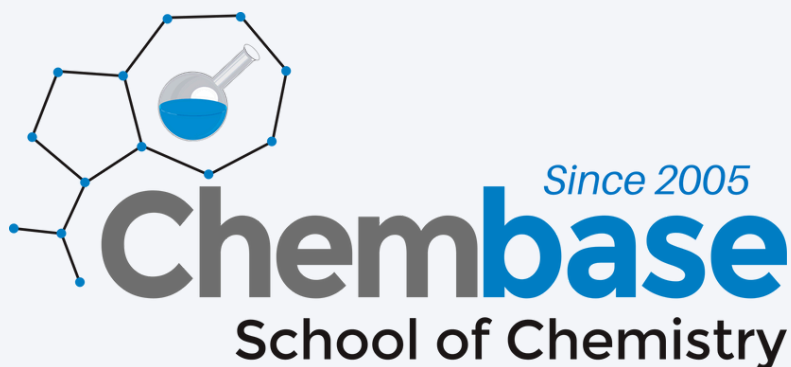
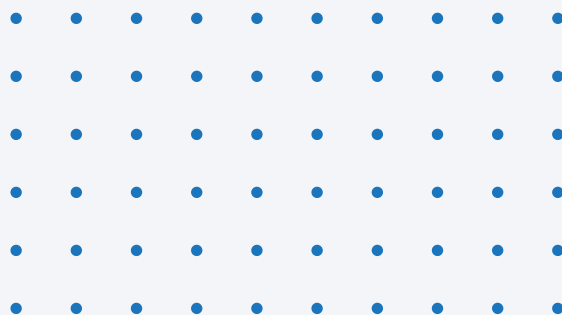




STUDY PACK 1.1

CHEMICAL FORMULAE



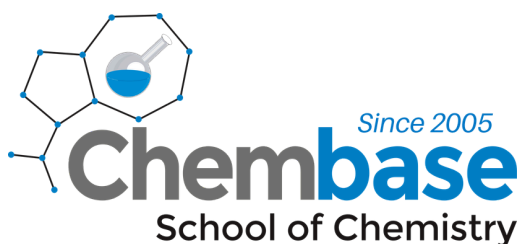
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Chemical Formulae

1. What is meant by the term Valency?

Valency of an element is equal to the number of positive or negative charge acquired by the atom by losing or gaining electrons

2. Write down the Rules of writing a Chemical formula?

- a) Write down the symbols of the elements/ radicals given in the chemical name of the compound.
- b) Write down the valencies of each element or radical under the corresponding symbol.
- c) Cross them over as shown below

- d) The valencies show the simplest combining ratio & may be cancelled down in order to simplify

- e) If an element has more than one valency, the name of the compound will indicate the valency in capital roman numerals.

Eg: Copper (I) Oxide

Lead (IV) chloride

5. Explain why the valency of noble gasses is zero hence forming no compounds

Noble gases possess a completely filled outermost shell of electrons. Therefore, it will not lose or gain electrons, hence the valency is zero forming no bonds.

6. Assign the valency for the following Elements & Radicals:

ELEMENTS			RADICALS		
	Symbol	Valency		Symbol	Valency
Hydrogen	H		Hydroxide	OH	
Carbon	C		Nitrite	NO ₂	
Nitrogen	N		Nitrate	NO ₃	
Oxygen	O		Sulfite	SO ₃	
Sodium	Na		Sulfate	SO ₄	
Magnesium	Mg		Ammonium	NH ₄	
Aluminium	Al		Carbonate	CO ₃	
Silicon	Si		Hydrogen-carbonate (bicarbonate)	HCO ₃	
Phosphorus	P		Hydrogen- Sulfite (bisulfite)	HSO ₃	
Sulfur	S		Hydrogen- Sulfate (bisulfate)	HSO ₄	
Chlorine	Cl		Phosphate	PO ₄	
Potassium	K		Manganate (VII)	MnO ₄	
Manganese	Mn		Chlorate (I)	ClO	
Iron	Fe		Chlorate (V)	ClO ₃	
Cobalt	Co		Vanadate (V)	VO ₃	
Copper	Cu		Chromate (VI)	CrO ₄	
Zinc	Zn		Dichromate (VI)	Cr ₂ O ₇	
Bromine	Br		Oxalate	C ₂ O ₄	
Barium	Ba		Thiosulfate	S ₂ O ₃	
Iodine	I		Tetrathionate	S ₄ O ₆	
Lead	Pb		Peroxi di sulfate (per sulfate)	S ₂ O ₈	
Mercury	Hg				
Silver	Ag				

