

Unit one - Elements, Mixtures and Compounds




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Lesson 1: The Periodic Table

By the end of this lesson I should know

1. That elements are the building blocks of everything that exists
2. That elements are listed in the Periodic Table
3. That the periodic table can be divided into metals / non-metals
4. Metals and non-metals have different PROPERTIES
5. Each element in the periodic table has its own unique set of letters called a CHEMICAL SYMBOL.

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All things are made up of tiny building blocks called **ATOMS**. Atoms of all one type are called **ELEMENTS**.

There are 118 different **ELEMENTS** and they are displayed on the **PERIODIC TABLE**.

Elements are substances made up of **ONE TYPE** of atom.

Different elements have different **PROPERTIES** from one another.

All elements are either **METAL** or **NON-METAL**.

Metals and non-metals

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Look at some examples of metal elements and non-metal elements.



Can you see any similarities between the samples of metals and non-metals you have been given?

We call these things "**properties**". They differ between metals and non-metals.

Most metals will share properties with other metals, but not all metals have identical properties.

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What are Properties?

Physical properties e.g. Shiny/dull; hardness; conducts electricity; melting point, boiling point.

Chemical properties (the way a chemical behaves in a chemical reaction) e.g. reactivity with water, oxygen, acid; flammability (how easily it catches on fire).

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Metals vs non-metals

comparing the "properties" of elements can help us to categorise them

properties of metals	properties of non-metals

Page 7

Metals vs non-metals

comparing the "properties" of elements can help us to categorise them

properties of metals	properties of non-metals
Shiny Conduct Electricity Mostly very hard All solids (except for mercury) Smooth	Dull Mostly do not conduct electricity Can be quite hard or soft Some are solid, some are gases and one (bromine) is a liquid. Smooth or rough Colours

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CHEMICAL SYMBOLS

Notice that all the elements in the periodic table have their own letter or letters. For example, Carbon has the letter 'C', Magnesium has the letters 'Mg'.

These letters are called the CHEMICAL SYMBOL for the element.

- If there is only one letter in the chemical symbol it is a CAPITAL letter
- If there are two letters in the chemical symbol, the first is a CAPITAL and the second is lower case - Cu, Al, Ar

Stick a chemical symbols table in your jotter and use your periodic table to complete it. Finish it for homework if you do not finish in class.

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Chemical Symbols

Element name	Chemical Symbol
Oxygen	
Helium	
	Mg
	H
Carbon	
Tin	
	Cl
Sodium	
	Kr
	Ag
Lead	

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Homework 1 Research and Design



Use the internet or books from a library to research the element below

Make a data card showing the following information about your element:

- Name and chemical symbol
- Melting and boiling points
- Use
- How the element behaves / what the element does.
- Any other information you think you should include.

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Lesson 2 : Properties of Elements

By the end of this lesson I should know:

1. The difference between a 'group' and a 'period'.
2. That elements close together on the periodic table have similar chemical properties properties.
3. Metals do not always share properties - some are very different from others.
4. Alkali metals are very soft and very reactive.
5. Transition metals are unreactive and usually hard solids (except mercury).

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The vertical columns on the periodic table are called **GROUPS**.

The horizontal rows are called **PERIODS**.

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Use data cards produced for your homework.

Find others in the class with similar properties to your own data card.

Can you see a pattern in terms of position of the elements in the periodic table?

If you have not done your homework then you must tell your teacher who will give you a data card to use for today.



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Conclusion: Elements that are in the same column or _____ in the _____ have similar _____ to each other.

Elements are only made up of _____ type of atom.
Alkali metals (group ____) all react explosively in _____.

brainiac clip

<http://www.youtube.com/watch?v=m55kgYApYrY>

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Use your white 'show me board' to answer these questions.

1. Elements are made of tiny particles called?
2. The elements are listed in a chart called the?
3. The metal elements are found on the hand side of the chart.
4. Vertical columns in the chart are called
5. Elements in the same vertical column of the chart have similar

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Lesson 3 : Solids, Liquids and Gases

By the end of this lesson I should know:

1. Where 'halogens', 'noble gases', 'alkali metals' and 'transition metals' are found on the periodic table.
2. Which elements are solids, which are liquids and which are gases.
3. How to make and record observations about elements and say which state they are in.

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Halogens

Halogens are found in group 7. Chlorine and fluorine are examples of Halogens. The Halogens are quite reactive and will readily form compounds with other elements.

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Noble Gases

Noble gases are found in group 0. They include elements such as Helium, Neon and Argon. These elements are very stable and therefore they do not react.

<http://www.youtube.com/watch?v=QLr0fyj6a2s&safe=active>

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Alkali Metals

Alkali metals are found in group 1. Sodium and Lithium are examples of alkali metals. The alkali metals are very reactive and will readily form compounds with other elements. They are so reactive they must be kept in oil to make sure they don't react with water in the atmosphere.

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Transition Metals

Transition metals are found in the middle of the Periodic Table. Iron, Copper and Zinc are examples of transition metals. The transition metals are not very reactive but do form compounds with other elements.

