

Lesson Plan 28

Subject: Chemistry

Topic: Mixtures and Compounds

Sub – Topic: Separation of Mixtures and Compounds

Grades: 7 & 8

Duration: 30mins

Objectives:

1. To distinguish between mixtures and compounds.
2. To separate mixtures by using such techniques as solubility differences in water, filtration and evaporation.
3. To decompose various compounds either by heating or electrolysis.

Materials Required:

1. white rice, uncooked
2. 7 small beakers
3. dilute sulphuric acid
4. white sand
5. table sugar
6. copper(II) chloride
7. table salt
8. hydrogen peroxide
9. bromothymol blue indicator
10. distilled water
11. small raw potato
12. 6 electrical leads with
13. ground black pepper
14. 1 medium beaker
15. alligator clips
16. iron filings
17. matches
18. 3 6 - volt batteries
19. ground charcoal
20. hot plate
21. 4 graphite electrodes
22. coffee filter papers
23. sodium sulfate
24. 2 U-shaped drying tubes
25. 2 utility clamps
26. 2 ring stands
27. Hoffman electrolysis
28. plastic spoons
29. strainer
30. apparatus

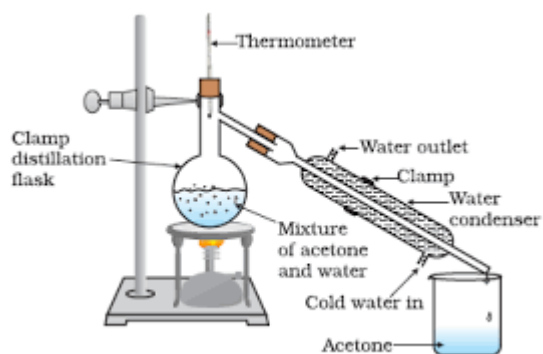
Strategy:

1. Review definitions of element, compound and mixture while showing students examples of each (e.g. aluminum foil, sugar and Kool-Aide).

2. Hold up a small bottle of sand and another of white rice. Ask students to name some properties of each. Now pour some of each into the same small beaker and stir. How have the properties of each changed? What have we made? How could we separate them? Students may suggest separating them by picking out the rice; have a student try this. What would be a faster way? Use a strainer.

3. Hold up a bottle of distilled water and another of table salt. Again ask students to name their properties. Pour small portions of each into the same small beaker and stir. How have the properties of each changed? What have we made? How could we separate them? Place the beaker on the hot plate and observe what happens with heating. What is left in the beaker? What left the beaker?

4. Hold up samples of table salt and ground black pepper. Compare their properties. Mix small portions of each together in a small beaker. What have we made? Add water to the beaker. What have we made? What happened to the salt? How can we separate the three ingredients from each other? Use coffee filter paper and then evaporation on the hot plate. Hold up the beaker to show the recovered salt.



Separating mixtures

Cut out and stick the correct picture with it's name and what it separates into your book

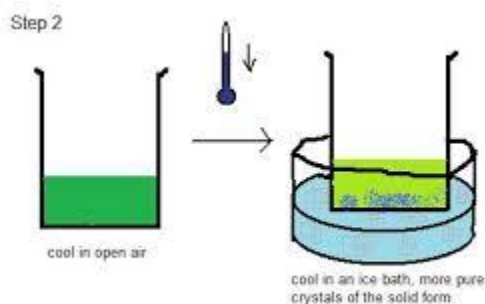
Chromatography	Separates liquids with different boiling points
Distillation	Separates a liquid and solid by boiling off the liquid
Filtration	Separates liquids of different colours
Evaporation	Separates a solid that can dissolve from one that can't

5. Hold up samples of iron filings and charcoal. Mix small portions together. Have the students write out a procedure for separation.

6. Place a small beaker of sugar on the hot plate and slowly heat it while holding up a second small sample for students to observe. What are the properties of sugar? Students will eventually notice the smell of heating sugar. Ask for observations. What is in the beaker? What might the moisture droplets on the side of the beaker be? Light a match and then blow it out. Pass the burnt match about for inspection. What does the tip of the match look like? What element might

it be? Is there any resemblance to the heated sugar? What elements compose sugar? Is sugar a compound or a mixture?

7. Hold up a bottle of hydrogen peroxide. What is it used for? Is it a compound or a mixture? Cut a small potato in half. Fill a medium sized beaker about half full of the peroxide and drop in the potato. What observations can be made? What might be causing the bubbles? Explain that the potato cells contain the enzyme catalase which speeds up the decomposition of hydrogen peroxide into oxygen gas and water.



8. Hold up a small beaker of pure water. What about water itself? Is it a compound or mixture? Would heating separate it? Place the beaker on the hot plate with a watch glass over it; heat to boiling. What is observed? Show the students a Hoffman apparatus that has been operating long enough for the hydrogen gas column to be clearly twice that of the oxygen. Explain the circuitry. How many gases have been produced? Which is which? Write the equation for each electrode on the board.

9. Repeat the electrolysis of water using a U-tube filled with a mixture of distilled water, sodium sulfate and bromothymol blue indicator. Fasten the tube to a ring stand with a utility clamp. What is happening at the yellow electrode? What about at the blue? What is happening in the green region? Now add a drop of phenolphthalein indicator to each arm. What happens? Why was this indicator added? (To prove that hydroxide ions are actually being made at the hydrogen gas electrode.) Explain about acid/base indicators and write the reactions on the board.

10. Can other compounds besides water be decomposed by electrolysis? Pass around a small sample of copper (II) chloride. Then pour a mixture of the chloride, water and phenolphthalein into another U-tube. If water is being electrolyzed, then one arm of the tube should be pink, showing the presence of hydroxide ions and two gases will be seen. What do the students actually see?