5. SEPARATION OF SOLID - SOLID MIXTURES

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. What kind of mixtures are alloys?
A) Solid-Gas B) Liquid-Liquid C) Gas-Gas D) Solid-Solid
Answer:D
Solution:Alloys (like brass, bronze) are mixtures of two or more metals or a metal and a non-metal in the solid state.
2. A magnet could be used to separate
A) colours in a food dye B) sand and iron filingsC)sand and salt D) water and sand
Answer:B
Solution:Iron is magnetic; sand is not. A magnet easily separates iron filings from sand.
3. Sublimation is the phase transition from _____
A)solid to liquid B)solid to gas C)gas to solid D)liquid to gas
Answer:B
Solution:Sublimation is when a solid directly changes to gas without becoming a liquid (e.g., dry ice, camphor).
4. Sublimation process is applicable for
A) Two sublimating substances B) Three sublimating substances
C) Two non sublimating substances D) One nonsublimating and one sublimating
Answer:D
Solution:Sublimation helps separate a sublimable solid (e.g., iodine) from a non-sublimable one (e.g., sand).
5. Which is not used as a solvent?
A)Petrol B)Acetone C)Benzene D)Phosphorus
Answer:D
Solution: Petrol, acetone, benzene are common solvents. Phosphorus is a reactive element, not used as a solvent.
6. Nickel and lead can be seperated by
A)Gravity B) Solvents C)Distillation D)Magnetic seperation
Answer:D
Solution:Nickel is magnetic, lead is not. Use a magnet to separate them.
7. Chemical formula of nitre is
A) $NaNO_3$ B)KNO_3 C)$AgNO_3$ D)NaOH
Answer:B
Solution:Nitre refers to potassium nitrate, used in fertilizers and gunpowder.
8. Which of the following is not a sublimable substance?
A)Ammonium chloride B)Iodine C)Naphthalene D)Iron fillings
Answer:D
Solution: Iron does not sublime. The others (ammonium chloride, iodine, naphthalene) are sublimable solids.
9. Gunpowder is a mixture of

A)Nitrogen,Carbon, Hydrogen B)Sodium,Oxygen,Nitrogen
C)Nitre,Carbon,Sulphur D)Potassium,Chlorine,Hydrogen

Answer:C

Solution:Traditional gunpowder (black powder) is made of KNO_3 (nitre), carbon (charcoal), and sulphur.

10. Rubber dissolves in
A)Benzene B)Alcohol C)Oil D)Petrol

Answer:A

Solution:Rubber (natural rubber, polyisoprene) dissolves in benzene because both are non-polar substances with similar intermolecular forces (London dispersion forces).

Benzene's molecular structure allows it to effectively break apart rubber's polymer chains.

11. What is the primary purpose of hand picking in agriculture?
A) To separate stones from rice and pulses
B) To separate salt from sand
C) To remove rotten fruits from fresh ones
D) To sort oranges and apples based on color

Answer:A

Solution:Hand picking is used to remove large, visible impurities like stones from grains.

12. Why is hand picking not effective for separating salt from sand?
A) Salt and sand have similar sizes and textures
B) Salt is heavier than sand
C) Sand is lighter than salt
D) Salt dissolves in water

Answer:A

Solution:Salt and sand look similar, making it hard to pick one from the other manually. Also, salt dissolves in water, allowing for separation by filtration

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

13. Gun powder is soluble in
A)Carbondisulphide B)Water C)Benzene D)Ethyl alcohol

Answer:A

Solution:Gunpowder, which is a mixture of sulfur, charcoal, and potassium nitrate, is not soluble in water, but it is soluble in Carbon Disulphide

Carbon Disulphide; it is a non-polar solvent and like dissolves like. Benzene and ethyl alcohol are also organic solvents, but carbon disulfide is the most effective at dissolving sulfur.

14. Carbondisulphide can dissolve
A)Iodine B)Sulphur C)Phosphorus D)Nitre

Answer:A,B,C

Solution:Carbon disulphide (CS_2) is a non-polar solvent. It can dissolve other non-polar substances like:Iodine ,Sulphur ,Phosphorus

Nitre (KNO_3) is ionic and water-soluble, not soluble in CS_2.

15. Sublimable solids are
A)Benzene B)Iodine C)Water D)Camphor
Answer:B,D
Solution:Sublimable solids change directly from solid to gas on heating.Iodine ,Camphor
Benzene is a liquid at room temperature.
Water changes from solid (ice) to liquid, not via sublimation.

