Chapter 9: Methods of Separation in Everyday Life

Practice Worksheet 3

Name: _____ Class & Sec: 6_____ Date: _____

Section A: Multiple Choice Questions

1. To separate a mixture of sand settled in water from the clear water above it, which pair of methods is most suitable?

(a) Winnowing and threshing (b) Sedimentation and decantation (c) Churning and sieving (d) Magnetic separation and threshing

2. A goldsmith finds iron filings mixed with gold dust on his workshop floor. Which method should he use to remove the iron filings without losing any gold dust?

(a) Winnowing (b) Sieving (c) Magnetic separation (d) Churning

3. Which of these mixtures CANNOT be separated by winnowing?

(a) Wheat grains and husk (b) Rice and husk (c) Salt dissolved in water (d) Chaff and grain

4. Filter paper is more effective than ordinary cloth for filtration mainly because it:

(a) Is cheaper (b) Has very fine pores that trap smaller particles (c) Dissolves in water (d) Can be reused many times

5. Cream is separated from milk in dairies using a method similar to:

(a) Filtration (b) Churning (c) Threshing (d) Sieving

6. A mixture of potatoes, salt and sawdust is given. The most convenient FIRST step to separate the potatoes would be:

(a) Filtration (b) Handpicking (c) Evaporation (d) Churning

7. After removing the potatoes, adding water to the salt-sawdust mixture and stirring would dissolve the:

(a) Sawdust (b) Salt (c) Both salt and sawdust (d) Neither

8. Filtering the salt-sawdust solution prepared above would separate out the:

(a) Salt (b) Water (c) Sawdust (d) None of these

9. To finally recover solid salt from the filtered salt solution, which method should be used?

(a) Threshing (b) Evaporation (c) Magnetic separation (d) Winnowing

10. A face mask traps dust and germ particles from the air much like a:

(a) Magnet (b) Filter (c) Churner (d) Soop

Section B: Fill in the Blanks

1. The fine hair inside our nose acts like a _____ that traps dust particles from the air we breathe.

2. Face masks are usually made of layers of _____ that filter out dust and germs.

3. In a mixture of potatoes, salt and sawdust, the potatoes can first be removed by _____.

4. When water is added to a salt-sawdust mixture, the salt _____ in the water while the sawdust does not.

5. Sawdust floating in a salt solution can be removed by the method of _____.

6. After filtering out the sawdust, salt can be recovered from the salt solution by _____.

7. A mixture of iron filings and sand can be separated using a _____.

8. Decantation, sedimentation and filtration are all methods used to separate the components of a solid-_____ mixture.

9. While performing separation activities, especially with heat, we should always work under proper _____.

10. A mixture with many different components often needs a _____ of more than one method of separation.

Section C: True or False

1. A face mask works on a principle similar to filtration. **(True / False)**

2. A mixture of iron filings and sand can be separated by winnowing alone. **(True / False)**

3. In the potato-salt-sawdust mixture, handpicking is a convenient first step because the potatoes are large. **(True / False)**

4. Salt dissolved in water can be separated from the water by simple filtration. **(True / False)**

5. Sawdust does not dissolve in water; it floats or mixes without dissolving. **(True / False)**

6. Evaporation is the step used to get back solid salt from a salt solution. **(True / False)**

7. A combination of methods is sometimes required to separate a mixture with multiple components. **(True / False)**

8. Filtration alone can completely separate salt from a salt solution. **(True / False)**

9. Nasal hair has nothing to do with any method of separation. **(True / False)**

10. No special caution is needed while performing separation activities that involve heating. **(True / False)**

Section D: Answer in Two Lines

1. How would you separate a mixture of potatoes, salt, and sawdust? (Answer briefly)

2. Why can't filtration alone separate salt from a salt solution?

3. How does nasal hair help our body?

4. Why do we wear masks, and how do they work?

5. Why would a goldsmith use a magnet to clean floor sweepings containing gold dust and iron filings?

6. Can winnowing separate salt from water? Give a reason.

7. What should you keep in mind while choosing a filter for a mixture?

8. Why should activities involving heating always be done carefully?

9. Give one example each of a method to separate (a) two solids and (b) a dissolved solid from a liquid.

10. Why is it important to know different methods of separation in everyday life?

Section E: Short Notes (Answer in 5–8 lines)