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Hydrogen																		Helium																	
1 H																		2 He																	
1.00794																		4.00260																	
Lithium																		Boron																	
3 Li																		5 B																	
6.941																		10.811																	
Beryllium																		Carbon																	
4 Be																		6 C																	
9.0122																		12.011																	
Nitrogen																		Oxygen																	
7 N																		8 O																	
14.007																		15.999																	
Fluorine																		Neon																	
9 F																		10 Ne																	
18.998																		20.180																	
Sodium																		Magnesium																	
11 Na																		12 Mg																	
22.990																		24.305																	
Aluminum																		Silicon																	
13 Al																		14 Si																	
26.982																		28.086																	
Phosphorus																		Sulfur																	
15 P																		16 S																	
30.974																		32.06																	
Chlorine																		Argon																	
17 Cl																		18 Ar																	
35.45																		39.948																	
Potassium																		Calcium																	
19 K																		20 Ca																	
39.098																		40.078																	
Scandium																		Titanium																	
21 Sc																		22 Ti																	
44.956																		47.88																	
Vanadium																		Chromium																	
23 V																		24 Cr																	
50.942																		52.00																	
Manganese																		Iron																	
25 Mn																		26 Fe																	
54.938																		55.845																	
Cobalt																		Nickel																	
27 Co																		28 Ni																	
58.933																		58.69																	
Copper																		Zinc																	
29 Cu																		30 Zn																	
63.546																		65.38																	
Gallium																		Germanium																	
31 Ga																		32 Ge																	
69.723																		72.63																	
Arsenic																		Selenium																	
33 As																		34 Se																	
74.922																		78.96																	
Bromine																		Krypton																	
35 Br																		36 Kr																	
79.904																		83.80																	
Rubidium																		Strontium																	
37 Rb																		38 Sr																	
85.468																		87.62																	
Yttrium																		Zirconium																	
39 Y																		40 Zr																	
88.906																		91.224																	
Niobium																		Molybdenum																	
41 Nb																		42 Mo																	
92.906																		95.94																	
Technetium																		Ruthenium																	
43 Tc																		44 Ru																	
98.906																		101.07																	
Rhodium																		Palladium																	
45 Rh																		46 Pd																	
102.91																		106.37																	
Silver																		Cadmium																	
47 Ag																		48 Cd																	
107.87																		112.41																	
Indium																		Tin																	
49 In																		50 Sn																	
114.82																		118.71																	
Antimony																		Tellurium																	
51 Sb																		52 Te																	
121.76																		127.60																	
Bismuth																		Polonium																	
53 Bi																		54 Po																	
208.98																		209																	
Astatine																		Radon																	
85 At																		86 Rn																	
210																		222																	

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Solid, liquid or gas?

Periodic Table of the Elements Colored by Standard State																		0
1A	2A																	
1 H 1.00794																	2 He 4.0026	
3 Li 6.941	4 Be 9.0122															10 Ne 20.179		
11 Na 22.9898	12 Mg 24.305															18 Ar 39.948		
		3B	4B	5B	6B	7B	8B						1B	2B				
19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.70	29 Cu 63.54	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80	
37 Rb 85.468	38 Sr 87.62	39 Y 88.905	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc 98.906	44 Ru 101.07	45 Rh 102.905	46 Pd 106.37	47 Ag 107.868	48 Cd 112.41	49 In 75.75	50 Sn 118.71	51 Sb 121.757	52 Te 127.60	53 I 126.905	54 Xe 131.29	
55 Cs 132.905	56 Ba 137.33	57 La 138.905	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.98	84 Po 209	85 At 210	86 Rn 222	
87 Fr 223	88 Ra 226	89 Ac 227	104 Rf 261	105 Db 262	106 Sg 266	107 Bh 264	108 Hs 277	109 Mt 268	110 Ds 271	111 Rg 272	112 Cn 285	113 Nh 284	114 Fl 289	115 Lv 293	116 Uu 294	117 Uus 294	118 Uuo 294	

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Look at some elements in jars and categorise them as solids, liquids or gases them by their appearance.



Solid	Liquid	Gas

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These 12 elements are gases...

Periodic Table of the Elements																		0															
1A		2A																Colored by Standard State		0													
1																		2															
H 1.00797																		He 4.0026															
3		4																10															
Li 6.941 9.01212		Be																Ne 20.179															
11		12		13		14		15		16		17		18		36																	
Na 22.9898		Mg 24.305		Al		Si		P		S		Cl		Ar		Kr 83.80																	
19		20		21		22		23		24		25		26		34																	
K 39.098		Ca 40.08		Sc 44.956		Ti 47.90		V 50.942		Cr 51.996		Mn 54.938		Fe 55.847		Se 78.96																	
37		38		39		40		41		42		43		44		52																	
Rb 85.47		Sr 87.62		Y 88.906		Zr 91.22		Nb 92.906		Mo 95.94		Tc 98.906		Ru 101.07		Te 127.60																	
55		56		57		58		59		60		61		62		70																	
Cs 132.905		Ba 137.33		La 138.91		Ce 140.12		Pr 140.908		Nd 144.24		Pm 144.913		Sm 150.36		Yb 173.054																	
87		88		89		90		91		92		93		94		102																	
Fr (223)		Ra (226)		Ac (227)		Th (232)		Pa (231)		U (238)		Np (237)		Pu (244)		Uuo (294)																	
																		1A		2A		3A		4A		5A		6A		7A		8A	
																		5		6		7		8		9		10		11		12	
																		B		C		N		O		F		Ne		Na		Mg	
																		10.811		12.01115		14.0067		15.9994		18.9984		20.179		26.9815		28.085	
																		26.9815		28.085		30.9738		32.9595		35.453		39.948		40.078		78.96	
																		29		30		31		32		33		34		35		36	
																		Cu		Zn		Ga		Ge		As		Se		Br		Kr	
																		63.546		65.38		69.723		72.59		74.9216		78.96		79.904		83.80	
																		47		48		49		50		51		52		53		54	
																		Ag		Cd		In		Sn		Sb		Te		I		Xe	
																		107.8682		112.411		114.818		118.610		121.757		127.60		126.905		131.30	
																		79		80		81		82		83		84		85		86	
																		Au		Hg		Tl		Pb		Bi		Po		At		Rn	
																		196.96657		200.59		204.37		207.19		208.980		(210)		(210)		(222)	
																		101		102		103		104		105		106		107		108	
																		Db		Sg		Bo		Hs		Mt		Ds		Rg		Og	
																		105		106		107		108		109		110		111		112	
																		Nh		Fl		Mc		Lv		Ts		Og		113		114	
																		115		116		117		118		119		120		121		122	
																		Uut		Uuq		Uup		Uuh		Uus		Uuo		123		124	
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																		Nh		Fl		Mc		Lv		Ts		Og		133		134	
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																		145		146		147		148		149		150		151		152	
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These 2 elements are liquids...