Statement Type:

A) Both Statements are true, Statement II is the correct explanation of Statement I.
B) Both Statements are true, Statement II is not correct explanation of Statement I.
C) Statement I is true, Statement II is false.
D) Statement I is false, Statement II is true.
16. Statement I : We can seperate nickel from mixture of nickel and lead by magnetic seperation.
Statement -II : One of the components of mixture is magnetic substance.
Answer:A
Solution:Nickel is magnetic, while lead is not.
Magnetic separation works when one component is magnetic.
17. Statement -I : Mixture of salt and sand can be seperated by using gravity method.
Statement -II : In gravity method, one of the components of mixture is lighter than the other.
Answer:D
Solution:Statement I is false because salt and sand are not separated using gravity method. Instead, we use dissolution, filtration, and evaporation.
Statement II is true in general: gravity method (like winnowing) works when one substance is lighter than the other

Comprehension Type:

Comprehension I:
Using solvents method , we can seperate components of mixture based on solubility by using specific solvents
18. Which is soluble in ethyl alcohol?
A)Iodine B)Oil C)Chlorophyll D)Nail polish
Answer:A,C,D
Solution:Ethyl alcohol (ethanol) is a versatile solvent that can dissolve:
Iodine (A) – Forms a brown solution (used in tincture of iodine for antiseptic purposes).
Chlorophyll (C) – Extracted from leaves using ethanol in laboratories.
Nail polish (D) – Many nail polish formulas use ethanol as a solvent or thinner.
Oil is non-polar, while ethanol is polar.
Oil dissolves better in non-polar solvents (e.g., hexane, ether) but not in ethanol.

Comprehension II:

There are five methods to seperate solid -solid mixtures. they are magnetic seperation, solvents, gravity etc... based on physical properties of components in the mixtures.

19. Sodium nitrate and Sodium chloride are seperated by:

A) Solvents B)MagnetC)Fractional crystallisation D)Sublimation

Answer:C

Solution:Sodium nitrate ($NaNO_3$) and sodium chloride (NaCl) are both soluble in water, so you cannot use solvents or sublimation.

Magnet won't work as neither substance is magnetic.

Fractional crystallisation is the correct method — it separates two soluble solids based on their different solubilities and crystallization temperatures.

Integer type:

20. Among sawdust , sand, marble, how many are heavier components?.....

Answer:2

Solution: Sand and Marble are heavier components.

Matrix Matching Type:

21. Column - I	**Column - II**
A)Oxalic acid	1.Paint
B)Benzene	2.Iodine
C)Ethyl alcohol	3.Rubber
D)Turpentine oil	4.Rust

Answer:A-4,B-3,C-2,D-1

Solution:

Column - I	**Column - II**
A)Oxalic acid	4) Rust (Removes rust stains)
B)Benzene	3) Rubber (Dissolves rubber)
C)Ethyl alcohol	2) Iodine (Makes tincture of iodine)
D)Turpentine oil	1) Paint (Used as paint thinner)

22. Column - I	**Column - II**
A)In sand and sawdust	1.Heavier component
B) Magnetic seperation is used	2.Lighter component is sawdust
C) Magnetic substance	3.Iron
D) Limestone	4. Nickel
	5.To seperate iron from soil

Answer:A-2,B-5,C-3,4,D-1

Solution:

A)In sand and sawdust	2.Lighter component is sawdust
B) Magnetic seperation is used	5.To seperate iron from soil
C) Magnetic substance	3.Iron, 4. Nickel
D) Limestone	1.Heavier component

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. Sulphur is soluble in
A)Carbon-disulphide B)Water C)Ethyl alcohol D)Petrol
Answer:A
Solution:Sulphur is a non-polar substance, and dissolves in non-polar solvents like carbon disulphide.
2. Iron in sand mixture can be seperated by
A)Solvents B)Gravity C)Magnetic seperation D)Sublimation
Answer:C
Solution:Iron is magnetic, sand is not. A magnet will attract iron, separating it from sand.
3. Which is soluble in Acetone?
A)Iodine B)Chlorophyll C)Nail polish D)Oil
Answer:C
Nail polish is soluble in Acetone.
4. Oil is soluble in
A) Benzene B)Oxalic acid C)Carbondisulphide D)Petrol
Answer:D
Solution:Oil is a nonpolar substance and dissolves in nonpolar solvents like petrol. While oil is also soluble in benzene and carbon disulphide , the most common and practical solvent for oil in everyday use is petrol .
5. Iodine is ..... in nature
A) Magnetic B)Soluble C)Sublimable D)denser
Answer:C
Solution:Iodine undergoes sublimation (directly changes from solid to gas without becoming liquid), which is one of its characteristic properties.
6. Which of the following are magnetic substances?
A)Steel B)Iron C)Cobalt D)All the above
Answer:D
Solution:Steel (A), Iron (B), and Cobalt (C) are all ferromagnetic materials, meaning they are strongly attracted to magnets.
7. Which of the following is needed for seperation of mixtures?
A)Chemical properties B)Melting point C)Boiling point D) Physical properties
Answer:D
Solution:Mixtures are separated based on differences in physical properties (e.g., boiling point, melting point, solubility, density) rather than chemical properties.
8. Among sand and saw-dust , lighter component is.....
A)Sand B)Saw-dust C)Both D)None
Answer:B
Solution:Sawdust is less dense and lighter compared to sand, making it the lighter component.
9. Turpentine oil can dissolve.....
A)Paint B)Grease C)Paraffin wax D)Both A &C
Answer:D

Solution:Turpentine oil is a nonpolar solvent that can dissolve paint (A) and paraffin wax (C), both of which are nonpolar substances.