7. Write the formulae of the following, by showing the valencies of each element & Crossing them over:

Aluminium Oxide

Iron (II) Sulfate

Copper (I) Oxide

Lead (II) Nitrate

Ammonium Carbonate

Calcium Hydrogen Carbonate

Lead (IV) Oxide

Tin (II) Chloride

Iron (III) hydroxide

Ammonium Phosphate

Magnesium Chromate (VI)

Potassium Chlorate (V)

Aluminium Vanadate (V)

Sodium dichromate (VI)

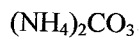
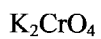
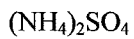
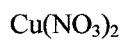
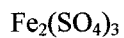
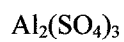
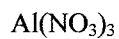
Calcium Oxalate

Zinc nitrate

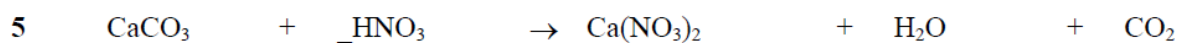
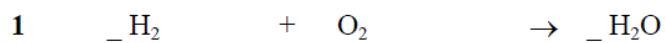
Sodium thiosulfate

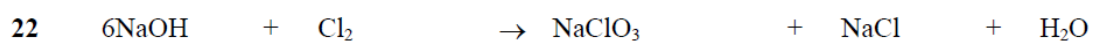
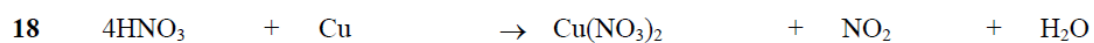
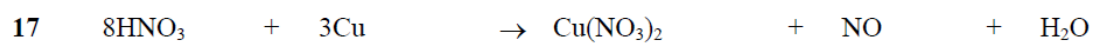
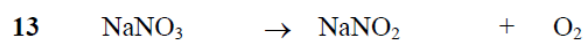
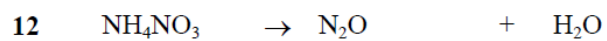
Sodium Chlorate (I)

Naming of Compounds



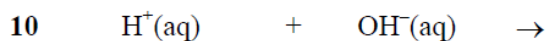
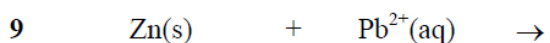
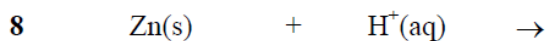
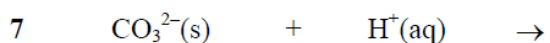
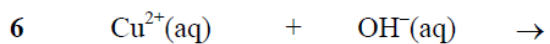
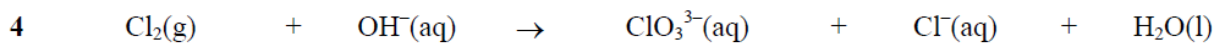
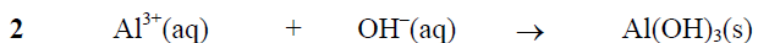
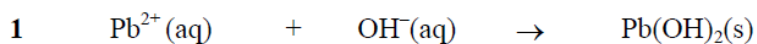
Balancing Equations





Ionic equations

In questions 1–5 you are required to balance the equations, in questions 6–10 you are required to complete the equation and then balance it. For questions 1–17 you are required to write the full, balanced ionic equation. Questions 18–20 involve more complex ions again you are just asked to balance the equation.



