

Water as a popular element allows for numerous experimental experiences and is therefore particularly suitable for any "technical" early experience in the field of chemistry and physics. In this case, none of the experiments shown is intended to lead to a final product. They all rather contain certain products which should be adapted to the individual group situation.

Table of contents:Bubble powder or a volcanic eruption3
Shaking glasses5
Water mix – how does water taste7
Is water hard9
Water as a solvent11
Sewage plant13
Sugar and ink15
Transfer pictures17

Name:		Category:
		Chemistry
Bubble powder or a volcanic eruption		- Substances and their properties
For age range: 6- 10 years		For how many?: 5-10 Children
Where: Demonstration	How long: ca 20 minutes	Preparation/materials:
room		20 grams citric acid and 20 grams natron (from the pharmacy)
Aims for the children:		- red food colouring
The children shall describe wi	hy water bubbles	- a small jam jar with screw top (prick)
The children call all substance	es used by their names.	- a device to pierce tins
Scientific explanation:		- a hopper
Scientific explanation:	raa gaa aarban diaxida whan	- sand
reacting with the	ree gas carbon dioxide when	- water
Departies of patron (adjum by	(dragon carbonate) with evenium	Glass, soup plate, citric acid, natron powder, screw top, spoon.
ions Dovelopment of carbon	dioxido	Steps:
for ex formulated with citric a	cid (or simpler)	Every child gets a bowl a glass and a soup plate. With the spoon the children can
$3 \text{ N}_2 \text{H}_2 \text{C}_3(\text{e}) + C_3 \text{H}_4(\text{C}_2 \text{C}_2)$	3OH(s) + 2a	fill half a spoonful of both types of powder into the bowl and stir it. They should
3  NancO3(S) + C3n4(COOn)3On(S) + aq Na3C3H4(COO)3OH(aq) + 3 CO2(q) + 3 H2O		then put some powder into the screw top and this into the class which they have
		first half-filled with water. Afterwards the children take the plate and place it over
HCO3		the glass with the inner side facing the glass. Ask the children to turn the glass
$-(a_0) + H_{3O} + CO_{2}(a_0) + 2 H_{2O}$		with the plate in a quick movement. The water starts bubbling because the top
Sodium hydrogen carbonate reacts with citric acid to trisodium		turns over.
citrate, carbon dioxide and water.		
Be aware of.		Possible variations:
YOU CAN'T BE TOO SURE		"Proceed as follows:
In chemistry safety has top pr	iority! Although all GEOlino	Punch a hole with the prick into the top of the jam jar. The hole should be large
experiments are safe you can	never be too careful!	enough to accommodate the tube of the hopper. Then fill citric acid and natron
Therefore: do not forget your eye protection! If you are not		powder into it. Screw on the top, put in the hopper and bury the glass under a heap
wearing glasses anyway get yourself a pair of plastic protective		of sand. The opening of the hopper must be visible just like a "crater". Dye a glass
glasses in a do-it-yourself shop. You should also not forget to		of water properly with red food colouring, pour it into the crater – and move
thoroughly wash your hands after every experiment. Because		backwards with a few quick steps." © geolino see below
remains of chemicals may stick to them – and who knows where		References:
you may smear them.		Spannende Experimente von Herrmann
		Krekeler und Marlies Kieper Bastian. Ravensburger Verlag
		http://www.geo.de/GEOlino/basteln_experim
		entieren/experimentieren/1998 03 GEOlino versuche chemistry/
		<u>?linkref=geolinode teaser archive text&amp;SDSID=34073600000011073509109</u>



