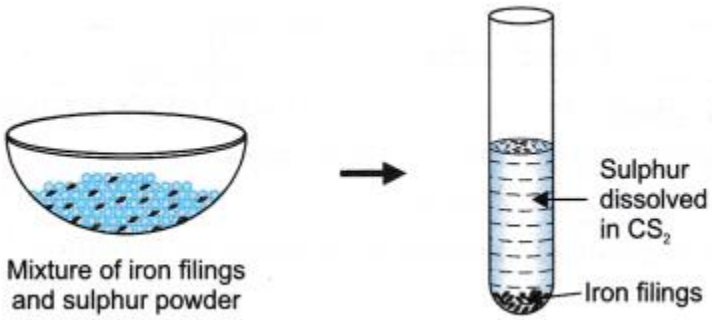
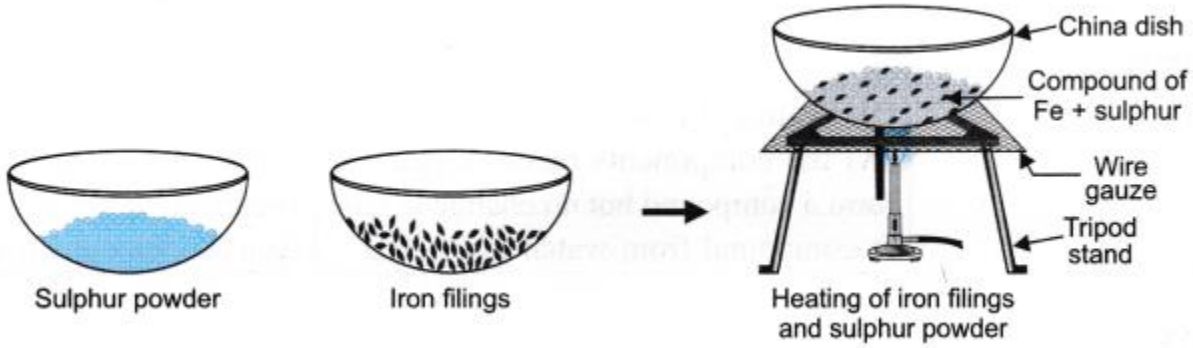
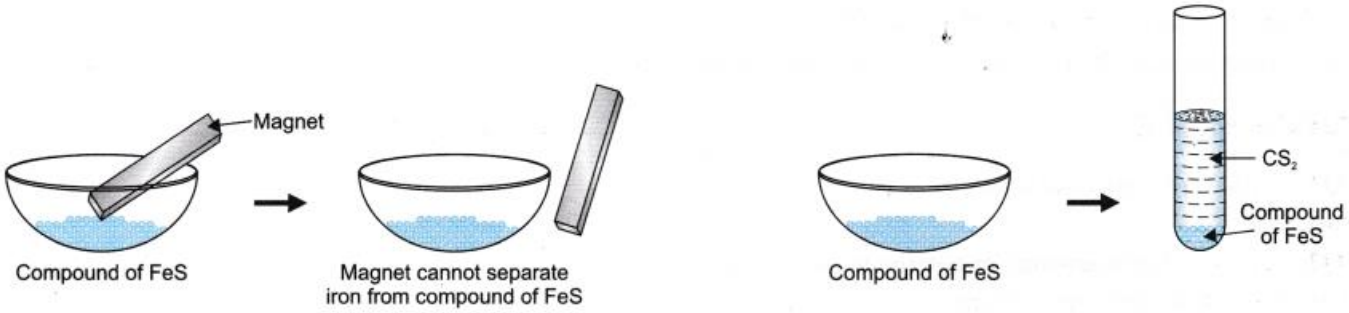


Compound



Separation of Iron and Sulphur from its compound



Materials 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.

Procedure

1. **Preparation of a mixture of iron and sulphur powder.**
   Take a pinch of iron filings and two pinch of sulphur powder, mix them thoroughly. The product obtained is mixture of iron and sulphur. Keep it in a watch glass (A).
2. **Preparation of the compound of iron and sulphur.**
   Take a pinch of iron filing and a pinch of sulphur powder in a hard glass test tube. Hold it in a test tube holder, 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).
   (The mixture of iron filing and sulphur powder can be heated in China dish)
   Record your observations in the table.

