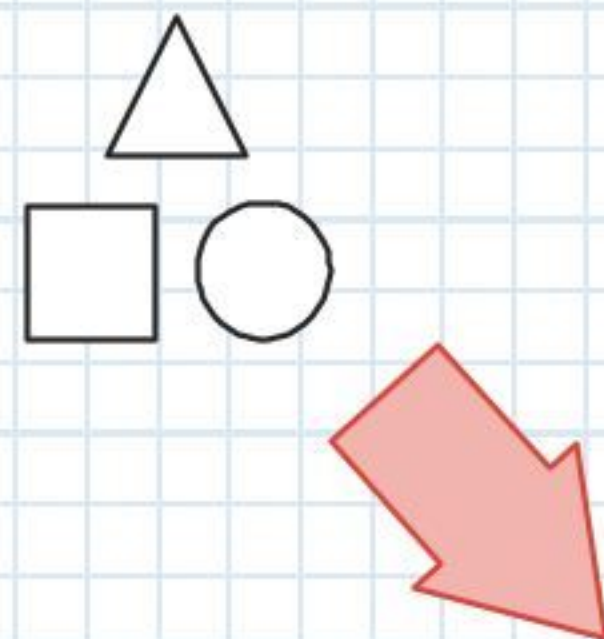


Welcome!

RA Session
28/03/2022

Chemistry

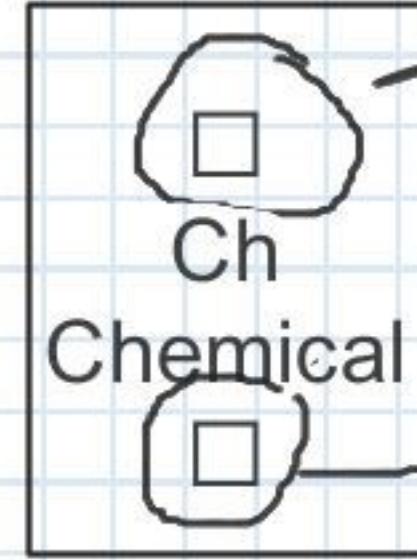


Recap

First invented/discovered
by Dimitri Mendeleev in
1869

Periodic Table

18 groups and 7
periods



Mass
number

number of p
+ n

Proton/Atomic
number

number of p
OR e

Abbreviated
to PT

Potassium
Sodium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Tin
Lead
Hydrogen
Copper
Silver
Gold



The Periodic Table of Elements

Groups = 18

1. Alkali Metals
2. Alkaline Earth Metals
7. Halogens
0. Noble Gases

GCSE
Groups

Increasing mass

Key

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H hydrogen 1																	4 He helium 2
2	7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
3	23 Na sodium 11	24 Mg magnesium 12											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
4	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
5	85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] 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
6	133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	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
7	[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] 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 oganeson 118

Increasing mass + electrons (electron shells increase in size)

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for Cu and Cl have not been rounded to the nearest whole number.

Bonding

metal +
non-metal

Ionic

Involves
ions

Electrolysis when
molten or aqueous

High melting and boiling
points due to strong
electrostatic forces of
attraction

High m + b
ps

Metallic

in metals

delocalised
electrons

can
conduct

strong



non-metal +
non-metal

Electrons
are shared

Covalent

Giant
Diamond and
graphite

Small
molecules

Weak intermolecular
forces - low m + b
ps

Cannot
conduct

m + b ps = melting
and boiling points

Overall
energy change =
reactants energy -
products energy

Worked Examples

Values

Equation

Substitute

Rearrange

Answer

Units

Formula
Insert Values
Fine Tune
Answer

Hydrogen and chlorine react to form hydrogen chloride gas:



Calculate the energy change.

VESRAU

Bond Bond Energy
(kJ/mol)

H-H 436

Cl-Cl 243

H-Cl 432

energy change = reactants - products

energy change = 679 - 864

-185 = 679 - 864

-185 kJ/mol

Exothermic reaction

Hydrogen bromide decomposes to form hydrogen and bromine:

$$2 \times 366 = 732$$

$$436 + 193 = 629$$



Calculate the energy change.

VESRAU

Bond Bond Energy
(kJ/mol)

H-Br 366

H-H 436

Br-Br 193

energy change = reactants - products

$$\text{energy change} = 732 - 629$$

$$103 = 732 - 629$$

$$+103 \text{ kJ/mol}$$



Endothermic reaction

How to answer bond energy questions

1. Write the bond energy equation
2. Calculate bond energy of reactants
3. Calculate bond energy of products

REMEMBER: Include both large and small numbers in calculations

4. Take reactants from products

REMEMBER: Write units and positive or negative symbol

REMEMBER: You may have to work in reverse!

Practice Questions

Practice questions are available
on the Online Quizzing System
(OQS) under the title: Online RA
Session #02 - Chemistry