Periodic Table of the Elements																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar	19	K																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
39.098	40.08	44.956	47.90	50.942	51.996	54.938	55.94	58.933	58.70	63.54	65.38	69.72	72.59	74.9216	78.96	79.904	83.80	85.46	88.906	89.904	91.224	92.906	95.94	97.90	101.07	102.9055	106.42	107.8682	108.906	112.411	114.9126	115.9125	117.904	118.9055	121.757	124.9046	126.9051	127.61	129.904	131.29	132.905	134.907	136.907	138.905	140.908	142.907	144.903	146.905	148.906	150.907	151.96	153.912	154.923	156.907	158.908	160.907	162.905	164.903	166.907	168.934	170.904	172.907	174.903	176.905	178.907	180.906	182.905	184.903	186.905	188.906	190.907	192.906	194.904	196.906	198.906	200.906	201.906	203.906	205.907	207.906	209.906	211.906	213.906	215.906	217.906	219.906	221.906	223.906	225.906	227.906	229.906	231.906	233.906	235.906	237.906	239.906	241.906	243.906	245.906	247.906	249.906	251.906	253.906	255.906	257.906	259.906	261.906	263.906	265.906	267.906	269.906	271.906	273.906	275.906	277.906	279.906	281.906	283.906	285.906	287.906	289.906	291.906	293.906	295.906	297.906	299.906	301.906	303.906	305.906	307.906	309.906	311.906	313.906	315.906	317.906	319.906	321.906	323.906	325.906	327.906	329.906	331.906	333.906	335.906	337.906	339.906	341.906	343.906	345.906	347.906	349.906	351.906	353.906	355.906	357.906	359.906	361.906	363.906	365.906	367.906	369.906	371.906	373.906	375.906	377.906	379.906	381.906	383.906	385.906	387.906	389.906	391.906	393.906	395.906	397.906	399.906	401.906	403.906	405.906	407.906	409.906	411.906	413.906	415.906	417.906	419.906	421.906	423.906	425.906	427.906	429.906	431.906	433.906	435.906	437.906	439.906	441.906	443.906	445.906	447.906	449.906	451.906	453.906	455.906	457.906	459.906	461.906	463.906	465.906	467.906	469.906	471.906	473.906	475.906	477.906	479.906	481.906	483.906	485.906	487.906	489.906	491.906	493.906	495.906	497.906	499.906	501.906	503.906	505.906	507.906	509.906	511.906	513.906	515.906	517.906	519.906	521.906	523.906	525.906	527.906	529.906	531.906	533.906	535.906	537.906	539.906	541.906	543.906	545.906	547.906	549.906	551.906	553.906	555.906	557.906	559.906	561.906	563.906	565.906	567.906	569.906	571.906	573.906	575.906	577.906	579.906	581.906	583.906	585.906	587.906	589.906	591.906	593.906	595.906	597.906	599.906	601.906	603.906	605.906	607.906	609.906	611.906	613.906	615.906	617.906	619.906	621.906	623.906	625.906	627.906	629.906	631.906	633.906	635.906	637.906	639.906	641.906	643.906	645.906	647.906	649.906	651.906	653.906	655.906	657.906	659.906	661.906	663.906	665.906	667.906	669.906	671.906	673.906	675.906	677.906	679.906	681.906	683.906	685.906	687.906	689.906	691.906	693.906	695.906	697.906	699.906	701.906	703.906	705.906	707.906	709.906	711.906	713.906	715.906	717.906	719.906	721.906	723.906	725.906	727.906	729.906	731.906	733.906	735.906	737.906	739.906	741.906	743.906	745.906	747.906	749.906	751.906	753.906	755.906	757.906	759.906	761.906	763.906	765.906	767.906	769.906	771.906	773.906	775.906	777.906	779.906	781.906	783.906	785.906	787.906	789.906	791.906	793.906	795.906	797.906	799.906	801.906	803.906	805.906	807.906	809.906	811.906	813.906	815.906	817.906	819.906	821.906	823.906	825.906	827.906	829.906	831.906	833.906	835.906	837.906	839.906	841.906	843.906	845.906	847.906	849.906	851.906	853.906	855.906	857.906	859.906	861.906	863.906	865.906	867.906	869.906	871.906	873.906	875.906	877.906	879.906	881.906	883.906	885.906	887.906	889.906	891.906	893.906	895.906	897.906	899.906	901.906	903.906	905.906	907.906	909.906	911.906	913.906	915.906	917.906	919.906	921.906	923.906	925.906	927.906	929.906	931.906	933.906	935.906	937.906	939.906	941.906	943.906	945.906	947.906	949.906	951.906	953.906	955.906	957.906	959.906	961.906	963.906	965.906	967.906	969.906	971.906	973.906	975.906	977.906	979.906	981.906	983.906	985.906	987.906	989.906	991.906	993.906	995.906	997.906	999.906	1001.906	1003.906	1005.906	1007.906	1009.906	1011.906	1013.906	1015.906	1017.906	1019.906	1021.906	