Observations

	Experiment	Observations	Inference
1.	**Observe for appearance**	Watch glass (A) shows heterogenous mixture and (B) shows a black mass of homogeneous substance.	(A) is mixture which is heterogeneous and (B) is homogeneous substance.
2.	**Action with Magnet.** A bar magnet is rolled over both the watch glasses A and B.	Iron filings cling to magnet from watch glass (A) but not in (B).	Constituents of 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 in it.	In test tube (A) sulphur dissolves in carbon disulphide and iron filings settles down. Whereas in other test tube (B) nothing dissolves.	Components of mixture can be separated by physical means. A is mixture. B is compound.
4.	**Effect of heat**	On heating mixture from watch glass (A) the components react together to form a compound but no change is seen in 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 compound from watch glass (B).

Precautions

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

VIVA VOCE

Question 1:
Is mixture a pure substance?
Answer:
No.

Question 2:
Is alloy a homogeneous or heterogeneous mixture?
Answer:
It is a homogeneous mixture.

Question 3:
Give one test to show that mixtures can be separated physically.
Answer:
Take sulphur + iron-mixture, roll magnet over it, iron filings clings to magnet.

Question 4:
Why doesn't air show same composition over all places? .
Answer:
Air is a mixture but various gases, particles, pollutants keep on adding in air in various proportions.

Question 5:
Give two examples of uniform composition in mixture.
Answer:
Sugar in water, salt in water.

Question 6:
Give two examples of non-uniform composition.
Answer:
Sand and salt, sugar and salt, blood.

PRACTICAL BASED QUESTIONS

Question 1:
Why do mixtures show heterogeneous appearance?
Answer:
The constituents of mixture are not mixed uniformly hence show heterogeneous appearance.
Question 2:
Name the constituents of the following compounds.
Water, Sugar, Magnesium oxide, Iron sulphide.
Answer:
Water – Hydrogen and Oxygen
Sugar – Carbon, Hydrogen, Oxygen
Magnesium Oxide – Magnesium and Oxygen
Iron sulphide – Iron and Sulphur.

Question 3:
What happens when dilute sulphuric acid is added to a mixture of iron and sulphur?
Answer:
Iron reacts with dilute sulphuric acid and hydrogen gas is released.

Question 4:
What happens when dilute sulphuric acid is added to a compound of iron and sulphur?
Answer:
The iron sulphide reacts with dilute sulphuric acid to form hydrogen sulphide gas, it is colourless gas with the smell of rotten eggs.

Question 5:
Classify the following into mixture and compound.
soil, air, alloy, sugar, soap solution, milk, coal, blood, glucose.
Answer:
Mixture – soil, air, alloy, soap solution, milk, coal, blood Compound – sugar, glucose.

Question 6:
How can you prove that water is a compound?
Answer:
On electrolysis of water we get hydrogen and oxygen gas is separated in fixed ratio always
i. e., H : O is 2 : 1.

Question 7:
Why do we use carbon disulphide as a solvent to dissolve sulphur?
Answer:
As sulphur does not dissolve in water, carbon disulphide is used as a solvent.

Question 8:
Give two examples of mixture formed by compounds.
Answer:
Common salt + sugar.
Smoke + methane + carbon dioxide in air.

Question 9:
Give two examples of mixture formed by two or more elements.
Answer:
Nitrogen and oxygen in air, copper and gold in alloy.

NCERT LAB MANUAL QUESTIONS

Question 1:
Why does brass react with dilute hydrochloric acid and is corroded in rainy season to form $CuC0_3.Cu(OH)_2$?
Answer:
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 $CuC0_3.Cu(OH)_2$

MULTIPLE CHOICE QUESTIONS (MCQs)
Questions based on Procedural and Manipulative Skills

Question 1:
A student was given a challenge to separate mixture of iron filings and sulphur powder, which method should he take?
(a) dissolve the mixture in water
(b) dissolve the mixture in dil.H_2S0_4 and filter
(c) dissolve the mixture in carbon disulphide
(d) dissolve the mixture in alcohol.

Question 2:
In the laboratory, what precaution needs to be taken while handling carbon disulphide.
(a) Keep it away from flame
(b) Keep it away from sunlight
(c) Keep it away from magnet
(d) Keep it away from distilled water.

Question 3:
Which is not the property of a mixture?
(a) It is a heterogeneous system
(b) It is a system of constant composition
(c) It is a system of variable composition
(d) Its components can be separated by physical methods.

Question 4:
Water in alcohol can be grouped as:
(a) compound
(b) homogeneous mixture
(c) heterogeneous mixture
(d) immiscible liquids.

Question 5:
Choose the homogeneous mixture
(a) wood
(b) blood
(c) charcoal
(d) sugar syrup.