Name:		Category:
		Chemistry
Snaking glasses		– Substances and their properties
For age range:		For how many?:
5 to 6 years	Howleng	Ca. 10 to 11 children
Group rooms	Ca 30 minutes	Look for the necessary materials and prepare them for the experiment
		Split up the children into groups.
		Supply a table and chairs for the children.
Aims/theoretical an	alvsis:	Put on a table cloth.
1. Ask the children	o screw on the top of the glass.	Several long, slim glasses (in Germany: olive or caper glasses), water, shampoo,
2. They shall all sha	ke the glass themselves.	edible oil, surprise-egg figures, rubber rings, marbles, coloured feathers, glitter,
3. The children take	turns in taking and naming the	
materials.	ment of the water (shelving) the glitter	
4. Due to the movel	nent of the water (shaking) the giller	
with the litter adhesive turns cloudy		
Scientific explanatio	n:	Steps:
A suspension is a hete	erogeneous mix of substances	Clean the glasses properly and remove the paper labels.
consisting of a liquid and a solid substance evenly distributed		Fill them with water, edible oil or shampoo.
In it, i.e. reduced to slime.		And now try out with what they could be filled!
what floats and what sinks. Due to the movement of the		Light objects are slowly libating on the water.
is transported	der consisting of grains of unterent size	Paraffin oil does not mix with water. If you shake it small foam hubbles are
		produced which, however, re-disappear after a while.
		It is also nice to have a marble slide through the rubber ring (in shampoo).
Be aware of:		A chain formed from paper clips does also make funny movements in the glass!
Fill the glass carefully	to a level that there is a slight convexity.	You can also design nice shaking glasses from small jam jars (not those very small
Now screw on the top firmly.		ones)! Flitter and water or paraffin oil and water, or small things to scatter and
much) into the rim of the top and then screw it on. This is		Water.
advisable for younger children.		Two objects in one glass (a heavy and a light one) and the race is on! Which object
Because they may try	to unscrew the top.	reaches the surface first?
		Possible variations:
		Due to the glitter adhesive the water turns cloudy. During the second experiment we
		leave out the glitter adhesive and take only some glitter powder. It works perfectly.
		Keterences:
		<u>mup.//www.cmiurengauur.ue/Kigacms/bastein/imo.ntm?wnu=3&amp;ciu=3&amp;kiu=205&amp;Ci=0k</u>



Name:		Category:
		Chemistry
water mix- How does water taste		Lye and acids
For age range:		For how many?:
6-10 years		Ca. 8 children
Where:	How long: ca	Preparation/materials:
Kitchen/group room	20 min	Fill some sort of water into every jug, water with sugar, water with
		salt,
		All jugs are numbered consecutively. Describe on a separate sheet of
Aims for the children:		paper which substance is contained in each of the jugs.
The children discuss	s the problem and share their ideas.	Arrange all jugs like a buffet together with glasses, and perhaps a
The children learn to	b be patient and enduring and work	spittoon or a basin. Different water with: salt, sugar, carbonated water,
on a solution		tap water, spoon water jug
The children describ	e what they taste.	
• The children's sense	e of taste is enhanced.	
Scientific explanation:		Steps:
In chemistry a solution is	a homogeneous mix consisting of	1. Every child gets a glass. Then ask the children to take a sig of
one or several dissolved substances and on solvent (which		water from each glass jug one after the other.
itself can be a solution).		2. Have them guess what the water tastes like, what the water
Whether and to what extent a substance is soluble in a		contains and which water tastes best. Furthermore, ask them to
certain solvent depends	of its solubility. The dissolved	guess which of the jugs contains tap water.
substances can be		3. This is not as easy as that because all types of water look alike.
gaseous (for ex. c	oxvaen or hydrogen chloride in water	Salt and sugar dissolve in water, they seem to disappear.
or carbon dioxide in mine	eral water).	4. The water into which you have filled some salt will taste salty.
liquid (for ex. alco	hol in water) or	whereas the water with sugar tastes sweet. But how do the other
solid (for ex. kitch	en salt in water).	types of water taste? Try and find out.
The water molecules get	in between the molecules of salt and	51
sugar. You get a salt and sugar solution which tastes salty or		
sweet.		
Be aware of		Possible variations:
Do not fill too much salt or sugar into the receptacle.		Instead of jugs you can also take bottles.
Otherwise the substance settles at the bottom of the jug and		References:
does not dissolve.		365 Experimente für jeden Tag Verlag: moses ISBN 3-89777-113-6