1023.906	1025.906	1027.906	1029.906	1031.906	1033.906	1035.906	1037.906	1039.906	1041.906	1043.906	1045.906	1047.906	1049.906	1051.906	1053.906	1055.906	1057.906	1059.906	1061.906	1063.906	1065.906	1067.906	1069.906	1071.906	1073.906	1075.906	1077.906	1079.906	1081.906	1083.906	1085.906	1087.906	1089.906	1091.906	1093.906	1095.906	1097.906	1099.906	1101.906	1103.906	1105.906	1107.906	1109.906	1111.906	1113.906	1115.906	1117.906	1119.906	1121.906	1123.906	1125.906	1127.906	1129.906	1131.906	1133.906	1135.906	1137.906	1139.906	1141.906	1143.906	1145.906	1147.906	1149.906	1151.906	1153.906	1155.906	1157.906	1159.906	1161.906	1163.906	1165.906	1167.906	1169.906	1171.906	1173.906	1175.906	1177.906	1179.906	1181.906	1183.906	1185.906	1187.906	1189.906	1191.906	1193.906	1195.906	1197.906	1199.906	1201.906	1203.906	1205.906	1207.906	1209.906	1211.906	1213.906	1215.906	1217.906	1219.906	1221.906	1223.906	1225.906	1227.906	1229.906	1231.906	1233.906	1235.906	1237.906	1239.906	1241.906	1243.906	1245.906	1247.906	1249.906	1251.906	1253.906	1255.906	1257.906	1259.906	1261.906	1263.906	1265.906	1267.906	1269.906	1271.906	1273.906	1275.906	1277.906	1279.906	1281.906	1283.906	1285.906	1287.906	1289.906	1291.906	1293.906	1295.906	1297.906	1299.906	1301.906	1303.906	1305.906	1307.906	1309.906	1311.906	1313.906	1315.906	1317.906	1319.906	1321.906	1323.906	1325.906	1327.906	1329.906	1331.906	1333.906	1335.906	1337.906	1339.906	1341.906	1343.906	1345.906	1347.906	1349.906	1351.906	1353.906	1355.906	1357.906	1359.906	1361.906	1363.906	1365.906	1367.906	1369.906	1371.906	1373.906	1375.906	1377.906	1379.906	1381.906	1383.906	1385.906	1387.906	1389.906	1391.906	1393.906	1395.906	1397.906	1399.906	1401.906	1403.906	1405.906	1407.906	1409.906	1411.906	1413.906	1415.906	1417.906	1419.906	1421.906	1423.906	1425.906	1427.906	1429.906	1431.906	1433.906	1435.906	1437.906	1439.906	1441.906	1443.906	1445.906	1447.906	1449.906	1451.906	1453.906	1455.906	1457.906	1459.906	1461.906	1463.906	1465.906	1467.906	1469.906	1471.906	1473.906	1475.906	1477.906	1479.906	1481.906	1483.906	1485.906	1487.906	1489.906	1491.906	1493.906	1495.906	1497.906	1499.906	1501.906	1503.906	1505.906	1507.906	1509.906	1511.906	1513.906	1515.906	1517.906	1519.906	1521.906	1523.906	1525.906	1527.906	1529.906	1531.906	1533.906	1535.906	1537.906	1539.906	1541.906	1543.906	1545.906	1547.906	1549.906	1551.906	1553.906	1555.906	1557.906	1559.906	1561.906	1563.906	1565.906	1567.906	1569.906	1571.906	1573.906	1575.906	1577.906	1579.906	1581.906	1583.906	1585.906	1587.906	1589.906	1591.906	1593.906	1595.906	1597.906	1599.906	1601.906	1603.906	1605.906	1607.906	1609.906	1611.906	1613.906	1615.906	1617.906	1619.906	1621.906	1623.906	1625.906	1627.906	1629.906	1631.906	1633.906	1635.906	1637.906	1639.906	1641.906	1643.906	1645.906	1647.906	1649.906	1651.906	1653.906	1655.906	1657.906	1659.906	1661.906	1663.906	1665.906	1667.906	1669.906	1671.906	1673.906	1675.906	1677.906	1679.906	1681.906	1683.906	1685.906	1687.906	1689.906	1691.906	1693.906	1695.906	1697.906	1699.906	1701.906	1703.906	1705.906	1707.906	1709.906	1711.906	1713.906	1715.906	1717.906	1719.906	1721.906	1723.906	1725.906	1727.906	1729.906	1731.906	1733.906	1735.906	1737.906	1739.906	1741.906	1743.906	1745.906	1747.906	1749.906	1751.906	1753.906	1755.906	1757.906	1759.906	1761.906	1763.906	1765.906	1767.906	1769.906	1771.906	1773.906	1775.906	1777.906	1779.906	1781.906	1783.906	1785.906	1787.906	1789.906	1791.906	1793.906	1795.906	1797.906	1799.906	1801.906	1803.906	1805.906	1807.906	1809.906	1811.906	1813.906	1815.906	1817.906	1819.906	1821.906	1823.906	1825.906	1827.906	1829.906	1831.906	1833.906	1835.906	1837.906	1839.906	1841.906	1843.906	1845.906	1847.906	1849.906	1851.906	1853.906	1855.906	1857.906	1859.906	1861.906	1863.906	1865.906	1867.906	1869.906	1871.906	1873.906	1875.906	1877.906	1879.906	1881.906	1883.906	1885.906	1887.906	1889.906	1891.906	1893.906	1895.906	1897.906	1899.906	1901.906	1903.906	1905.906	1907.906	1909.906	1911.906	1913.906	1915.906	1917.906	1919.906	1921.906	1923.9