Question 6:
The process used to separate a mixture of iron filings, iodine and common salt is:
(a) sublimation followed by magnetic separation
(b) dissolution in water followed by sublimation and magnetic separation

(c) magnetic separation followed by sublimation
(d) any order can be followed

Question 7:
To prepare iron sulphide by heating a mixture of iron filings and sulphur powder we should use a
(a) copper dish
(b) watch glass
(c) china dish
(d) petri dish

Question 8:
The components of a mixture of iron filings and sulphur are separated by:
(a) sublimation
(b) filtration
(c) using magnet
(d) distillation

Question 9:
In laboratory, carbon disulphide should be:
(a) kept away from flame
(b) kept away from distilled water
(c) kept away from alcohol
(d) kept away from sunlight

Question 10:
Which of the following would be the correct set of apparatus required if you have to separate camphor and common salt?
(a) Round bottom flask, funnel, burner, condenser, wire gauze, stand with clamp.
(b) Conical flask, filter paper, funnel, beaker, stand with clamp, wire gauze.
(c) Separating funnel, beaker, conical flask, tripod stand, burner wire gauze.
(d) China dish, funnel, burner, cotton plug, tripod stand, stand with clamp, wire gauze.

Questions based on Observational Skills

Question 11:
When we heat mixture of sulphur powder and iron filings, the first observation made is:
(a) sulphur melts
(b) iron filings start melting
(c) mixture becomes red hot
(d) mixture evaporates.

Question 12:
When iron and sulphur are heated at high temperature:
(a) yellow coloured iron sulphide is formed
(b) black coloured FeS is formed
(c) mixture of iron and sulphur is formed
(d) they do not react.

Question 13:
The smell of H_2S is
(a) pleasant
(b) like that of rotten eggs
(c) like that of burning sulphur
(d) none of these.

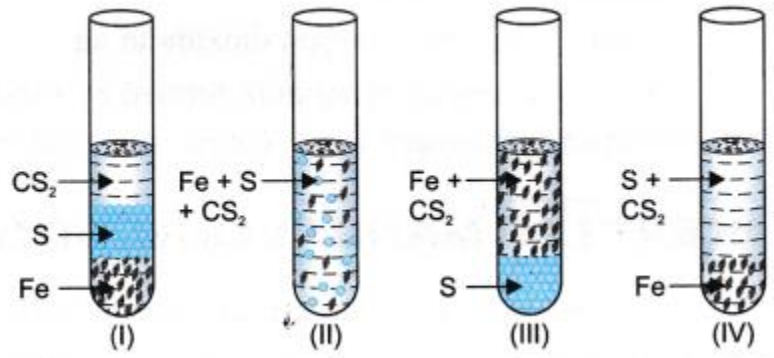
Question 14:
Sulphur is soluble in
(a) water
(b) carbon disulphide
(c) both (a) and (b)
(d) none of these.

Question 15:
Colour of the compound of iron and sulphur is
(a) black
(b) green
(c) yellow
(d) grey.

Question 16:
When a mixture of sulphur powder and iron filings is heated for a little longer time:
(a) iron filings starts melting
(b) the mixture sublimes
(c) the mixture melts
(d) only sulphur melts.

Question 17:
When iron filings and sulphur are heated:
(a) a black mass is obtained
(b) the mixture changes from black to yellow
(c) a pungent smelling gas is obtained
(d) the mixture becomes brown.

Question 18:
When a mixture of iron filings and sulphur is added to a test tube containing CS_2.What is observed?



(a) I
(b) II
(c) III
(d) IV

Question 19:
A mixture of iron filings and sulphur is heated, the colour of the mixture will change
(a) black to yellow
(b) yellow to black
(c) black to brown
(d) brown to yellow

Question 20:
What is observed when carbon disulphide is added to a mixture of iron filings and sulphur powder taken in a test tube? .
(a) iron filings turn red
(b) sulphur powder dissolves to give a colourless solution
(c) sulphur powder remains unaffected.
(d) A brisk effervescence

Question 21:
What is not observed when a magnet is moved repeatedly through a mixture of iron filing and sulphur placed on a paper?
(a) iron filings stick to the magnet
(b) A black mass of iron sulphide is formed
(c) sulphur powder is left on the paper
(d) Each of the above

Question 22:
A mixture of iron filings and sulphur is heated in a hard boiling tube. Which of the following will be observed?

(a) mixture sublimes
(b) Iron will melt first
(c) sulphur will melt first
(d) mixture becomes red hot without melting

Questions based on Reporting and Interpretation Skills

Question 23:
Which of the following will not happen when CS_2 is added to a mixture of iron filings and sulphur in a beaker?
(a) Iron filings do not dissolve in CS_2
(b) Sulphur will dissolve forming a yellow solution
(c) Iron sulphide will dissolve in CS_2
(d) none of these.