1. Outline a stepwise procedure to separate a mixture of potatoes, salt and sawdust into its three components.

2. Explain, with reasons, why a single method of separation is not always enough for a mixture with many components.

3. Describe how the human body and everyday objects (like nasal hair and masks) use the principle of filtration.

4. Compare handpicking and magnetic separation: when would you choose one over the other?

5. Summarise any four methods of separation you have learnt in this chapter, along with one example of each.

Section F: Case Study Based Questions

Case Study 1

Case Study: *As part of a science exhibition, Anika was given a mixture containing small potato pieces, common salt and sawdust, all mixed together in one container. She had to design a series of steps using only the methods she had learnt in science class to get back all three components separately.*

i) *Suggest the very first step Anika should take, and why.*

ii) *After removing the potato pieces, what should Anika do next to begin separating the salt from the sawdust?*

iii) *What is the last step Anika must perform to get back solid salt, and why?*

Case Study 2

Case Study: *During a heavy dust storm, Karan's mother asked everyone at home to wear a mask before stepping outside. Karan wondered why even without a mask, most of the dust does not reach deep inside our lungs.*

i) *Identify the separation method that a mask works on.*

ii) *Apart from masks, name one natural part of our body that also works like a filter.*

iii) *Why are masks with finer fabric or multiple layers usually more effective at keeping out tiny dust particles?*

Case Study 3

Case Study: *A goldsmith was worried that some iron filings had accidentally mixed with the gold dust collected from his workshop floor. He wanted a method that would not waste even a single speck of the precious gold dust.*

i) *Which method of separation should the goldsmith use, and why?*

ii) *Will this method work if the floor sweepings also contained sand mixed with the gold dust? Why or why not?*

iii) *Suggest what method could remove sand from the gold dust, if needed.*

Case Study 4

Case Study: *Suresh is a ragpicker who collects waste material from a city dump every day. He has his own way of separating useful items: first he picks out plastic bottles and metal cans by hand, then uses a magnet on the remaining heap, and finally allows the rest to dry in the sun before sorting paper from wet waste.*

i) *Name the THREE different methods of separation that Suresh is using, in the order he uses them.*

ii) *Why might Suresh choose to handpick plastic bottles and cans before using the magnet?*

iii) *Suggest one way Suresh's work benefits the environment.*

Case Study 5

Case Study: *While on a camping trip, Tanvi's group needed drinking water but could only find a muddy pond nearby. Tanvi remembered what she had learnt in science class and let the muddy water stand undisturbed in a bucket for some time before pouring it carefully into another container through a piece of clean cloth.*

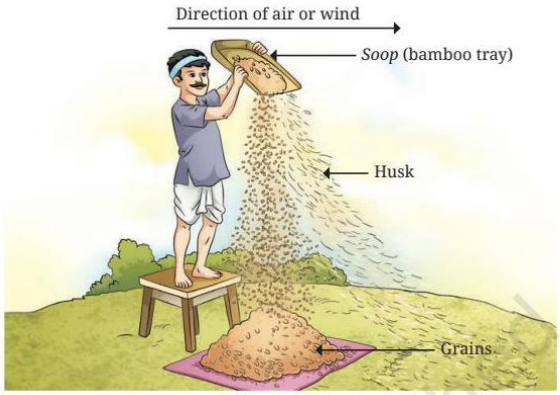
i) *Which TWO methods of separation has Tanvi used here, in order?*

ii) *Why did Tanvi let the water stand undisturbed before pouring it?*

iii) *Is the water now completely safe to drink? What additional step would you suggest, and why?*

Section G: Picture Based Questions

Picture 1



i) *What would happen to this process if it were attempted inside a closed room? Give a reason.*

ii) *Identify the labelled part in the picture that represents the heavier component.*

iii) *Suggest one modern device that could provide artificial wind if natural wind is not available.*

Picture 2

i) *What will remain behind once all the water in the pits has evaporated?*

ii) *Apart from making salt, name one other everyday example where evaporation is used to separate or concentrate a substance.*

iii) *Would this method work well on a cloudy, cold day? Why or why not?*

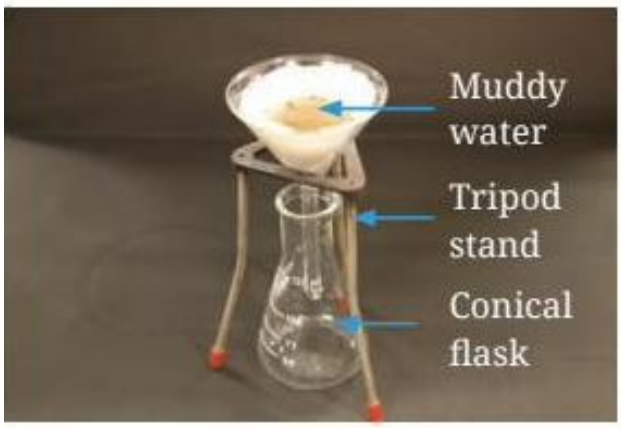
Picture 3

i) *Why must the vessel be tilted gently and not shaken in this process?*

ii) *Name one other pair of substances (mentioned in your chapter) that can be separated by a similar method.*

iii) *Is this method sufficient to get completely clear tea? Why or why not?*

Picture 4



i) *Apart from filter paper, name TWO other materials mentioned in your chapter that can be used as filters.*

ii) *On what basis should we choose which filter material to use for a particular mixture?*

iii) *Give one real-life example (other than the one shown) where filtration is used.*