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The other 104 are solids...

Periodic Table of the Elements Colored by Standard State																		0
1A	2A																	
1 H 1.00794																	2 He 4.0026	
3 Li 6.941	4 Be 9.0122															10 Ne 19.9924		
11 Na 22.9898	12 Mg 24.305															18 Ar 39.948		
19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80	
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc 98.9062	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.9056	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.757	52 Te 127.60	53 I 126.905	54 Xe 131.29	
55 Cs 132.905	56 Ba 137.33	57 La 138.905	58 Ce 140.12	59 Pr 140.908	60 Nd 144.24	61 Pm 144.9128	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.925	66 Dy 162.50	67 Ho 164.930	68 Er 167.259	69 Tm 168.933	70 Yb 173.054	71 Lu 174.967	72 Hf 178.49	
87 Fr [223]	88 Ra [226]	89 Ac [227]	90 Th [232]	91 Pa [231]	92 U [238]	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]	103 Lr [262]	104 Rf [261]	
																		105 Db [262]
																		106 Sg [266]
																		107 Bh [264]
																		108 Hs [277]
																		109 Mt [268]
																		110 Ds [271]
																		111 Rg [272]
																		112 Cn [285]
																		113 Nh [284]
																		114 Fl [289]
																		115 Mc [288]
																		116 Lv [293]
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Page 27

Complete table showing solids, liquids and gases.

Periodic Table of the Elements																	
Colored by Standard State																	
1A		2A														0	
1	2															18	
H	He															Ne	
1.00797	4.002602															20.1797	
3	4															10	
Li	Be															Ne	
6.941	9.0122															20.1797	
11	12															18	
Na	Mg															Ar	
22.989769	24.304															39.948	
		3B	4B	5B	6B	7B	8B				1B	2B					
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.0983	40.078	44.9557	47.867	50.942	51.996	54.938	55.845	58.9332	58.70	63.546	65.38	69.723	72.59	74.9216	78.96	79.904	83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
85.47	87.62	88.905	91.224	92.906	95.94	(99)	101.07	102.905	106.4	107.868	112.41	114.82	118.710	121.75	127.60	126.9045	131.29
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	(Rn)
132.905	137.33	174.967	178.49	180.948	183.85	186.207	190.22	192.225	195.084	196.967	200.59	204.37	207.19	208.980	(210)	(210)	(222)
87	88	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Uut	Fl	Uup	Lv	Uus	Uuo
(223)	(226)	(227)	(261)	(262)	(263)	(264)	(265)	(266)	(267)	(268)	(269)	(279)	(285)	(289)	(293)	(294)	(294)
Inner transition metals																	
Lanthanides: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu																	
Actinides: Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr																	

Page 28

Homework 2
Chemical Symbols

Lesson 4 : States of Matter

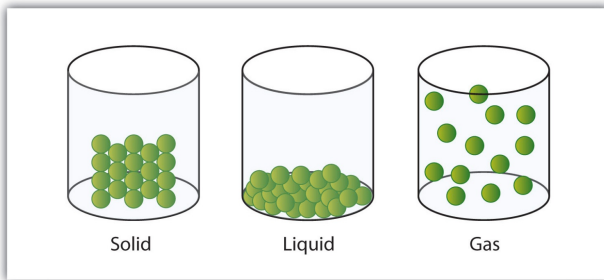
By the end of this lesson I should know:

1. Some of the properties of solids, liquids and gases
2. That solids, liquids and gases are made of particles and be able to describe how these particles are arranged in solids, liquids and gases.
3. The particle theory of matter to explain the changes from solid to liquid to gas

Page 30

Page 29

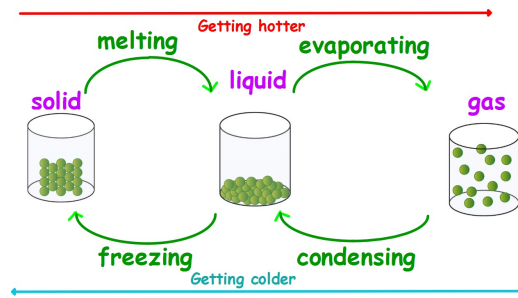
States of matter



Page 31

States of matter

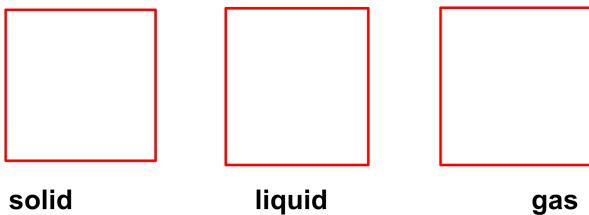
Elements can also be grouped in another way. They can be grouped as a solid, liquid or gas. This is called the three states of matter. Matter is used to describe the particles that everything which has a mass is made from...
...us, earth, iPod, water, air, paper etc.



