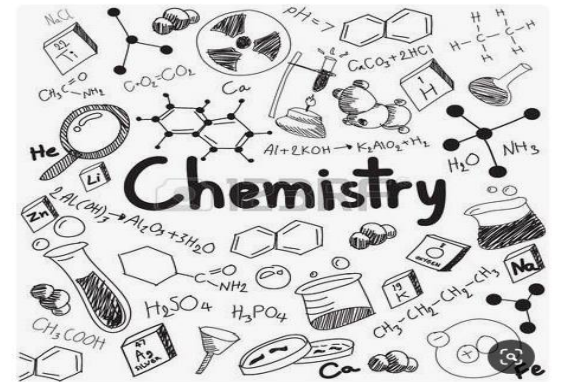
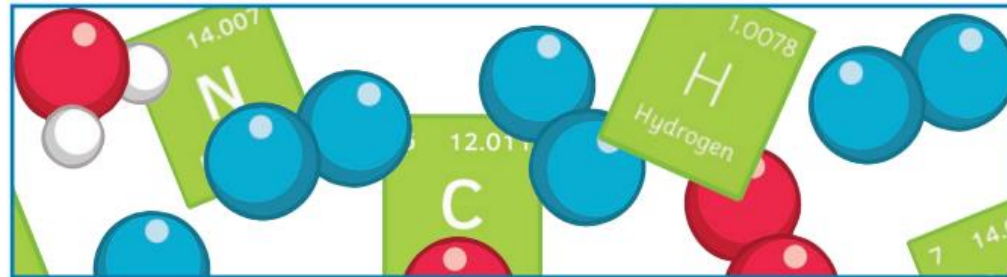




NOS

Reviewing the Periodic table, Acids and Alkalis



Learning Objectives:

- Understand that the periodic table is a way to sort elements.
- Identify different groups in the periodic table.
- Describe Acids , Bases and Alkalis.

Key words:

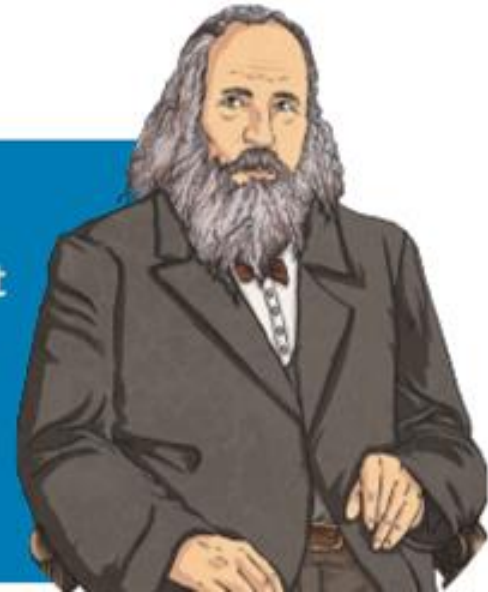
- ❖ Atom
- ❖ Element
- ❖ Compound
- ❖ Chemical Symbol
- ❖ Chemical formula
- ❖ pH indicator
- ❖ Neutralization

Dmitri Mendeleev

A Russian scientist born in 1834. He created the Periodic Table almost 150 years ago.

When creating the Periodic Table, Mendeleev even predicted elements would be discovered in the future. Those elements have, in fact, been discovered in recent years

As a reminder of the importance of Mendeleev's great work, element number 101 was named after him. It is appropriately named "Mendelevium!"



The Periodic Table

A column in the periodic table is called a **group**.

The groups are numbered along the top, from Group 1 to Group 7, with Group 8 on the end.

The middle section is not included in this group system because the elements here behave differently to those in the labelled groups.

- Each box on the periodic table tells you the element **symbol**, **atomic number**, and **atomic mass** for all the known elements.
- This is very useful information, but did you know that the arrangement of the elements on the periodic table gives you even **more information**?
- Each major **column** of elements represents a **group** of elements with **similar chemical behavior**.
- Can you see **why the arrangement** of elements on the periodic table is **important**?

