

## 6. SEPERATION OF MIXTURES : SOLID - SOLID MIXTURES SOLUTIONS

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### TEACHING TASK

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#### JEE MAINS LEVEL QUESTIONS

##### Mutiple Choice Question Type :

1. What kind of mixtures are alloys?

- A) Solid-Gas B) Liquid-Liquid C) Gas-Gas D) Solid-Solid

**Answer:D**

Solution:Alloys are mixtures of two or more metals or a metal and another element, forming a solid-solid mixture.

2. A magnet could be used to separate

- A) colours in a food dye B) sand and iron filings C) sand and salt D) water and sand

**Answer:B**

Solution:A magnet can attract and separate 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 the direct transition from a solid to a gas without passing through the liquid phase.

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 is used to separate a sublimating substance from a non-sublimating one

5. Which is not used as a solvent?

- A) Petrol B) Acetone C) Benzene D) Phosphorus

**Answer:D**

Solution:Phosphorus is not used as a solvent, whereas petrol, acetone, and benzene are common solvents.

6. Nickel and lead can be seperated by

- A) Gravity B) Solvents C) Distillation D) Magnetic seperation

**Answer:D**

Solution:Nickel is magnetic, but lead is not, so a magnet can separate them.

7. Chemical formula of nitre is

- A)  $\text{NaNO}_3$  B)  $\text{KNO}_3$  C)  $\text{AgNO}_3$  D)  $\text{NaOH}$

**Answer:B**

Solution:Nitre, also known as saltpeter, is potassium nitrate, with the chemical formula  $\text{KNO}_3$

8. Which of the following is not a sublimable substance?

- A) Ammonium chloride B) Iodine C) Naphthalene D) Iron fillings

**Answer:D**

Solution:Iron filings do not sublime, whereas ammonium chloride, iodine, and

naphthalene do

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: Gunpowder is a mixture of  $\text{KNO}_3$  (nitre), charcoal (carbon), and sulphur.

10. Rubber dissolves in

- A) Benzene B) Alcohol C) Oil D) Petrol

**Answer: A**

Solution: Rubber dissolves in benzene, but not in alcohol, oil, or petrol

### **JEE ADVANCED LEVEL QUESTIONS**

#### **Mutli Correct Answer Type :**

11. Gun powder is soluble in

- A) Carbondisulphide B) Water C) Benzene D) Ethyl alcohol

**Answer: A, C**

Solution: A) Carbon disulphide (Gunpowder's components, like sulfur, are soluble in  $\text{CS}_2$ .)

C) Benzene (Some components of gunpowder dissolve in benzene.)

B) Water (Potassium nitrate ( $\text{KNO}_3$ ) in gunpowder is water-soluble, but sulfur and carbon are not, so gunpowder as a whole is not fully soluble in water.)

D) Ethyl alcohol (Gunpowder does not dissolve in ethanol.)

12. Carbondisulphide can dissolve

- A) Iodine B) Sulphur C) Phosphorus D) Nitre

**Answer: A, B, C**

Solution: A) Iodine (Iodine dissolves well in  $\text{CS}_2$ , forming a purple solution.)

B) Sulphur (Sulfur is highly soluble in  $\text{CS}_2$ .)

C) Phosphorus (White and red phosphorus dissolve in  $\text{CS}_2$ .)

D) Nitre ( $\text{KNO}_3$ ) (Nitre is not soluble in  $\text{CS}_2$ ; it dissolves in water instead.)

13. sublimable solids are

- A) Benzene B) Iodine C) Water D) Camphor

**Answer: B, D**

Solution: Sublimable solids directly change from solid to gas.

Examples: Iodine, Camphor. Also includes ammonium chloride, naphthalene, etc.

#### **Statement Type :**

A) Statement-I, is True, Statement - II is True; Statement - II is a correct explanation for Statement-I .

B) Statement - I is True, Statement is True; Statement -II , is NOT a correct explanation for Statement - I

C) Statement - I is True, Statement - II , is False

D) Statement - I is False, Statement - II is True

14. Statement I : We can separate nickel from mixture of nickel and lead by magnetic separation.

Statement II : One of the components of mixture is magnetic substance.