Green arrows show the "Changes of state"

Page 32

On your whiteboards, draw a picture of the particles in a:



Page 33

Complete Homework 3

Page 34

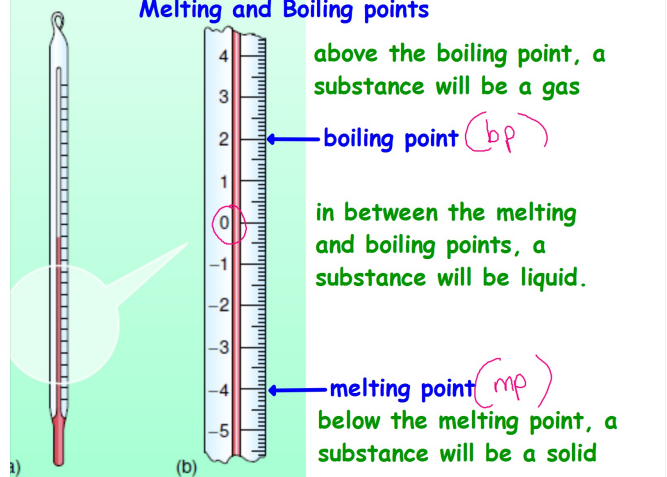
Lesson 5 : Melting & Boiling Points

By the end of this lesson I should know:

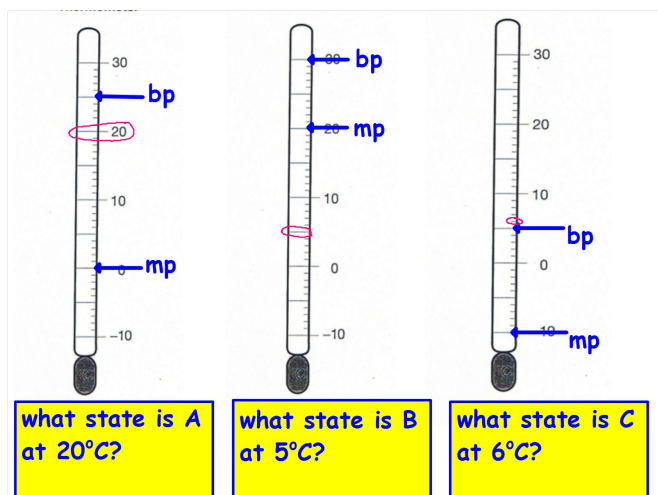
1. Different substances have different melting and boiling points.
2. We can watch the rate at which things evaporate. The lower a substance's boiling point the quicker it will evaporate.
3. If a substance is below its melting point it is a solid, between its melting point and boiling point it's a liquid and above its boiling point it is a gas.

Page 35

Melting and Boiling points



Page 36



Page 37

Homework 3 States of Matter, M.P. & B.P.

Page 38

Lesson 6 & 7 : Elements & Compounds 1

By the end of this lesson I should know:

1. Elements are found in a chart called the periodic table.
2. Elements are made up of atoms.
3. Mixtures are formed when elements muddle together without chemically bonding.
4. Mixtures are easy to separate.
5. Compounds are formed when elements join together (bond) forming something new.
6. Compounds are difficult to separate.

Page 39

Elements and Compounds

Elements are the building blocks of life. Elements are found in the periodic table.

[A closer look at an element](#)



IRON

what can you tell your class about the element iron?

Did you know that iron is magnetic?

Page 40

When iron joins with the oxygen in the air, a new substance called iron oxide (rust) is formed. Iron oxide is not an element - it is called a COMPOUND.

A Compound is a new substance made when 2 or more elements join together in a chemical reaction.

[A closer look at an iron compound](#)

Look at the sample of iron oxide (rust).

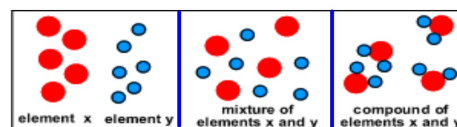
Does it look like the elements it was made from?

Does it behave like the elements? (test the rust with a magnet)

Compounds behave in different ways from the elements they are made from. We say that the compound has different PROPERTIES.

Page 41

Elements, Mixtures and Compounds



elements
made up of one
type of atom

mixtures are
made when
elements
muddle together
without
chemically
joining.
Easy to separate

compounds
are made when
elements chemically
join together forming
a bond.
Difficult to separate

Page 42

A mixture of compounds
Atoms of one element
A mixture of elements
Molecules of one element
A compound

Page 43

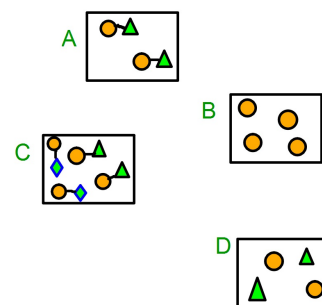
Match up the particle arrangement with the correct description:

Compound

Mixture

Element

Mixture of compounds



Page 44

Making Salt

Look at the elements Sodium and Chlorine
How do they appear?



Sodium



Chlorine

How are they different from the compound sodium chloride?



Using *Chemical Science Level 3* make a poster to show how the properties of elements differ from compounds

Page 45

Lesson 8 : Solutes and Solvents

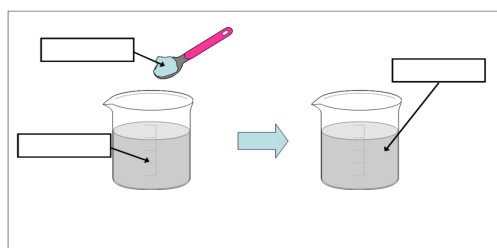
By the end of this lesson I should know:

1. A solute dissolves in a solvent to make a solution.
2. Something insoluble does not dissolve.
3. Something insoluble does not dissolve.
4. A solution that is 'saturated' is full and cannot dissolve any more solute. This can be demonstrated with salt and water.
5. When salt is dissolved in water, it splits into its different parts – sodium ions and chlorine ions. These ions fit in between the molecules of water.

