

COMPARISON OF SOLUTIONS, COLLOIDS, AND SUSPENSIONS

	SOLUTIONS	COLLOIDS	SUSPENSIONS																														
COMPOSITION	<ul style="list-style-type: none"> • solute particles have dissolved to the point of ions, atoms, or molecules • solute particles are evenly dispersed through solvent • particles do not settle out with time 	<ul style="list-style-type: none"> • solute particles do not dissolve fully • particles form groups of ions, atoms, or molecules • are evenly dispersed through solvent, but solution appears cloudy • particles do not settle out with time 	<ul style="list-style-type: none"> • really a mixture, solute particles do not dissolve • particles form large groups of insoluble particles • particles settle out with time 																														
SIZE	<ul style="list-style-type: none"> • particles are too small to see with naked eye (less than 1 nanometer = 0.000000001 m) 	<ul style="list-style-type: none"> • particles are usually not seen with naked eye (1 - 100 nanometers) 	<ul style="list-style-type: none"> • particles can be seen with naked eye (larger than 100 nm) 																														
SEPARATION	<ul style="list-style-type: none"> • solute particles will pass through a paper filter and a semipermeable membrane; cannot be separated except through distillation 	<ul style="list-style-type: none"> • solute particles will pass through a paper filter; can be separated by a semipermeable membrane, i.e., cellophane and cell walls 	<ul style="list-style-type: none"> • can be easily separated by filtering 																														
OTHER	<ul style="list-style-type: none"> • may be dilute or concentrated; • may be unsaturated, saturated, or supersaturated • degree of saturation is dependent on temperature; ex, more sugar will dissolve when tea is hot) 	<ul style="list-style-type: none"> • parts of a colloid may be separated by an ultracentrifuge (spin at very high speeds; used to separate blood) 																															
TYPES	<ul style="list-style-type: none"> • there are 9 types of solutions, based on the solute (1st) and the solvent (2nd) + example: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">solute</th> <th style="text-align: left;">solvent</th> <th style="text-align: left;">example</th> </tr> </thead> <tbody> <tr> <td>gas</td> <td>gas</td> <td>air</td> </tr> <tr> <td>gas</td> <td>liquid</td> <td>soda water</td> </tr> <tr> <td>gas</td> <td>solid</td> <td>hydrogen in Pt</td> </tr> <tr> <td>liquid</td> <td>gas</td> <td>water vapor in air</td> </tr> <tr> <td>liquid</td> <td>liquid</td> <td>alcohol in water</td> </tr> <tr> <td>liquid</td> <td>liquid</td> <td>silver amalgam</td> </tr> <tr> <td>solid</td> <td>gas</td> <td>sulfur vapor in air</td> </tr> <tr> <td>solid</td> <td>liquid</td> <td>sugar in water</td> </tr> <tr> <td>solid</td> <td>solid</td> <td>brass</td> </tr> </tbody> </table>	solute	solvent	example	gas	gas	air	gas	liquid	soda water	gas	solid	hydrogen in Pt	liquid	gas	water vapor in air	liquid	liquid	alcohol in water	liquid	liquid	silver amalgam	solid	gas	sulfur vapor in air	solid	liquid	sugar in water	solid	solid	brass	<ul style="list-style-type: none"> • there are 3 types of colloids: <ul style="list-style-type: none"> • gels - liquid particles in a solid, flow slowly (gelatin, jelly, stick deodorant) • emulsions - two liquids (mayonnaise, hand cream, milk) • aerosols - solid or liquid in a gas (fog, smoke, paint-spray can) 	<ul style="list-style-type: none"> • examples include Italian salad dressing, liquid medicines that require shaking before being taken; and some paint
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