UNIT 4: Exploring Diversity of Matter Using Separation Techniques

Section: A

1. B	6. D	11. B	16. A	21. A
2. A	7. C	12. D	17. B	22. A
3. A	8. C	13. A	18. C	
4. B	9. B	14. A	19. D	
5. C	10. B	15. C	20. C	

Section: B

1. (a) Chromatography
   (b) Evaporation
   (c) Filtration and evaporation.

2. (a) Perfume industry, oil refinery (Petroleum industries)
   (b) Mining industries, scrap yard (To remove iron from scrap metal)

3. (a) A - retort stand
   B - round-bottom flask/ distillation flask.
   C - condenser
   D - conical flask
   (b) Because the cost of setting up the plant is high and large amounts of fuel are required for constant heating.
   (C) In reverse osmosis, pressure are applied for seawater to pass through a semi-permeable membrane. The membrane only allows water molecules to pass through so that pure water is obtained. Salt molecules and other particles that are much larger than water molecules are left on the other side of the membrane.

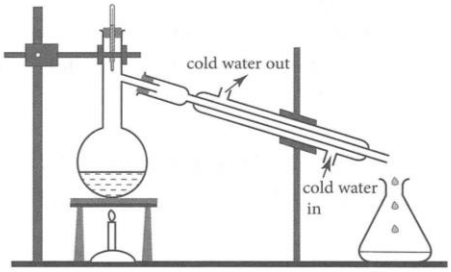
4. (a) Evaporation
   (b) Distillation
   (c) Chromatography
   (d) Magnetic attraction
   (e) Fractional distillation

Section: C

1. (a) 1. Pour the mixture of water and the salt into the distillation flask in the distillation set-up.
   2. Boil the solution and collect the distillate in a small beaker.
   3. Make sure the temperature reads 100 °C when the distillate is collected.
   4. Pure water is obtained in the beaker.
   (b) Sulfur is a non-magnetic substance and iron fillings is a magnetic substance. So a magnet can be used to separate these two.

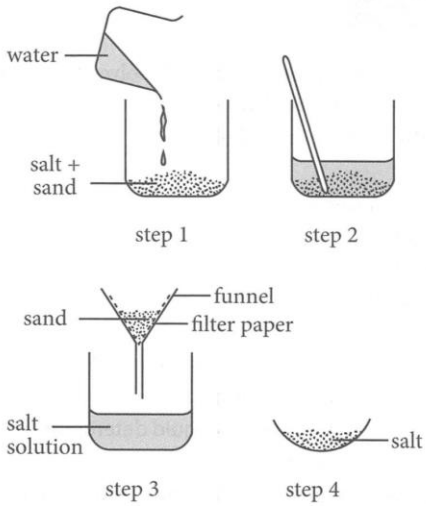
2. Method of separation : Filtration
   (a) A : Filter funnel
   B : Residue
   C : Beaker
   D : Filtrate
   E : Filter paper
   Method of separation : Filtration
   (b) Sand and water
   (c) Purification of water, air filters in vacuum cleaners

3. (a) (i) Bulb of the thermometer is placed incorrectly.
(ii) Condenser is placed horizontally.
(iii) Water inlet and water outlet are connected incorrectly.
(iv) A stopper is placed in the conical flask which collects the distillate.



(b) (i) Thermometer is placed wrongly.
Correction: The bulb of the thermometer should be placed near the mouth of the condenser.
Reason: This helps to record the temperature of the distilled liquid and shows its boiling point.
(ii) Condenser is placed horizontally.
Correction: It has to be tilted at an angle.
Reason: This improves the circulation of water and allows the distillate to flow into the conical flask.
(iii) Water inlet and water outlet are connected incorrectly.
Correction: The water supply enters the condenser at the lower opening and leaves at the upper opening.
Reason: This ensures a better cooling effect.
(iv) A stopper is placed at the mouth of the conical flask.
Correction: Remove the stopper and leave the flask open to collect the distillate.
Reason: Otherwise the air inside may prevent the distillate from entering the flask.

4.



Step 1: Add water to the salt and sand mixture.
Step 2: Mix well until the salt is dissolved. Sand does not dissolve in water.
Step 3: Filter the solution. The sand remains in the funnel and the salt solution passes through the filter paper.
Step 4: Heat the salt solution under sunlight, so that water is evaporated leaving behind the salt.

5. (a) Ink contains dye which may get dissolved in the solvent and affect the result. Pencil lead is not soluble and does not affect the result.
(b) The solvent level should be below the spots of dyes and solutions so that the solvent can travel up and dissolve the dyes and move further to give results.
(c) To ensure a good separation. Using larger amounts may cause the spots to merge and give unclear results.

6. (a) Chromatography
(b) Water
(c) So that the solvent gets absorbed and travels up the filter paper.

(d) 

[Note: Sweets and candies are coloured by three dyes so there should be circles to show that.]

7. **(a)** A, C and E
   (b) A and B
   (c) D
   (d) To ensure maximum separation of the components of the dyes.