**Answer: A**

Solution: Nickel is magnetic, while lead is non-magnetic, so a magnet can be used to separate them. Since Statement II correctly explains Statement I

15. Statement I : Mixture of salt and sand can be separated by using gravity method.

Statement II : In gravity method, one of the components of mixture is lighter than the other.

**Answer:D**

Solution:The gravity separation method is generally used for separating heavy ores from lighter impurities, not for salt and sand. Salt is soluble in water, so the correct method is dissolution, filtration, and evaporation, not gravity separation. Statement II is a true general statement about gravity separation, but it doesn't apply to the example given in Statement I.

### **Comprehension Type :**

#### **Comprehension - I :**

Using solvents method , we can separate components of mixture based on solubility by using specific solvents

16. 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 separate solid -solid mixtures. they are magnetic separation, solvents, gravity etc... based on physical properties of components in the mixtures.

17. Sodium nitrate and Sodium chloride are separated by:

A) Solvents B)Magnet C)Fractional crystallisation D)Sublimation

**Answer:C**

Solution:Sodium nitrate ( $\text{NaNO}_3$ ) and sodium chloride ( $\text{NaCl}$ ) have different solubilities in water at varying temperatures.

Fractional crystallization works by dissolving the mixture in hot water and then slowly cooling it.

$\text{NaNO}_3$  is much more soluble at higher temperatures than  $\text{NaCl}$ , so it remains dissolved while  $\text{NaCl}$  crystallizes out first upon cooling.

Further cooling allows  $\text{NaNO}_3$  to crystallize separately.

#### **Integer Type :**

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

**Answer:2**

Solution:Sawdust – Very light (low density, floats on water)

Sand – Heavy, sinks in water

Marble – Heavier, a dense solid stone

### Matrix Matching Type :

19. 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:

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

Oxalic acid is a rust remover (not related to paint, iodine, or rubber).

Benzene dissolves rubber (not typically used for iodine or paint).

Ethyl alcohol dissolves iodine to make medical tinctures.

Turpentine oil is primarily a paint thinner.

20. Column - I      Column - II

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

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### LEARNERS TASK

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#### CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Question Type :

1. Sulphur is soluble in

- A)Carbon-disulphide B)Water C)Ethyl alcohol D)Petrol

**Answer:A**

Solution:Sulphur dissolves well in  $\text{CS}_2$ , forming a yellow solution

2. Iron in sand mixture can be separated by

- A)Solvents B)Gravity C)Magnetic separation D)Sublimation

**Answer:C**

Solution:Iron is magnetic, while sand is not

3. Which is soluble in Acetone?

- A)Iodine B)Chlorophyll C)Nail polish D)Oil

**Answer:C**

Solution:Nail polish is soluble in Acetone.

Oil is not very soluble in acetone (partial miscibility only).

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 sublimates from solid to gas directly.

6. Which of the following are magnetic substances?

A) Steel B) Iron C) Cobalt D) All the above

**Answer:D**

Solution: Iron, steel, and cobalt are all magnetic materials.

7. Which of the following is needed for separation of mixtures?

A) Chemical properties B) Melting point C) Boiling point D) Physical properties

**Answer:D**

Solution: Separation relies on differences in physical properties like density, solubility, etc

8. Among sand and saw-dust, lighter component is.....

A) Sand B) Saw-dust C) Both D) None

**Answer:B**

Solution: Sawdust is much lighter than sand.

9. Turpentine oil can dissolve.....

A) Paint B) Grease C) Paraffin wax D) Both A & C

**Answer:D**

Solution: Turpentine oil dissolves paint and paraffin wax.

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

A) Fractional Distillation B) Gravity method

C) Sublimation D) Fractional crystallisation

**Answer:D**

Solution: Fractional crystallisation separates two solids based on their different solubilities in the same solvent at different temperatures.

### **JEE MAINS LEVEL QUESTIONS**

#### **Multiple Choice Question Type :**

1. Sublimation is a technique that helps chemists to

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

**Answer:B**

Solution: Sublimation is used to purify substances that sublime, like iodine or camphor.