Page 46

Making a solution

Sugar was added to a beaker of water. After stirring the sugar dissolved in the water.



solute, soluble, solution, insoluble, solvent
solute soluble solution solvent

Page 47



Solubility

Look at the tray of chemicals and the equipment list.
In your group write down a **method** you could use to test the solubility of the chemicals in the tray.

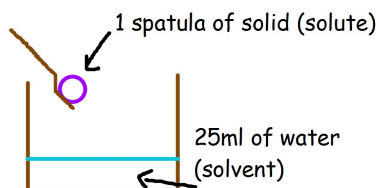
Equipment list

beaker
stirring rod
spatula
water
measuring cylinder

Page 48



Testing solubility



Page 49



Testing solubility

Results

Solute	soluble or insoluble
sugar	
salt	
iron oxide	
copper oxide	
copper carbonate	
copper sulfate	
sulfur	
potassium nitrate	

Sugar was added to lemon juice to make lemonade

Name the Solute -

Name the Solvent-

Page 50

Testing solubility

Sugar was added to lemon juice to make lemonade

Name the Solute -

Name the Solvent-

Name the Solution-

Page 51

Match up the definitions with the correct words

Soluble

insoluble

saturated

solute

solvent

solution

1. When a substance can dissolve
2. When a substance doesn't dissolve
3. The liquid that can do the dissolving
4. The substance that you are adding to the liquid
5. What you make when a solute is added to a solvent
6. What is formed when you add too much solute to a solvent, that no more dissolves.

Page 52

Look at the chemistry
animation "dissolving" in
desk tools

Page 53

Homework 4
Solutes, Solvents &
Solutions

Page 54

Separating Iron from Sulphur

It was very easy to separate iron from sulphur using a magnet. It would not be possible to separate iron from sulphur if you were trying to separate the chemical iron sulphide as the iron is JOINED to the sulphur and cannot be separated easily.



Iron and Sulfur are easy to separate with a magnet.

It is not possible to separate iron from iron sulphide, as the 2 elements are joined chemically. With a magnet

Page 55

Lesson 11 : Separation Techniques
By the end of this lesson I should know:



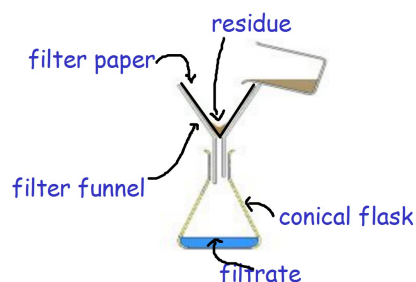
Page 56

How could you separate cooked pasta from boiling water?

Page 57

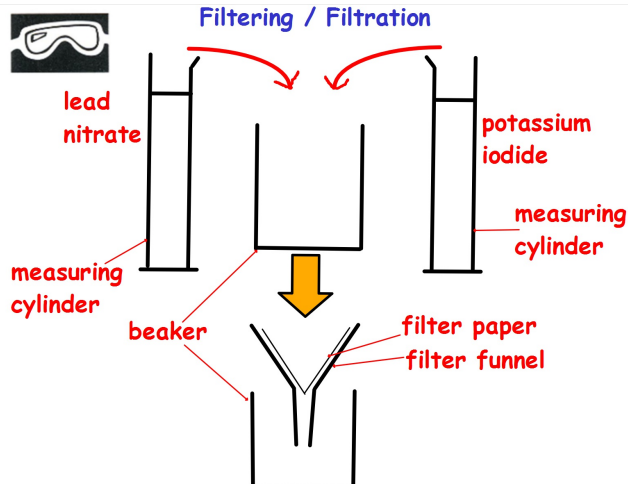
Separation techniques

Filtration can be used to remove a solid that doesn't dissolve from a liquid



Page 58

Filtering / Filtration



Page 59

Results

Filtering / Filtration

What happened when you added the two colourless solutions together?

What happened after the lead nitrate and potassium iodide solution was filtered?

Filtration is used to separate a solid THAT DOES NOT DISSOLVE from a liquid.



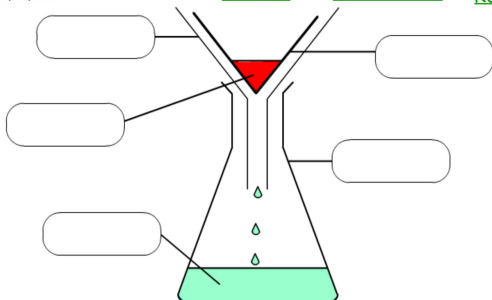
Page 60

Summary

Can you name the equipment we use to filter substances? Drag the labels to the correct places on the diagram.

Filter paper Conical flask Filtrate Filter funnel Residue

Filter paper Flask Filtrate Filter funnel Residue



Page 61

Filtration is used to separate an **INSOLUBLE** solid from a liquid.