1 H	2 He											13 B	14 C	15 N	16 O	17 F	18 Ne
3 Li	4 Be											5 Al	6 Si	7 P	8 S	9 Cl	10 Ar
11 Na	12 Mg	3 Sc	4 Ti	5 V	6 Cr	7 Mn	8 Fe	9 Co	10 Ni	11 Cu	12 Zn	13 Ga	14 Ge	15 As	16 Se	17 Br	18 Kr
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
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110 110	111 111	112 112				116 116	118 118	
		f															
Lanthanides		58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
Actinides		90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

1

2

3

4

5

6

7

8

1 H Hydrogen 1

4 He Helium 2

7 Li Lithium 3	9 Be Beryllium 4
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11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
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23 Na Sodium 11	24 Mg Magnesium 12
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27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
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39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
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85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
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133 Cs Caesium 55	137 Ba Barium 56	57-71	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	(209) Po Polonium 84	(210) At Astatine 85	(222) Rn Radon 86
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(223) Fr Francium 87	(226) Ra Radium 88	89-103	(261) Rf Rutherfordium 104	(262) Db Dubnium 105	(266) Sg Seaborgium 106	(264) Bh Bohrium 107	(269) Hs Hassium 108	(268) Mt Meitnerium 109	(269) Ds Darmstadtium 110	(272) Rg Roentgenium 111	(285) Cn Copernicium 112	(286) Nh Nihonium 113	(289) Fl Flerovium 114	(289) Mc Moscovium 115	(293) Lv Livermorium 116	(294) Ts Tennessine 117	(294) Og Oganesson 118
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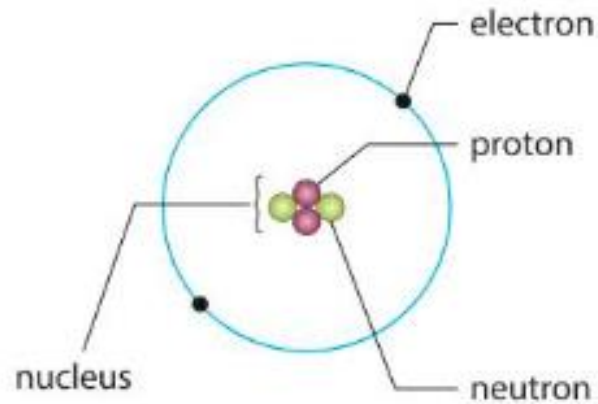
Lanthanide Series	139 La Lanthanum 57	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	(145) Pm Promethium 61	(150) Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	163 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
Actinide Series	(227) Ac Actinium 89	232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	(237) Np Neptunium 93	(244) Pu Plutonium 94	(243) Am Americium 95	(247) Cm Curium 96	(247) Bk Berkelium 97	(251) Cf Californium 98	(252) Es Einsteinium 99	(257) Fm Fermium 100	(258) Md Mendelevium 101	(259) No Nobelium 102	(266) Lr Lawrencium 103

What is proton number?

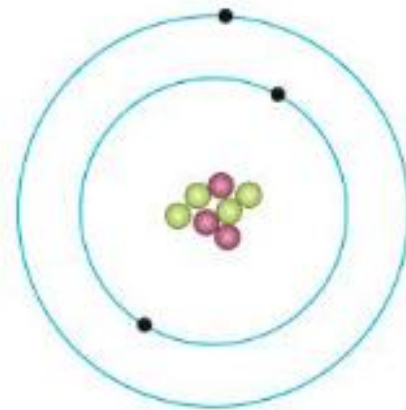
As you know, an atom has a nucleus. The nucleus is made up of two types of sub-atomic particle:

- positively charged protons
- neutrons, with no charge.

Each element has a different number of protons in its atoms. A helium atom has two protons. A lithium atom has three protons. A gold atom has 79 protons. The number of protons in an atom of an element is its **proton number**. Proton number is also called **atomic number**.



▲ *A helium atom has two protons.
The proton number of helium is 2.*



▲ *A lithium atom has three protons.
The proton number of lithium is 3.*

How is proton number linked to the periodic table?

In the periodic table, the elements are arranged in order of proton number.