10. The process of separation of two different soluble substances from their solution by crystallization at controlled temperature, such that one of the solid crystallises is called……

A) Fractional Distillation B)Gravity method
C)Sublimation D)Fractionalcrystallisation

Answer:D

Solution:Fractional crystallisation is a method used to separate two or more soluble solids from a solution by controlled cooling or evaporation, allowing one substance to crystallize out while the other remains dissolved.

JEE MAIN LEVEL QUESTIONS

1. Sublimation is a technique that helps chemists to

A) break B) purify C) melt D) freeze

Answer:B

Solution:Sublimation involves the direct transition of a solid to a gas without passing through the liquid phase.

It is used to purify substances (e.g., iodine, camphor) by leaving non-sublimable impurities behind.

2. Magnetic process is possible

A) when both are Magnetic B)when one is Magnetic other one is non Magnetic
C)when both are non Magnetic D)none

Answer:B

Solution:Magnetic separation works when one component is magnetic (e.g., iron, nickel, cobalt) and the other is non-magnetic (e.g., sand, sulfur).

If both are magnetic or both are non-magnetic, separation by this method is not possible.

3. Iodine and shellac can dissolve in

A)Ethyl alcohol B)Turpentine oil C)Acetone D)Spirit

Answer:A

Solution:Iodine dissolves in organic solvents like ethyl alcohol (ethanol) and acetone.

Shellac (a natural resin) is also soluble in alcohol.

Turpentine oil and spirit (methanol) are less effective for both substances.

4. Which of the following method is suitable for seperation of salt and sand?

A)Magnetic seperation B)Gravity C)Distillation D)Crystallisation

Answer:D

Solution:Salt (soluble in water) and sand (insoluble) can be separated by:

Dissolving the mixture in water (sand remains undissolved).

Filtering out the sand.

Evaporating the water to recover salt via crystallization.

5. One of the component is soluble but another is insoluble in specific solvent, then the technique used is

A)Gravity B)Solvents C)Magnet D)Sublimation

Answer:B

Solution:If one substance dissolves in a solvent while the other does not, solvent extraction/filtration is used.
Example: Salt (soluble) + Sand (insoluble) $\rightarrow$Dissolve in water, filter, and evaporate.
6. Which of the following techniques are used for solid-solid mixtures?
A) Magnetic seperation B)Using gravityC)Fractional crystallisation D)All the above
Answer:D
Solution:Magnetic separation (A): Separates magnetic solids (iron) from non-magnetic ones (sulfur).
Gravity method (B): Used for solids with different densities (e.g., sand and sawdust).
Fractional crystallisation (C): Separates solids based on solubility differences (e.g., KNO_3 and NaCl).
7. Which of the following is not seperated by using solvents?
A)Sand and Sawdust B)Sand and Iodine C)Salt and Sand D)Sand and Sulphur
Answer:A
Solution:Sand and sawdust (A) $\rightarrow$ Both are insoluble in common solvents, so they cannot be separated this way. Instead, they are separated by gravity or flotation.
8. In potassium nitrate and sodium chloride, More soluble component is
A)Potassium nitrate B)Sodium chloride C)Sodium nitrate D)Potassium chloride
Answer:A
Solution:Potassium nitrate (KNO_3) is much more soluble in hot water than sodium chloride (NaCl).
This difference in solubility allows their separation via fractional crystallisation.
9. Choose the solvent that seperates common salt and marble powder
A)Turpentine oil B)Water C)Carbondisulphide D)Benzene
Answer:B
Solution:Common salt (NaCl) dissolves in water, while marble powder ($CaCO_3$) is insoluble.
Other solvents (turpentine oil, carbon disulfide, benzene) cannot dissolve salt.
10. Which method is used to seperate iodine and sand?
A)Gravity B)Solvents C)Sublimation D)Both B&C
Answer:D
Solution:B) Solvents $\rightarrow$ Iodine dissolves in alcohol/acetone, while sand does not.
C) Sublimation $\rightarrow$ Iodine sublimes (turns directly into vapor) when heated, leaving sand behind.
Both methods are effective, so the correct answer is D) Both B & C.
11. What property of rice, pulses, and stones is crucial for the effectiveness of hand picking?
A Their color B) Their taste C) Their shapes, sizes, and textures D) Their weight
Answer:C
Solution:Hand picking relies on visible differences in physical characteristics like size, shape, and texture.
For example, stones are usually larger/rougher than rice grains, making them easy to identify and remove manually.

