Solution, solute and solvent: the definitions and examples sheet

Solution: a homogeneous mixture of two or more substances; the same composition in every part, particles smaller than 1 nm, so it is transparent, does not scatter light, does not settle and passes through filter paper. Solute: the substance that is dissolved, present in the smaller amount. Solvent: the substance that does the dissolving, present in the larger amount, whose state the solution takes; when the solvent is water the solution is aqueous, written (aq). Solubility: the maximum mass of solute that dissolves in 100 g of solvent at a given temperature, giving a saturated solution.

Twenty examples with the solute and the solvent named

Solution	Solute	Solvent	Type
Salt water, sea water	Sodium chloride and other salts	Water	Liquid
Sugar syrup	Sugar (sucrose)	Water	Liquid
Vinegar	Acetic acid	Water	Liquid
Soda water, fizzy drinks	Carbon dioxide	Water	Gas in liquid
Oxygen in pond water	Oxygen	Water	Gas in liquid
Tincture of iodine	Iodine	Ethanol	Liquid
Rubbing alcohol	Isopropyl alcohol	Water	Liquid in liquid
Antifreeze	Ethylene glycol	Water	Liquid in liquid
Hand sanitiser	Ethanol	Water	Liquid
Lemonade	Sugar, citric acid	Water	Liquid
Air	Oxygen, argon, CO2	Nitrogen	Gas in gas
Humid air	Water vapour	Air	Liquid in gas
Brass	Zinc	Copper	Solid in solid
Bronze	Tin	Copper	Solid in solid
Steel	Carbon	Iron	Solid in solid
Sterling silver	Copper	Silver	Solid in solid
22-carat gold	Copper and silver	Gold	Solid in solid
Dental amalgam	Mercury	Silver, tin	Liquid in solid
Hydrogen in palladium	Hydrogen	Palladium	Gas in solid
Camphor vapour in air	Camphor	Air	Solid in gas

The trap: a solution need not be a liquid. Air is a gaseous solution; brass and steel are solid solutions (alloys). 'A liquid with a solid dissolved in it' is wrong on both counts.

Solution, colloid or suspension: particle size decides everything

	True solution	Colloid	Suspension
Particle size	less than 1 nm	1 to 1000 nm	more than 1000 nm
Homogeneous?	Yes	Looks so; is heterogeneous	Heterogeneous
Tyndall effect	No	Yes	Yes
Settles on standing	No	No	Yes
Passes filter paper	Yes	Yes	No
Examples	salt water, air, brass	milk, fog, blood, ink, jelly, smoke	muddy water, chalk in water, flour in water

From sciencewithshobha.com/blog/solution-solute-solvent-definition-chemistry-with-examples/

Worksheet: solutions, solutes and solvents (Class 9, Year 9, MYP 3)

A. Name the solute and the solvent

Solution	Solute	Solvent
Sea water		
Soda water		
Brass		
Air		
Tincture of iodine		
Vinegar		
Steel		
Humid air		
Dental amalgam		
Sugar syrup		

B. Solution, colloid or suspension? Write S, C or U

1. milk ____
2. salt water ____
3. muddy water ____
4. fog ____
5. sugar water ____
6. chalk in water ____
7. blood ____
8. air ____
9. ink ____
10. brass ____
11. smoke ____
12. flour in water ____

C. Define, in one sentence each

Solution _____

Solute _____

Solvent _____

Saturated solution _____

Tyndall effect _____

D. Numericals (show the mass of the solution first)

1. 25 g of sugar is dissolved in 100 g of water. Find the mass by mass percentage.
2. A solution contains 15 g of salt in 85 g of water. Find the concentration (m/m).
3. 10 g of glucose is dissolved to make 200 mL of solution. Find the mass by volume percentage.
4. Potassium nitrate: solubility 32 g per 100 g of water at 20 C. A saturated solution made with 50 g of water is left at 20 C; how much KNO3 is dissolved?

Answers

A. salts / water; CO2 / water; zinc / copper; oxygen, argon, CO2 / nitrogen; iodine / ethanol; acetic acid / water; carbon / iron; water vapour / air; mercury / silver and tin; sugar / water. B. 1 C, 2 S, 3 U, 4 C, 5 S, 6 U, 7 C, 8 S, 9 C, 10 S, 11 C, 12 U. D. 25/125 x 100 = 20%; 15/100 x 100 = 15%; 10/200 x 100 = 5% (m/v); 16 g.