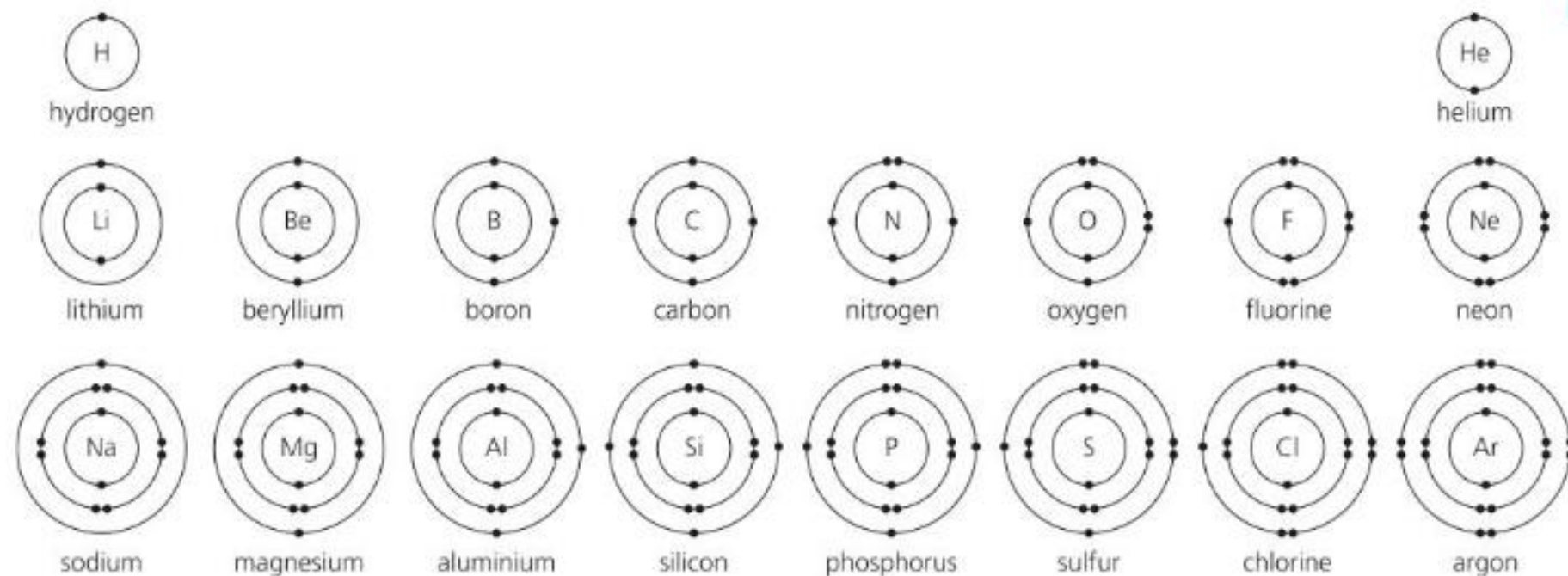
													1 hydrogen														2 helium
3 lithium	4 beryllium											5 boron	6 carbon	7 nitrogen	8 oxygen	9 fluorine	10 neon										
11 sodium	12 magnesium											13 aluminium	14 silicon	15 phosphorus	16 sulfur	17 chlorine	18 argon										
19 potassium	20 calcium	21 scandium	22 titanium	23 vanadium	24 chromium	25 manganese	26 iron	27 cobalt	28 nickel	29 copper	30 zinc	31 gallium	32 germanium	33 arsenic	34 selenium	35 bromine	36 krypton										
37 rubidium	38 strontium	39 yttrium	40 zirconium	41 niobium	42 molybdenum	43 technetium	44 ruthenium	45 rhodium	46 palladium	47 silver	48 cadmium	49 indium	50 tin	51 antimony	52 tellurium	53 iodine	54 xenon										
55 caesium	56 barium	57-71 lanthanoids	72 hafnium	73 tantalum	74 tungsten	75 rhenium	76 osmium	77 iridium	78 platinum	79 gold	80 mercury	81 thallium	82 lead	83 bismuth	84 polonium	85 astatine	86 radon										
87 francium	88 radium	89-103 actinoids	104 rutherfordium	105 dubnium	106 seaborgium	107 bohrium	108 hassium	109 meitnerium	110 darmstadtium	111 roentgenium	112 copernicium	113 nihonium	114 flerovium	115 moscovium	116 livermorium	117 tennessine	118 oganeson										