Question 24:
On mixing iron filings, sulphur and sulphuric acid
(a) hydrogen sulphide is released
(b) hydrogen gas is released
(c) iron sulphide is formed
(d) sulphur dioxide is formed.

Question 25:
A student by mistake mixed iron filings and sulphur powder. What should be added to separate the mixture?
(a) Ethyl alcohol
(b) Carbon disulphide
(c) Kerosene
(d) Cold water.

Question 26:
In which of the following mixtures the separation of the components may be done by using a magnet?
(a) A mixture of ferrous sulphide and copper sulphide.
(b) A mixture of iron filings and ferrous sulphide.
(c) A mixture of sulphur powder and ferrous sulphide,
(d) A mixture of carbon disulphide and ferrous sulphide.

Question 27:
Select a pure substance
(a) ice-cream
(b) milk
(c) sugar solution
(d) carbon dioxide gas.

Question 28:
Which amongst the following is not a mixture?
(a) dry ice
(b) air
(c) sugar syrup
(d) copper sulphate solution.

Question 29:
Which amongst the following is not a compound?
(a) sugar
(b) salt
(c) air
(d) water.

Question 30:
Select the mixture made up of two elements.
(a) Sand + water
(b) Sugar + water
(c) $C0_2 + H_2$
(d) Gold jewellery.

Question 31:
Select the mixture made up of an element and a compound.
(a) Copper sulphate solution
(b) Sulphur solution in Carbon disulphide
(c) An alloy of iron and steel
(d) Exhaust with smoke and carbon particles.

Question 32:
Select the mixture made up of two compounds.
(a) iron and water
(b) iron and sulphur
(c) iron oxide and carbon
(d) iron oxide and salt.

Question 33:
Select the heterogeneous mixture
(a) water + sugar
(b) water + salt
(c) water + glucose
(d) water + oil.

Question 34:
Choose the reaction that will result into the formation of mixture
(a) freezing of water to form ice
(b) adding water into lime (CaO)
(c) adding CS_2 into sulphur
(d) heating magnesium in air.

Question 35:
How can you separate a mixture of two immiscible liquids?
(a) heating in distillation flask
(b) evaporation
(c) separating funnel
(d) crystallisation.

Question 36:
The process of evaporation is fast when the mixture is
(a) heated but not covered
(b) heated but covered
(c) covered but not heated
(d) neither heated nor covered

SCORING KEY WITH EXPLANATION

1. (c) Sulphur will dissolve in carbon disulphide and iron can be filtered.
2. (a) It is highly flammable.
3. (b) No constant proportion is present in mixtures.
4. (b) Alcohol dissolves in water.
5. (d) Sugar syrup is stable and uniform throughout.
6. (c) Iron can be separated by magnet and iodine sublimes, leaving behind salt.
7. (c) China dish is the right apparatus used for strong heating.
8. (c) Iron is magnetic in nature.
9. (a) Carbon disulphide is highly flammable.
10. (d) All necessary apparatus given.
11. (a) The melting point of sulphur is less than iron.
12. (b) Sulphur reacts with iron to form a black colour compound FeS.
13. (b) It is the property of the gas.
14. (b) Sulphur does not dissolve in water but dissolves in organic solvent.
15. (a) FeS is black colour compound.
16. (d) The melting point of sulphur is low.
17. (a) FeS is black colour compound.
18. (d) Sulphur dissolves and iron gets deposited at the bottom of the tube.
19. (b) Sulphur is yellow in colour and iron sulphide is black.
20. (b) Sulphur dissolves and iron gets deposited at the bottom of the test tube.
21. (b) FeS is not formed by mixing iron and sulphur unless we heat the mixture strongly.

22. (c) The melting point of sulphur is less than iron.
23. (c) Iron sulphide is a compound of sulphur and its properties are different from sulphur.
24. (b) Fe being more reactive will displace hydrogen.
25. (b) Sulphur will dissolve in carbon disulphide and iron can be filtered.
26. (b) Iron filings are magnetic and will attract to the magnet.
27. (d) Elements or compounds are pure substances, carbon dioxide is a compound.
28. (a) Dry ice is solidified carbon dioxide.
29. (c) The components of air are not in proportion.
30. (d) In gold jewellery, gold is mixed with either copper or silver.
31. (b) Here sulphur is an element and carbon disulphide is a compound.
32. (d) Both are compound but, iron, sulphur and carbon are elements.
33. (d) Oil and water are not miscible and form heterogenous solution.
34. (c) Sulphur dissolves in organic solvent i.e., carbon disulphide.
35. (c) Separating funnel can separate the two immiscible liquids.
36. (a) For evaporation the substance should not be covered.