- 7 -

Name: Is water hard		Category: Chemistry - Lye and acids	
For age range: 6-10 years		For how many?: 5-10 children	
Where: Demonstration room	How long: ca 20 minutes	<b>Preparation/materials:</b> water, distilled water, soap, pipette, two glasses with top.	
Aims for the children: The children shall recognise differences in foaming.		<b>Steps:</b> Every child gets two glasses, of which one is filled with tap water and the second one with distilled water. The children use the pipette to fill one drop of soap into each glass. Then they screw on the top and shake the glasses. Afterwards they observe in which glass there is more foam.	
Scientific explanation: Tap water contains minerals (see the lime in your cooking pot). Soap lathers badly in hard water. Distilled water is soft because it does not contain any minerals. Therefore, more foam should develop in distilled water		<b>Possible variations:</b> You can also take different water glasses.	
Be aware of: Water is different from city to city.		References: Neil Ardley. 365 Spannende Experimente aus Wissenschaft und Technik.	

- 9 -

In detail:	

Name:		Category:
Water as a solvent		Substances and their compounds
For age range: 4 yea	ars and older	For how many? : 6-10 children
Where: Demonstration room	How long: ca 20 minutes	<b>Preparation/materials:</b> 2 glasses, teaspoons, different substances such as oil, coffee, salt
Aims for the children: The children shall learn which substances are soluble and that water- soluble substances dissolve more easily in warm water than in cold one. Help the children to understand that there is a degree of saturation. They learn to name water-soluble substances (examples).		Steps: Every child gets two glasses of which they fill one with cold and the second one with warm water. Once they have done this, they can take some coffee, salt and oil and fill these substances into the glasses (do not forget to stir!). Now they can observe what happens. If the substance dissolves in the water the children can fill in even more in order to see the degree of saturation. Then they can experiment with different substances.
<ul> <li>Scientific explanation:</li> <li>In chemistry a solution is a homogeneous mix consisting of one or several dissolved substances and on solvent (which itself can be a solution).</li> <li>Whether and to what extent a substance is soluble in a certain solvent depends on its solubility. The dissolved substances can be</li> <li>gaseous (for ex. oxygen or hydrogen chloride in water or carbon dioxide in mineral water),</li> <li>liquid (for ex. alcohol in water) or</li> <li>solid (for ex. kitchen salt in water).</li> </ul>		Possible variations:
Be aware of: Water-soluble substances dissolve more easily in warm water.		<b>References:</b> Klaus Klein, Rainer Becker: Sachunterricht begreifen, Schneider Verlag Hohengehren 1999

- 11 -

Water has a certain degree of saturation. Once this degree of saturation is exceeded, no more of the substance can be dissolved.

Do not continue the experiment for too long (gets boring).



Name:		Category:	
Sewage plant		- Substances and their properties	
For age range: 4 years and older		For how many?: up to 4 children	
Where: Mud area Aims for the childr Imparting knowledge Careful filling of sand Enhancement of soci assistance	How long: ca 35 min. en: on how a water filter works into a cup (eye- hand coordination) al competences through mutual	Preparation/materials:         Prepare tables with a water-resistant cl         With a hot needle pierce ca 8 – 15 hole         Contaminate water with sand, dirt, sm         -       Plastic cup         -       Bottling jar         Overall for clothes protection         -       Sifts         -       Small twigs         -       Scraps of paper         -       Pebbles	oth es into the bottom of a cup all twigs, etc. - Sandbox sand - Potting compost - Sand for birdcages - Bottling jars - Water - Cans - Spoons - Scissors
Scientific explanation: The different layers hold back most dirt particles and clean dirty water. Thus you can see where the water filter has an effect and where not. The self-made water filter can only filter out larger dirt particles. The water always remains a bit turbid. And surely not all impurities in water are visible. You cannot se whether there are for ex. lime, chlorine or lead in the water. In order to filter out these substances you need special filters filled with carbon particles or other		<ul> <li>Steps:</li> <li>1. Use a spoon to make layers of difference prepared cup. Start with the smaller largest one.</li> <li>2. Put a sift onto the bottling jar and p</li> <li>3. Pour the contaminated water into the result.</li> </ul>	erent natural materials in a est particle size and finish with the place the cup on top of it. he water filter and observe the
		Possible variations: As an alternative you can use different water filter. In order to filter out smaller dirt particles place it onto the bottom of the plastic cu	types of sand and stones in the s use a coffee filter cut to size and up (water flows at slower speed).
Be aware of:		References:	