57 lanthanum	58 cerium	59 praseodymium	60 neodymium	61 promethium	62 samarium	63 europium	64 gadolinium	65 terbium	66 dysprosium	67 holmium	68 erbium	69 thulium	70 ytterbium	71 lutetium
89 actinium	90 thorium	91 protactinium	92 uranium	93 neptunium	94 plutonium	95 americium	96 curium	97 berkelium	98 californium	99 einsteinium	100 fermium	101 mendelevium	102 nobelium	103 lawrencium


▲ This periodic table shows the proton number of each element.

The arrangement of the electrons in an atom is its **electron configuration**. The diagram below shows the electron configurations of the first 18 elements of the periodic table. The elements are arranged as they are in the periodic table.

Can you see a pattern in the electron structures? Atoms of elements in the left column (Group 1 of the periodic table) have one electron in their outer shell. Atoms of elements in the next column (Group 2) have two electrons in their outer shell. Atoms of all elements that are in the same column of the periodic table have the same number of outer shell electrons.



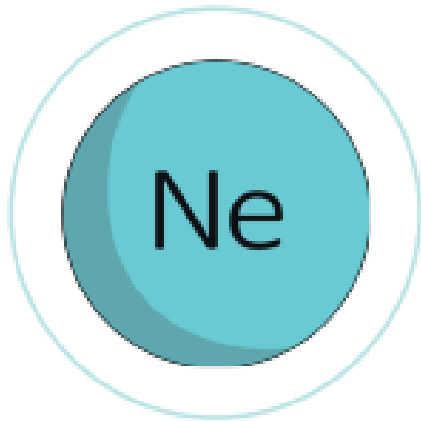
▲ *Electron configuration of the first 18 elements.*

 **Key points**

- The electron configuration of an atom describes how its electrons are arranged.
- Each electron shell has a maximum number of electrons.

REMEMBER

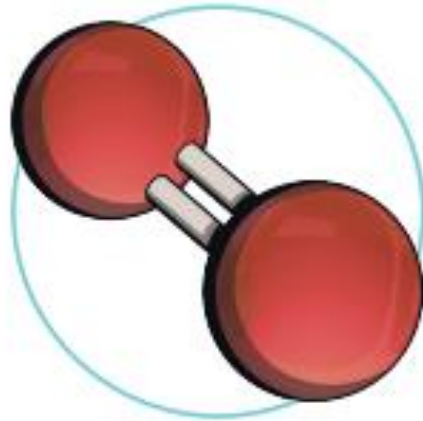




atom

The smallest particle of a chemical element.

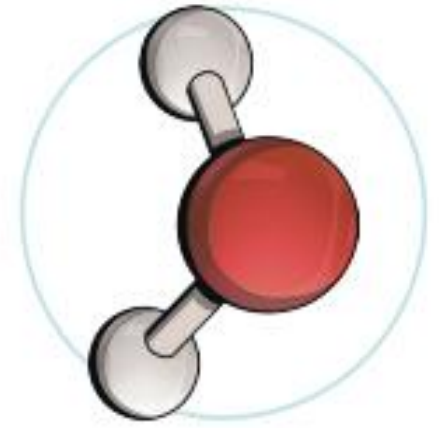
Contains electrons, protons and neutrons.



element

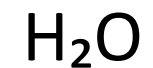
A substance that cannot be broken down into another substance.

Each element is made up of its own type of atom.



compound

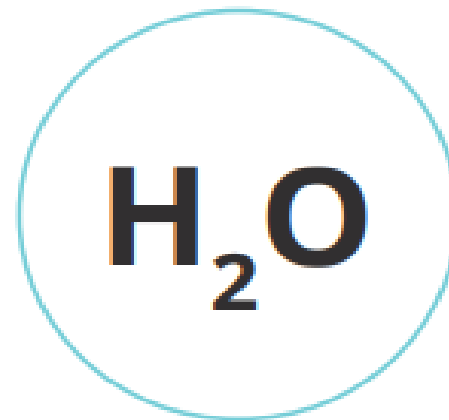
A substance made from two or more different elements that have been chemically joined.
Example:





chemical symbol

Most chemical elements are **represented symbolically by two letters**, generally the first two in their name.



chemical formula

Tells us the number of each element in a compound.
It contains the symbols of the elements present in the compound.