Picture 5

i) *Apart from carpentry workshops, name one large-scale place where this method is used.*

ii) *Why is this method considered very quick and effective for the type of mixture shown?*

iii) *Which chapter would you recall to understand why only certain substances respond to a magnet?*

ANSWER KEY — Worksheet 3

Section A: Multiple Choice Questions

1. (b) Sedimentation and decantation
2. (c) Magnetic separation
3. (c) Salt dissolved in water
4. (b) Has very fine pores that trap smaller particles
5. (b) Churning
6. (b) Handpicking
7. (b) Salt
8. (c) Sawdust
9. (b) Evaporation
10. (b) Filter

Section B: Fill in the Blanks

1. filter
2. cloth/fabric
3. handpicking
4. dissolves
5. filtration
6. evaporation
7. magnet
8. liquid
9. supervision
10. combination

Section C: True or False

1. True
2. False — Magnetic separation is more suitable, since iron filings are attracted to a magnet while sand is not.
3. True
4. False — Filtration cannot separate a dissolved solid; evaporation is needed to recover salt from its solution.
5. True
6. True
7. True
8. False — Filtration cannot separate dissolved substances; it only separates insoluble solids from a liquid.
9. False — Nasal hair works like a natural filter, trapping dust particles from the air.

10. False — Caution is always needed while heating, such as in the china dish evaporation activity, to avoid burns.

Section D: Answer in Two Lines

1. First handpick out the potatoes. Then add water to dissolve the salt, filter out the sawdust, and evaporate the filtered salt solution to recover the salt.

2. Salt dissolves completely in water to form a solution, so its particles pass through the filter paper along with the water.

3. Nasal hair acts like a natural filter, trapping dust and larger particles present in the air we breathe in.

4. Masks are usually made of layers of cloth or fine fabric, and they filter out dust particles and germs from the air we breathe.

5. Since iron filings are magnetic and gold dust is not, a magnet can pull out the iron filings, leaving the gold dust behind.

6. No, winnowing only separates heavier and lighter solid particles using wind; dissolved salt cannot be blown away from water.

7. The choice of filter depends on the size of the particles to be removed; finer particles need a filter with smaller pores.

8. Heating can cause burns or accidents, so such activities should be done carefully, preferably under adult or teacher supervision.

9. (a) Sieving or handpicking can separate two solids; (b) Evaporation can separate a dissolved solid like salt from a liquid.

10. Many daily tasks like cooking, cleaning, and farming need separation of useful substances from unwanted ones, so knowing these methods helps us do such tasks efficiently.

Section E: Short Notes

1. To separate a mixture of potatoes, salt, and sawdust, we can follow a series of steps using different separation methods. First, since potato pieces are large enough to be identified easily, they can be removed from the mixture by handpicking. Next, water is added to the remaining mixture of salt and sawdust, and the mixture is stirred well; the salt dissolves completely in the water to form a salt solution, while the sawdust, being insoluble, remains floating or mixed in the water without dissolving. This mixture is then passed through a filter, such as filter paper; the sawdust gets collected as residue on the filter, while the salt solution passes through as the filtrate. Finally, the filtered salt solution is heated to evaporate the water completely, leaving behind solid common salt. In this way, all three components are obtained separately.

2. A single method of separation usually works on only one particular property of the components, such as their size, weight, magnetism, or solubility in a liquid. When a mixture contains more than two components with different properties, one method may successfully separate only one pair of components but may fail to separate the others. For example, in a mixture of potatoes, salt and sawdust, handpicking can remove the potatoes, but it cannot separate the dissolved salt from the insoluble sawdust; for that, water, filtration and evaporation are additionally needed. Therefore, mixtures with multiple components usually require a carefully planned

combination of two or more separation methods, applied one after another in a suitable sequence.

3. Filtration is the process of separating insoluble solid particles from a liquid or air using a material with tiny pores or holes, and this principle is also used by our body and by everyday objects to keep out unwanted particles. Inside our nose, fine nasal hair acts like a natural filter, trapping dust and larger particles present in the air before it reaches deeper into our respiratory system. Similarly, the masks we wear, especially in dusty conditions or during illness, are usually made of layers of cloth or fine fabric containing tiny pores; these pores allow us to breathe normally while trapping dust particles and germs. Both examples show how the simple idea of using small pores to block bigger particles is applied by nature and by human-made objects for protection and health.

