
Lesson Plan

1. Daily learning objectives

- Be able to describe chemical and physical properties of matter
- Cooperatively design projects and generate new ideas when problem solving
- Reflect on your investigation methods and the quality of the data collected
- Identify possible sources of error and suggest improvements to your methods
- Transfer and apply learning of the types of matter to new situations

2. Problem: separation of matter (Presented using PowToon!)

“You are a chemist working for CleanItUp, a chemical spill cleanup company. CleanItUp is a well-known company for its quick and effective clean-up of toxic waste and chemical spills. You get a call from Dr. Doom who has found a large container of iron filings, sand, salt, and styrofoam. Dr. Doom wants these items separated in order to use them later on their own for different chemistry projects. There are many ways you could separate these components, but in order to keep the excellent reputation of CleanItUp you want to complete the task in as few steps as possible and the least amount of time.

In your CleanItUp tool belt you have the following equipment to use: beakers, Erlenmeyer flasks, filter paper, funnels, hot plates, magnets, stirrers, tongs, rubber bands, a small shovel, vacuum backpack. All with a short description of their potential uses.

You also have a Material Facts pocketbook with some useful facts about the substances in the mixture.

In groups of 3, create a plan to separate each component.

Equipment List

Equipment	Uses
Beaker	A beaker can be used to hold liquids, mix substances, heating liquids
Erlenmeyer Flask	A beaker can be used to hold liquids
Filter Paper	Filter paper can be used to filter out coarse particles that are suspended in liquids
Funnel	A funnel can be used to transfer liquids from one container to another
Magnet	A magnet can be used to attract metals or materials containing metals
Hot Plate	A hot plate can be used to heat items
Stirrer	A stirred can be used to mix a solution
Tongs	Tongs can be used to grab larger items
Rubbers Bands	Rubber bands can be used to secure items together
Vacuum Backpack	A vacuum backpack is useful for large spills
Small Shovel	A small shovel is handy for digging holes

Material Facts File

Material	Facts
Iron	<ul style="list-style-type: none"> • silvery white metal • Atomic symbol= Fe • Very ductile and very magnetic • High melting point of 1535 degree C • Iron quickly rusts in moist air, the reddish rust is a mixture of iron oxides
Salt	<ul style="list-style-type: none"> • Common salt is a compound, NaCl (sodium chloride) • White crystal • Very soluble in water • Melting point of 801 degrees C
Sand	<ul style="list-style-type: none"> • Mostly made of Silicon Dioxide (SiO₂) • White to brown crystal material • Very hard • Insoluble in most substances • Generally, a melting point of more than 1700 degrees C
Styrofoam	<ul style="list-style-type: none"> • Chemical name Polystyrene • Chemical formula C₈H₈ - Melting point of 208 degrees C • Very soft - White Solid

3. Students submit their matter separation plans

4. Students experiment on a matter mixture (soil, sand, salt, glass beads, washers, and wood) using a variety of tools (tweezers, magnets, filters, funnels, beakers, mesh) to see how many components they can separate

5. Exit Ticket

Dr. Doom was so impressed with your quick work that he has another task for you.

Dr. Doom was making some solutions that he needs gone by tomorrow! But at CleanItUp you can only dispose of solutions once you have identified them. Dr. Doom would rather not say what they are so you will have to determine it for yourself. He will tell you though that one is an element, one is a compound, and one is a mixture.

Unknown A: is composed of soil, seeds, and white granules. When water is added and it is filtered, the white granules dissolve

Unknown B: is a thin, silver-coloured sheet that is easily bent. It is a very good conductor of electricity. It is insoluble in water and reacts with strong acids. When it reacts with acids it gives off bubbles of a flammable gas.

Unknown C: is a white, chalky powder. When heated it gives off a gas that does not support combustion. When water is re-added to the cooled powder, the substance reacts and gives off heat.