Page 62

Lesson 12 : Separation Techniques

By the end of this lesson I should know:

How to separate a soluble salt by evaporation

How to separate two liquids by distillation

Page 63



Equipment Handling

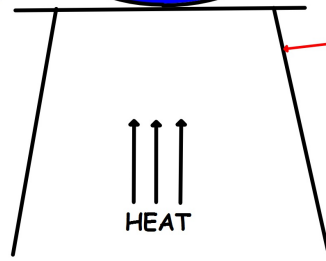
Evaporation

solution (liquid with substance dissolved)

evaporating dish

tripod

HEAT

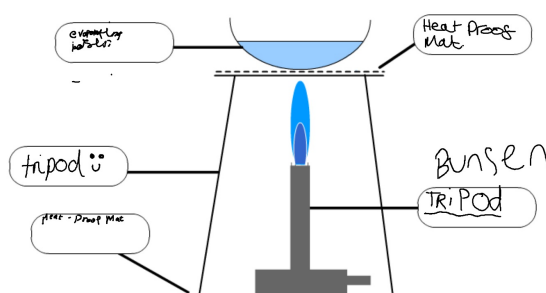


Page 64

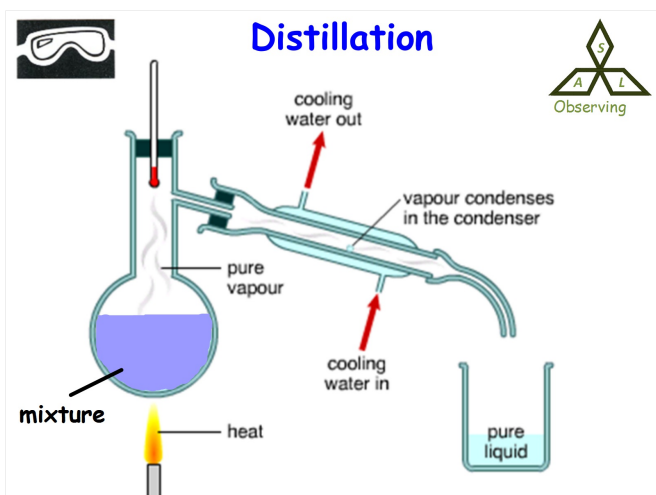
Evaporation is used to separate a **SOLUBLE** solid from a liquid that it is dissolved in.

Page 65

Gauze Bunsen burner Heat-proof mat Evaporating basin Tripod



Page 66



Page 67

Distillation

This is a separation technique which separates two liquids by their different boiling points. One liquid will boil at a lower temperature than the other and so will come off first. e.g alcohol and water. Alcohol boils at around 79 degrees celsius and water boils at 100 degrees celsius.

Page 68

Homework 5
Separation Technique
Research

Page 69

Lesson 13 : Separation Techniques

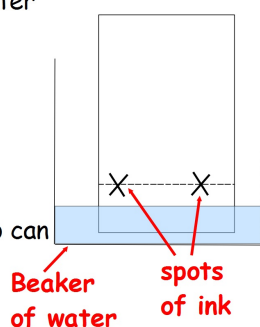
How to separate inks by chromatography



Page 70

Chromatography

- A little of each ink is spotted onto a cross on the paper which is placed into a beaker of water as shown.
- The water travels up the paper carrying the various molecules with it.
- Different dyes in the ink travel different distances so can then be identified.



Page 71

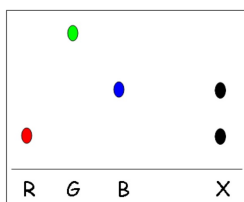


There has been a crime! Someone's lunch has been stolen and a ransom note is left. Use chromatography paper to find the culprit!

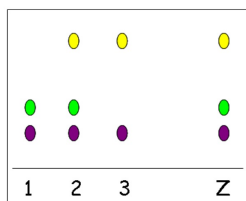
Page 72

Chromatography

Chromatography can be used to separate a mixture of different inks.



1) Ink X contains two different colours. What are they?



2) Which number ink is ink Z?

<https://www.twigonglow.com/experiment/felt-tip-chromatography-4108/0>

Page 73

Page 74

Summary of Separation techniques

A mixture containing something that DOES dissolve can be separated using _____

A mixture of liquids with different boiling points can be separated using _____

A mixture of different inks can be separated using _____

A mixture containing something that DOES NOT dissolve can be separated using _____

distillation, chromatography, evaporation, filtration

Page 75

Lesson 14+15 : Separation Techniques

By the end of this unit I can:



Plan and carry out an experiment to separate sand and salty water to obtain a dry sample.

Page 76

Separating Salty water and Sand



Imagine you're trapped on a desert island. You've somehow managed to acquire some fish and chips (seagull delivery?) and you need some salt!



Using the separation techniques you have learned in the past few lessons design an experiment to separate salt from sand and obtain a dry sample of salt.



Page 77

Planning your investigation

Look at the apparatus kit you have been given.. In your group plan how you are going

to carry out this investigation. Write your ideas in the box below.



Plan / method	Diagram of apparatus
	Safety

Page 78

Answer:-

Step 1 - To filter the solution so that the sand is collected in the filter paper and the salt water goes into the flask.

Step 2 - Evaporate the salt solution to leave the salt in the dish and the water will evaporate into the atmosphere.

Page 79

Homework 6: sand and salty water evaluation



EVALUATING

After carrying out the experiment to separate salt from sand write an evaluation about your work that lesson. Include your answers to the following questions in your report:

- What did you do?
- What did you find out?
- What went well?
- What did you find difficult? – were you successful at overcoming your difficulties?
- What would you change or do differently next time?
- Is there anything else you thought about before / after / during the lesson that is relevant and you want to mention?

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Test REVISION

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