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 requires one component to be magnetic (e.g., iron) and the other non-magnetic (e.g., sand).

3. Iodine and shellac can dissolve in

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

**Answer:A**

Solution:Iodine dissolves in alcohol to form tincture iodine, and shellac is also alcohol-soluble

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

A)Magnetic separation B)GravityC)Distillation D)Crystallisation

**Answer:D**

Solution:Salt dissolves in water, while sand does not. After filtration, salt is recovered by evaporation/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:Solvent extraction separates mixtures based on solubility differences.

6. Which of the following techniques are used for solid-solid mixtures?

A) Magnetic separation B)Using gravityC)Fractional crystallisation D)All the above

**Answer:D**

Solution:Magnetic separation, gravity, and fractional crystallization are all methods for solid-solid mixtures

7. Which of the following is not separated by using solvents?

A)Sand and Sawdust B)Sand and Iodine C)Salt and Sand D)Sand and Sulphur

**Answer:A**

Solution:Neither sand nor sawdust dissolves in common solvents; 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: $\text{KNO}_3$  is much more soluble in hot water than  $\text{NaCl}$ , enabling fractional crystallization

9. Choose the solvent that separates common salt and marble powder

A)Turpentine oil B)Water C)Carbondisulphide D)Benzene

**Answer:B**

Solution:Salt dissolves in water, while marble powder ( $\text{CaCO}_3$ ) does not.

10. Which method is used to separate iodine and sand?

A)Gravity B)Solvents C)Sublimation D)Both B&C

**Answer:D**

Solution:Iodine can be separated by solvent (e.g., alcohol) or sublimation, while sand remains unaffected.

## **JEE ADVANCED LEVEL QUESTIONS**

### **Mutli Correct Answer Type :**

11. 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: A) Grease is soluble in petrol

(Grease, being a non-polar substance, dissolves well in non-polar solvents like petrol.)

C) Paraffin wax is soluble in Turpentine oil

(Turpentine oil is a common solvent for waxes like paraffin.)

B) Nitre is soluble in ethyl alcohol

(Nitre ( $\text{KNO}_3$ ) is poorly soluble in alcohol; it dissolves much better in water.)

D) Sulphur is soluble in water

(Sulphur is insoluble in water but dissolves in non-polar solvents like carbon disulphide.)

### **Comprehension Type :**

#### **Comprehension - I :**

Using solvents method , we can separate components of mixture based on solubility by using specific solvents

12. Identify the solvent used to separate 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 separate solid -solid mixtures. they are magnetic separation, solvents, gravity etc... based on physical properties of components in the mixtures.

13. Sand and Sawdust can be separated by...

- A) Solvents B) Gravity C) Magnet D) Distillation

**Answer:B**

Solution: Sawdust is lighter and may float on water, while sand is heavier and settles down. This difference in density allows separation by gravity method (also called sedimentation or decantation).

### **Integer Type :**

14. How many methods are there to separate 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.

15. 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)

16. How many solvents are used to separate components in the gunpowder?....

**Answer:2**

Solution: Gunpowder contains potassium nitrate ( $\text{KNO}_3$ ), charcoal, and sulfur. Water dissolves  $\text{KNO}_3$  (separating it from charcoal/sulfur).

Carbon disulfide ( $\text{CS}_2$ ) dissolves sulfur (leaving charcoal).

Thus, two solvents are needed for complete separation.

17. 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					
				JEE MAINS LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
D	B	B	D	D	D	B	D	C	A
				JEE ADVANCED LEVEL QUESTIONS					
11	12	13	14	15	16	17	18	19	
A,C	A,B,C	B,D	A	D	A,C,D	C	2 A-4,B-3,C-2,D-1		
20									
A-2,B-5,C-3,4,D-1									
				LEARNERS TASK					
				CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)					
1	2	3	4	5	6	7	8	9	10
A	C	C	D	C	D	D	B	D	D
				JEE MAINS LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
B	B	A	D	B	D	A	A	B	D
				JEE ADVANCED LEVEL QUESTIONS					
11	12	13	14	15	16	17			
A,C	B	B	8	4	2	5			