

Acids: release H^+ in water, <7 on pH scale, e.g. HCl, H_2SO_4 , HNO_3 .

Bases: release OH^- in water, >7 on pH scale, e.g. NaOH, Na_2O .

(1) metal oxides e.g. Sodium oxide - Na_2O ••

(2) hydroxides e.g. NaOH - sodium hydroxide ••

(3) carbonates e.g. K_2CO_3 - potassium carbonate •••

(4) hydrogen carbonates e.g. $Ca(HCO_3)_2$ - calcium hydrogen carbonate. •••

(1) acid + metal oxide \rightarrow salt + water



(2) acid + metal hydroxide \rightarrow salt + water



(3) acid + carbonate \rightarrow salt + water + carbon dioxide



(4) acid + hydrogen carbonate \rightarrow salt + water + carbon dioxide



Neutralisation: acid added to base to form salt + water.

Salt formed depends on acid and base used.

pH scale: 1-14 scale, measure of how acidic or

basic solution is.
 (H^+) more acidic
 (OH^-) more basic ($OH^- > H^+$)

① 2 ③ 4 5 6 ⑦ 8 9 10 ⑪ 12 13 ⑭

(can only detect if acidic, basic or neutral)
Litmus paper

$\square + acid = \square$

$\square + base = \square$

$\square + acid = \square$

$\bullet + neutral = stays same$
 $\blacksquare + neutral = stays same$

Universal indicator
for more versatile - indicates strength of solution
pH 1-3 = (Strongly acidic)
4-6 = (weakly acidic)

7 = neutral

8-9 = (weakly basic)

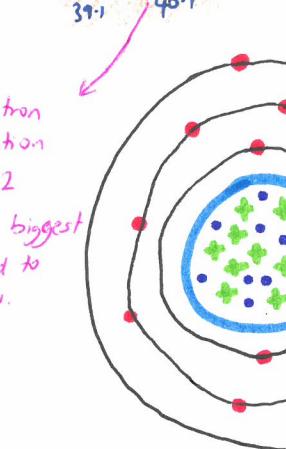
10-14 = (Strongly basic)

reactions begin rapidly (i.e. \uparrow conc.) but slow as reactants used up (conc. \downarrow).
 \uparrow surface area = \uparrow no. particles = \uparrow Ror
(e.g. powders vs. lumps)

Acids + Bases

atomic no.	H
mass no.	

3 Li	4 Be	5 B	6 C	7 N	8 O	9 F
6.9	9	10.8	12	14	16	19
"	"	"	"	"	"	"
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl
23	24.3	27	28.1	31	32.1	35.5
39.1	40.1					40



mass number = no. of particles in nucleus = no. protons + no. neutrons.

electron configuration = 2, 8, 8, 2 (this is the biggest you need to know.)
Na: 2, 8, 1 → atoms are neutral, no overall charge.
(+ = ●)

production of CO_2 indicated by

bubbling - confirmed by bubbling through limewater.

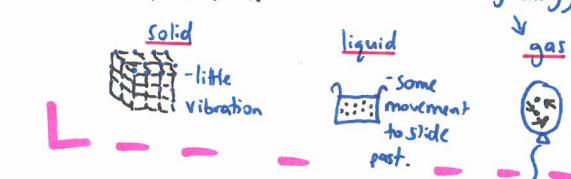
clear → cloudy ✓

isotopes = atoms that have different no. of neutrons.

metals

non-metals

Particle Theory: all matter is made up of tiny particles in a constant state of motion.



Collision Theory: a chemical reaction occurs when particles collide with sufficient energy (E_k) to break bonds that hold particles together.

\uparrow conc. = \uparrow particles in given volume = \uparrow likelihood of collision = \uparrow Ror
 \uparrow temp. = $\uparrow E_k$ in particles = \uparrow Ror.

catalyst e.g. enzymes. \uparrow Ror - never used up in reaction.

reactants | Na O H S
products | 2 6 4 1

check
let's check it.
*remember nos at front apply to entire compound.

You are given this periodic table.

2 He	4
5 B	6 C
7 N	8 O
9 F	10 Ne
11 Na	12 Mg
13 Al	14 Si
15 P	16 S
17 Cl	18 Ar

18 Ar	19 F	20 Ne
21	22	23
24	25	26
27	28	29
29	30	31

You are also given this ion table... but you need to know the names.

Cations = positive ions (lost electrons)		Anions = negative ions (gained electrons)	
+1	+2	+3	-2
NH_4^+	Ca^{2+}	Al^{3+}	O^{2-}
Na^+	Mg^{2+}	Cu^{2+}	S^{2-}
K^+	Pb^{2+}	Fe^{2+}	NO_3^-
Ag^+	SO_4^{2-}	Ba^{2+}	HCO_3^-
H^+	Zn^{2+}		F^-
Li^+			

polyatomic ions

metals (except NH_4^+) non-metals

Never trust an atom... they make up everything.

Ions: when atoms gain or lose electrons, becoming charged particles. They react to have complete outer shells.

+ve (cations) = lose electrons... now more protons than electrons so overall positive.

-ve (anions) = gain electrons... now more electrons than protons so overall negative.

Ionic Compounds: metals reacting with non-metals - attraction of unlike charges. (i.e. metal + non-metal).

e.g. $CuCl_2$ - copper chloride.

writing ionic formulae: e.g. zinc hydroxide

(1) select correct ions from table...
 $2n^{2+} OH^-$

(2) positive ion first (metal)

(3) if charges unequal: swap + drop

$2n^{2+} OH^-$

(4) $Zn(OH)_2$ brackets must be used in polyatomic ions.

Word equations: for all reactions.

ALWAYS use this format... use words.

(reactant) + (reactant) \rightarrow (product) + (product)

e.g. sodium hydroxide + sulfuric acid \rightarrow sodium sulfate + water

*remember - swap + drop!

$Na^+ SO_4^{2-} = Na_2SO_4$

e.g. $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

Balanced equation: same as above

BUT adding whole number in front of whole compound to ensure... same no. of each atom on BOTH sides of equation.

e.g. $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$