Let's review

- Define the following term; atomic number, mass number, a period.

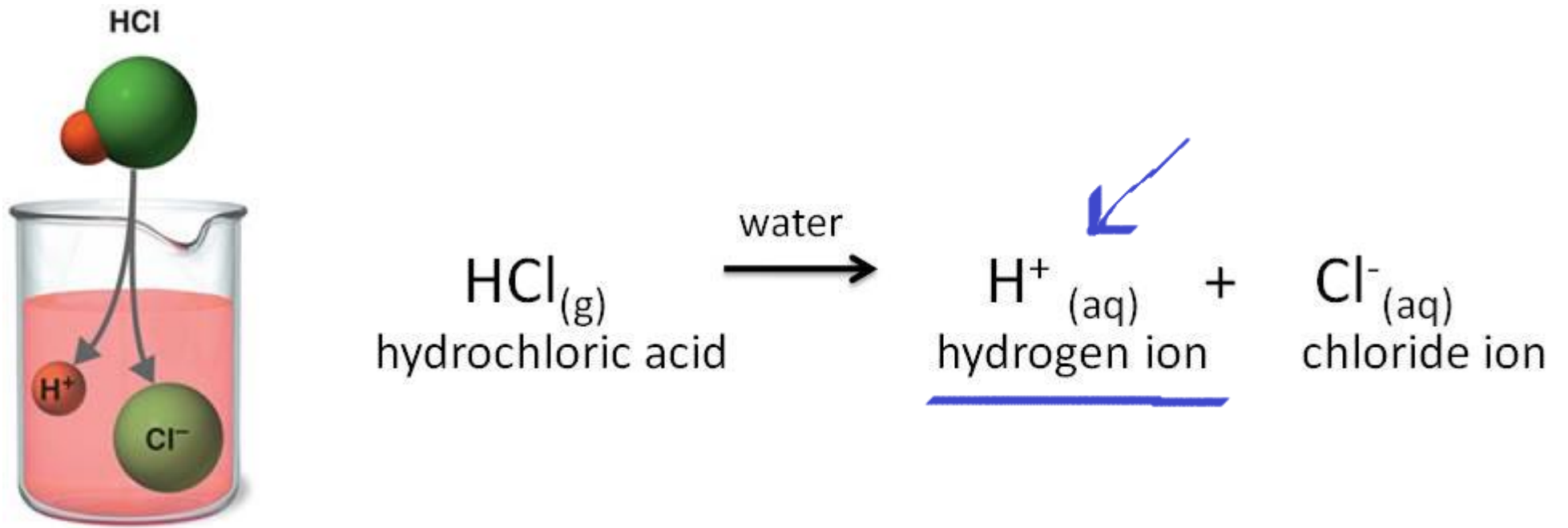
atomic number : The number of protons in an atom

mass number : The number of protons + number of neutrons in an atom

a period: a row of elements having the same number of electron shells

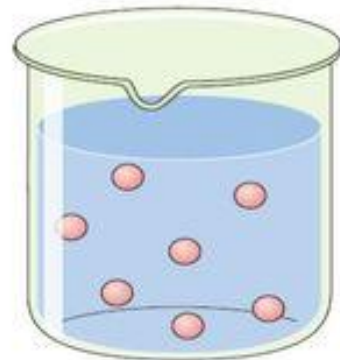
Acids

- Substances that donate hydrogen ions, H^{+1} , when **dissolved in water**.
- Acids conduct electricity well, due to the positive and negative ions in the solution. Acids turn blue litmus paper into red
- Corrosive: Can burn skin and react with metals. (stored in glass containers)
- All acids contain the element Hydrogen.
- Acids have a pH ranging from 0-6

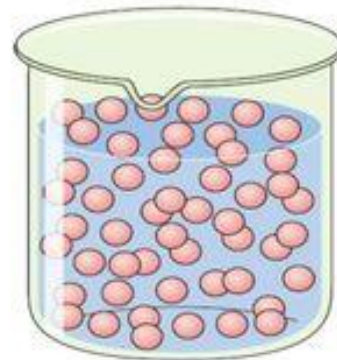


According to concentration acids are classified into :