- 13 -



Name:		Category:
		Chemistry
Sugar and ink		<ul> <li>Substances and their properties</li> </ul>
For age range:		For how many?:
4-10 years		6-8 Children
Where:	How long: ca	Preparation/materials:
Group room	20 min.	Water, sugar cubes, coloured ink, a large plate, if possible a pipette
Aims for the childre	n:	Steps:
The children learn that	there is still sugar although you	<ol> <li>Fill a flat plate with a little bit of cold water.</li> </ol>
cannot see it while it is	dissolving easily. They learn how	2. Drip one to two drops of ink onto a sugar cube and place it carefully
sugar dissolves and sp	preads in the liquid. They learn to drip	into the water.
carefully and slowly so	me drops onto the sugar cube and	3. Watch the spectacle.
observe with patience	what happens.	
Scientific explanatio	n:	Possible variations:
Make sure that the wat	ter does no longer move when you	The same experiment can be made with several sugar cubes and different
place the sugar cubes	in the liquid. The nice radial patterns	colours.
develop because suga	r and ink dissolve simultaneously.	
The dissolved sugar spreads invisibly, but faster in the water		
and takes along the ink.		
(the sugar gives the ink a piggy-back ride)		
Be aware of:		References:
		Buch: "Spannende Experimente" von: Hermann Krekeler, Marlies Rieper-
		Bastian, Verlag: Ravensburger
		http://www.physikfuerkids.de/lab1/versuche/teller/index.html

- 15 -



Name:		Category:	
Transfor nicturos		Chemistry	
		Substances and their properties	
For age range:		For how many?:	
4 years and older		4 children	
<ul> <li>4 years and older</li> <li>Where: Separate room with windows</li> <li>Aims for the children: The children shall understand water and washing-up liquid (printing ink) so that you can sheet of paper.</li> <li>Scientific explanation: Explanation: turpentine and w together form an emulsion will and oil particles of the dried-u them liquid again.</li> <li>Be aware of: <ul> <li>Make sure to dab the pictur rub it because otherwise the bleeding.</li> <li>Use a separate room with because the turpentine has</li> <li>Use only small pictures from most of the large pictures of</li> </ul> </li> </ul>	How long: ca 45 minutes	<ul> <li>4 children</li> <li>Preparation/materials: Refill the turpentine because it is too difficult for the children to use it from the can. Turpentine, washing-up liquid, water, sponge, newspaper, spoon, white paper, small bowl, overall for clothes protection</li> <li>Steps: <ol> <li>Everyone cuts a few small pictures out of a newspaper.</li> <li>In a second step everyone takes a small bowl with turpentine, a spoon and the small bowl with water.</li> <li>Now you add two spoonfuls of water and one spoonful of washing- up liquid into the small bowl with turpentine.</li> <li>Now the picture is placed on a ground and wet with the sponge.</li> <li>Then place a white sheet of paper on top, take the spoon and stroke the paper powerfully.</li> </ol> </li> <li>Now pick up the upper sheet of paper. The newspaper picture should have been copied onto it.</li> </ul> Possible variations: First, let the children test what happens when they give washing-up liquid into a greasy pan. Thus they will understand that the washing-up liquid helps to remove the grease. They can now derive that a mix of turpentine and washing-up liquid reduced with water is also a solvent.	
		References: Game leading to science	

- 17 -