4. Handpicking and magnetic separation are both methods used to remove unwanted solid particles from a mixture, but they work differently and suit different situations. Handpicking involves manually picking out particles based on differences in their size, colour, or shape, and is convenient only when the unwanted particles are present in small quantities and can be easily identified and removed by hand. Magnetic separation, on the other hand, uses a magnet to instantly attract and remove magnetic substances like iron from a mixture, regardless of how many magnetic particles are present, as long as the rest of the mixture is non-magnetic. We would choose handpicking for mixtures like stones in rice, and magnetic separation when the component involved is magnetic, such as iron nails in sawdust, since it is much faster than picking out each piece individually.

5. This chapter introduces several methods used to separate the components of a mixture in everyday life. Handpicking is the method of removing unwanted particles by hand based on differences in size, colour or shape, such as picking small stones out of rice. Winnowing separates heavier and lighter components of a mixture using wind or blowing air, such as separating husk from grain using a bamboo soop. Sieving separates solid particles of different sizes using a sieve, such as separating bran from wheat flour. Evaporation is used to separate a dissolved solid from a liquid by converting the liquid into vapour, such as obtaining common salt from seawater. (Students may choose any four methods, with one correct example each.)

Section F: Case Study Based Questions

Case Study 1

i) She should first handpick the potato pieces, since they are large enough to be picked out easily by hand.

ii) She should add water to the remaining mixture and stir, so that the salt dissolves in the water while the sawdust remains undissolved; she can then filter out the sawdust.

iii) The last step is evaporation of the filtered salt solution, so that the water turns into vapour and solid salt is left behind.

Case Study 2

i) Filtration.

ii) Nasal hair, present inside our nose, acts like a natural filter to trap dust particles.

iii) Finer fabric or multiple layers have smaller pores, so they can trap even very tiny dust and germ particles more effectively, just as filter paper with fine pores works better than cloth with bigger pores.

Case Study 3

i) Magnetic separation, because iron filings are magnetic and will get attracted to a magnet, while the non-magnetic gold dust will be left behind.

ii) No, magnetic separation alone will not remove sand, because sand is also non-magnetic and will not respond to the magnet.

iii) Since gold dust and sand may differ in particle size, a method such as sieving could be used (any reasonable, justified answer is acceptable).

Case Study 4

i) Handpicking (for plastic bottles and cans), magnetic separation (using a magnet on the heap), and evaporation/drying (using the sun to dry wet waste).

ii) Plastic bottles and cans are large and easy to identify, making handpicking the most convenient first step.

iii) His work helps in recycling useful materials and reduces the amount of waste that goes unmanaged, keeping the environment cleaner (any valid benefit).

Case Study 5

i) Sedimentation and decantation (letting the mud settle, then pouring off the water), followed by filtration through cloth.

ii) Standing undisturbed allows the heavier mud particles to settle down at the bottom, so most of the clear water can be poured off carefully without disturbing the settled mud.

iii) No, removing mud does not make water germ-free; Tanvi should also boil the water before drinking, since separation methods remove particles but not necessarily harmful germs.

Section G: Picture Based Questions

Picture 1

i) It would not work properly, because winnowing needs wind or moving air to blow away the lighter husk, and there is no wind inside a closed room.

ii) Grains (the heavier component, falling close to the person).

iii) An electric fan (or a winnowing machine/thresher).

Picture 2

i) Solid common salt (mixed with some impurities, before further purification).

ii) Drying herbs or spices in the sun, or drying washed clothes (any valid example).

iii) It would work more slowly, because evaporation depends on heat and air movement; without strong sunlight, the process takes much longer.

Picture 3

i) Gentle tilting avoids disturbing the settled tea leaves at the bottom, so that mainly the clear liquid is poured out.

ii) Oil and water (oil forms a separate layer and can be poured/decanted off).

iii) No, decantation does not completely separate all particles; a few light leaves may still pass into the cup, so filtration is needed for completely clear tea.

Picture 4

i) Cotton, cloth, charcoal, sand (any two).

ii) The choice of filter depends on the size of the particles to be removed.

iii) Any valid example, such as a tea strainer filtering tea, a fishing net catching fish and debris while letting water pass, or a mask filtering dust.

Picture 5

i) Recycling plants/scrapyards, which use magnetic cranes to separate scrap iron from waste heaps.

ii) It is quick and effective because the magnet can instantly attract and lift out all magnetic pieces from a heap without needing to handpick each one.

iii) The chapter "Exploring Magnets".