- **A- Concentrated acids**: more number of acid particles dissolved in water, so more H^{+1} ions present. (corrosive – can destroy skin and attack metals)
- **B- Diluted acids**: low number of acid particles dissolved in water, so less H^{+1} ions present. (irritant – skin may become red and blistered)



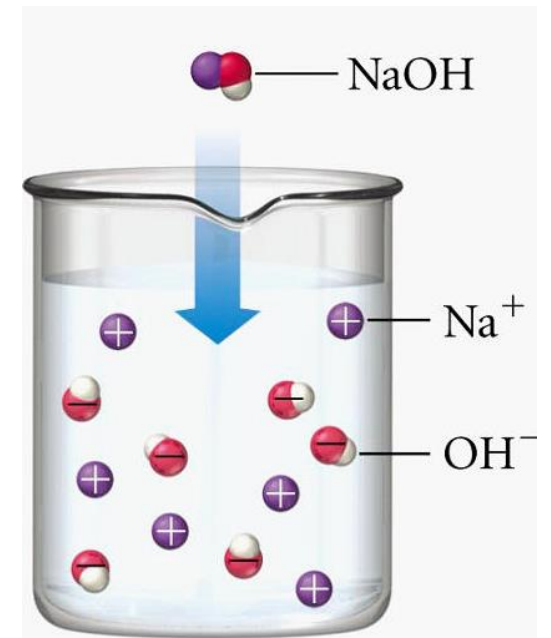
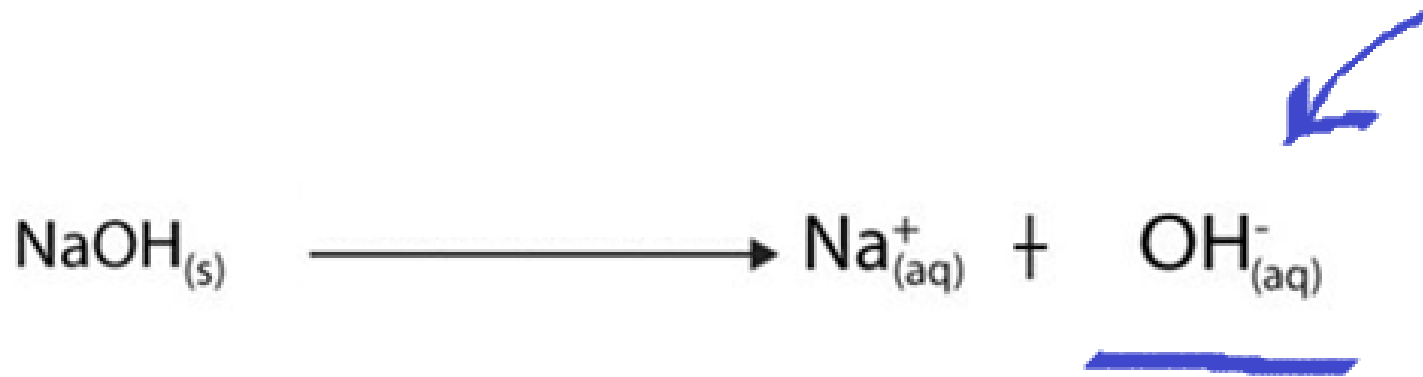
Dilute solution