12. How do farmers separate husk from grains during winnowing?
A) By using a machine B) By hand picking
C) By pouring the mixture on a windy day D) By soaking the mixture in water
Answer:C
Solution:Winnowing involves tossing the grain-husk mixture into the air.
The wind blows away the lighter husk, while the heavier grains fall back down.
Machines (A) are used in modern farming but aren't traditional winnowing. Hand picking (B) and soaking (D) don't separate husk effectively.
13. What is the role of wind in the process of winnowing?
A) To blow away the grains B) To blow away the husk
C) To mix the husk with grains D) To make the process faster
Answer:B
Solution:Wind carries the lighter husk particles away, leaving the denser grains behind.
14. Why is winnowing effective in separating husk from grains?
A) Because grains are heavier than husk
B) Because husk is heavier than grains
C) Because husk is lighter than grains
D) Because grains and husk have similar weights
Answer:C
Solution:Husk is less dense and gets carried by wind, while grains fall due to gravity.
Option A is incorrect because weight alone doesn't explain the separation mechanism.
Husk is never heavier than grains (B), and similar weights (D) would prevent separation.

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

15. Choose the correct statements
A)Grease is soluble in petrol
B)Nitre is soluble in ethyl alcohol
C)Paraffin wax is soluble in Turpentine oil
D)Sulphur is soluble in water
Answer:A,C
Solution:Grease is a nonpolar substance, and petrol (a nonpolar solvent) can dissolve it effectively.
Paraffin wax is nonpolar, and turpentine oil (a nonpolar solvent) can dissolve it.

Comprehension Type:

Comprehension I:
Using solvents method , we can seperate components of mixture based on solubility by using specific solvents
16. Identify the solvent used to seperate Rubber and Oil?
A)Water B)Petrol C)Carbondisulphide D)Acetone.

Answer:B
Solution:When separating rubber and oil, petrol is the most practical solvent because:
It dissolves both components
Allows for subsequent separation techniques
Is readily available and cost-effective

Comprehension II:
There are five methods to seperate solid -solid mixtures. they are magnetic seperation, solvents, gravity etc... based on physical properties of components in the mixtures.
17. Sand and Sawdust can be seperated by...
A)Solvents B)Gravity C)Magnet D)Distillation
Answer:B
Solution:Gravity separation (B) works because:
When mixed with water, sand settles quickly at the bottom
Sawdust floats or remains suspended
Can be separated by decantation or filtration

Integer type:

18. How many methods are there to seperate solid solid mixtures?....
Answer:8
Solution:
The common methods used to separate solid-solid mixtures is:8 methods
They are:Hand picking,Sieving,Winnowing,Magnetic separation,Sublimation,Solvent extraction (or dissolution method),Gravity separation ,Fractional Crystallization.
19. Among Paint,Grease , Iodine,Oil , how many are soluble in petrol?.....
Answer:4
Solution:All four substances are nonpolar and dissolve in petrol (a nonpolar solvent)
20. How many solvents are used to seperate components in the gunpowder?....
Answer:2
Solution:Gunpowder contains potassium nitrate (KNO_3), charcoal, and sulfur.
Water dissolves KNO_3 (separating it from charcoal/sulfur).
Carbon disulfide (CS_2) dissolves sulfur (leaving charcoal).
Thus, two solvents are needed for complete separation.
21. i) Potassium nitrate and sodium chloride
ii) Sand and sulphur
iii) Nitre and charcoal,
iv) Iodine and sand
v) Gunpowder. How many are solid-solid mixtures?.....
Answer:5
Solution:All given examples are solid-solid mixtures.

KEY

				TEACHING TASK					
1	2	3	4	5	6	7	8	9	10
D	B	B	D	D	D	B	D	C	A
11	12	13	14	15	16	17	18	19	20
A	A	A	A,B,C	B,D	A	D	A,C,D	C	2
21		22							
A-4,B-3,C-2,D-1		A-2,B-5,C-3,4,D-1							
				LEARNERS TASK					
1	2	3	4	5	6	7	8	9	10
A	C	C	D	C	D	D	B	D	D
				JEE MAIN:&ADVANCED LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
B	B	A	D	B	D	A	A	B	D
11	12	13	14	15	16	17	18	19	20
C	C	B	C	A,C	B	B	8	4	2
21									
5									