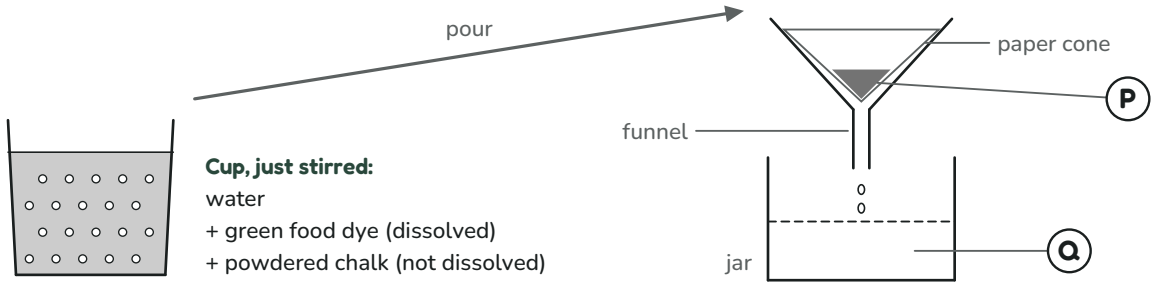
Mixtures and Solutions: Sort and Separate

Grades 6-8

Name _____ Date _____

Directions: Matter that is a **pure substance** has only one material in it. A **solution** is a mixture blended so evenly that it looks like one thing and never settles. Call it an **other mixture** when you can see separate parts or when parts settle out. In a solution, the **solute** is the part that dissolves and the **solvent** is the part that does the dissolving. For items 4 to 7, choose from the methods in the word bank.

filtration | **evaporation** | **magnet** | **sieving**



Setup for items 7 and 8. The drawing leaves the liquid at Q unshaded on purpose.

1. Write **pure substance, solution** or **other mixture** for each sample.
   (a) clear white vinegar (label: 5% acetic acid, 95% water) _____
   (b) a scoop of garden soil _____
   (c) a block of dry ice (frozen carbon dioxide, nothing else) _____
   (d) fresh orange juice with pulp _____

2. Soda water is made by pushing carbon dioxide gas into cold water until the gas dissolves.
   Solute: _____ Solvent: _____

3. A brown antiseptic liquid is made by dissolving solid iodine crystals in alcohol.
   Solute: _____ Solvent: _____

4. Steel ball bearings are mixed with ceramic beads of exactly the same size. Best way to pull the two apart: _____

5. Uncooked rice has spilled into a bag of dry flour. Best way to get the rice out: _____

6. Epsom salt has been stirred into a pan of water until none of it can be seen. Best way to get the solid Epsom salt back: _____

7. Look at the drawing. The cup held water, dissolved green food dye and powdered chalk. Name the method shown: _____ What collects at P? _____

8. Is the liquid that drips into the jar at Q green or colorless? Explain your choice by comparing the dissolved dye with the holes in the paper.

_____

_____

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Answer key

Item 1: four points. Items 2 and 3: two points each. Items 4 to 6: one point each. Items 7 and 8: two points each. Total 15.

1. **(a) solution; (b) other mixture; (c) pure substance; (d) other mixture**

   Vinegar: two substances, evenly mixed and clear. Soil: grains, bits of leaf and roots can be picked out. Dry ice: one substance only, even though it is a compound. Juice with pulp: the pulp can be seen and sinks or floats when the glass stands. For the soil and the juice also accept "mixture" or "heterogeneous mixture". For the vinegar also accept "homogeneous mixture", but not "mixture" alone: the task is to tell a solution from the rest.

2. **Solute: carbon dioxide. Solvent: water.**

   Here the solute is a gas, not a solid. Accept "the gas" or CO_2 for the solute.

3. **Solute: iodine. Solvent: alcohol.**

   Water is not the only solvent: here the iodine spreads through alcohol. Accept "iodine crystals".

4. **magnet**

   Steel is pulled by a magnet and ceramic is not. A sieve fails because both are the same size, and neither one dissolves. Accept "a magnet" or "magnetism".

5. **sieving**

   Flour falls through the holes of a sieve and the larger rice grains stay on top. Paper for filtering would stop both, and no liquid is present. Accept "a sieve", "sifting" or "a strainer".

6. **evaporation**

   When the water leaves as a gas, the dissolved solid stays in the pan. Dissolved particles are too small for a filter or a sieve to catch. Accept "evaporating" or "boiling the water away".

7. **filtration; the powdered chalk collects at P**

   The chalk grains are too large for the tiny holes in the paper. Accept "filtering" and "chalk" or "the solid that did not dissolve". The word "residue" alone does not name the substance.

8. **Green. The dye is dissolved, so its particles are tiny enough to slip through the paper's holes together with the water.**

   One point for green, one for the size comparison. A filter removes only what has not dissolved; evaporating liquid Q would leave the dye behind in the jar.