Concentrated solution

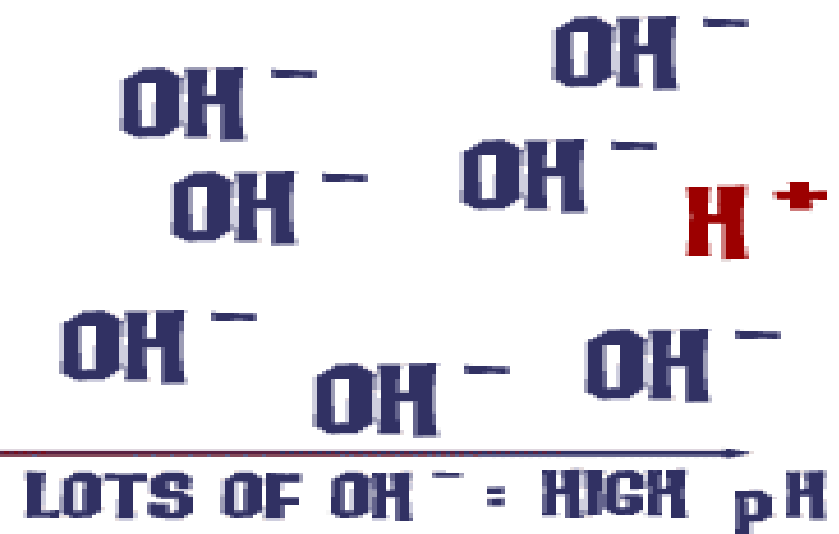
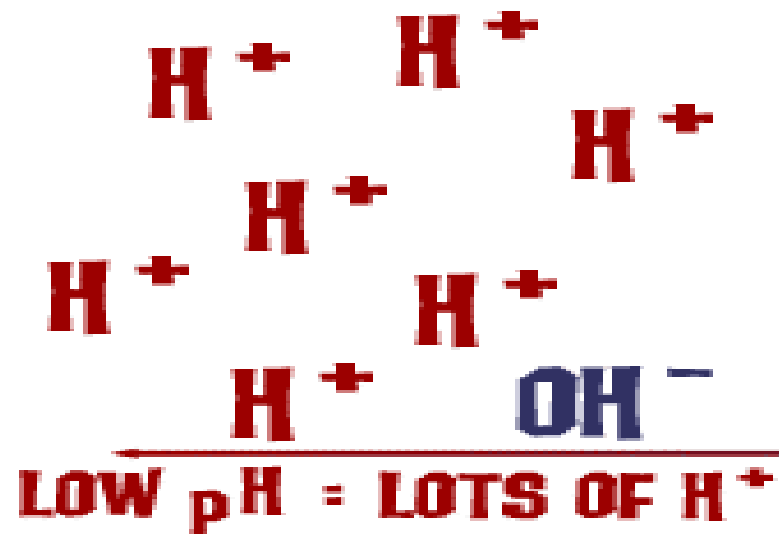
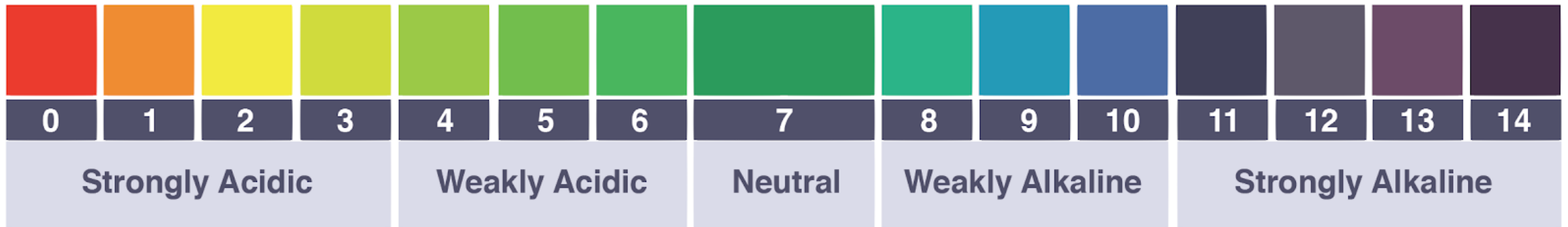
Bases and Alkalis

- Substances that form hydroxide ions (OH^{-1}) ions when dissolved in water
- Not all bases dissolve in Water. When a Base dissolves in water, the solution is called Alkali.
- Taste bitter
- Can burn skin (caustic).
- Alkaline solutions conduct electricity well.
- Alkalis turn red litmus paper into blue
- Have a pH ranging from 8-14



Universal Indicator

A mixture of indicators that give range of colors, used to show how strong or weak an acid or an alkali is.



Neutralization

- It is a chemical reaction between an acid and an alkali to form water and salt.
- Water is neutral (pH=7) , therefore, the pH changes when we mix acids and alkalis.