-
- 11** Write an ionic equation for the reaction of magnesium with sulphuric acid.
-
- 12** Write an ionic equation for the reaction of sodium carbonate solution with nitric acid.
-
- 13** Write an ionic equation for the reaction of copper oxide with hydrochloric acid.
-
- 14** Write an ionic equation for the reaction of barium chloride solution with sodium sulphate solution.
-
- 15** Write an ionic equation for the reaction of silver nitrate solution with potassium chloride solution.
-
- 16** Write an ionic equation for the reaction of zinc with silver nitrate solution.
-
- 17** Write ionic equations for the reactions of sodium hydroxide and potassium hydroxide with hydrochloric acid.
-
- 18** Write ionic equations for the reactions of sodium hydroxide and potassium hydroxide with nitric acid.
-
- 19** Write ionic equations for the reactions of sodium hydroxide and potassium hydroxide with sulphuric acid.
-
- 20** What do you notice about the answers to questions 17, 18 and 19?
-

Steps for writing ionic equations.

- Step 1 : Write the correct formulae of the reactants & the products.
Step II : Balance the equation.
Step III : Write the state symbols, aqueous (aq), liquid (l), gaseous (g), solid (s), vapour (v)
Step IV : Separate ONLY the (aq) molecules into their respective ions.
Step V : Cancel the common ions. (spectator ions)

Rules for solubility of salts

1. All nitrate salts are soluble.
2. All salts of Na^+ , K^+ & NH_4^+ are soluble.
3. Most Chloride salts are soluble. Exceptions : AgCl , PbCl_2
4. Most sulfate salts are soluble. Exceptions : BaSO_4 , PbSO_4 , CaSO_4
5. Most of hydroxide salts are slightly soluble. Important soluble hydroxides are : NaOH , KOH , & Ca(OH)_2
6. Most carbonate salts are insoluble. Except for Na^+ , K^+ & NH_4^+

Answers

The Periodic Table of Elements

1 2 3 4 5 6 7 0 (8) (18)

1.0	H	hydrogen	1
-----	----------	----------	---

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

(1) (2)

6.9	Li	lithium	3
9.0	Be	beryllium	4
23.0	Na	sodium	11
24.3	Mg	magnesium	12

39.1	K	potassium	19
40.1	Ca	calcium	20
85.5	Rb	rubidium	37
87.6	Sr	strontium	38

45.0	Sc	scandium	21
47.9	Ti	titanium	22
50.9	V	vanadium	23
52.0	Cr	chromium	24
54.9	Mn	manganese	25
55.8	Fe	iron	26
58.9	Co	cobalt	27
58.7	Ni	nickel	28
63.5	Cu	copper	29
65.4	Zn	zinc	30

69.7	Ga	gallium	31
72.6	Ge	germanium	32
74.9	As	arsenic	33
79.0	Se	selenium	34
79.9	Br	bromine	35
83.8	Kr	krypton	36

10.8	B	boron	5
12.0	C	carbon	6
14.0	N	nitrogen	7
16.0	O	oxygen	8
19.0	F	fluorine	9
20.2	Ne	neon	10

27.0	Al	aluminium	13
28.1	Si	silicon	14
31.0	P	phosphorus	15
32.1	S	sulfur	16
35.5	Cl	chlorine	17
39.9	Ar	argon	18

114.8	In	indium	49
118.7	Sn	tin	50
121.8	Sb	antimony	51
126.9	Te	tellurium	52
127.6	I	iodine	53
131.3	Xe	xenon	54

112.4	Cd	cadmium	48
114.8	In	indium	49
118.7	Sn	tin	50
121.8	Sb	antimony	51
126.9	Te	tellurium	52
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132.9	Cs	caesium	55
137.3	Ba	barium	56
138.9	La*	lanthanum	57
178.5	Hf	hafnium	72
180.9	Ta	tantalum	73
183.8	W	tungsten	74
186.2	Re	rhenium	75
190.2	Os	osmium	76
192.2	Ir	iridium	77
195.1	Pt	platinum	78
197.0	Au	gold	79
200.6	Hg	mercury	80
204.4	Tl	thallium	81
207.2	Pb	lead	82
209.0	Bi	bismuth	83
209.0	Po	polonium	84
210	At	astatine	85
222	Rn	radon	86

132.9	Cs	caesium	55
137.3	Ba	barium	56
138.9	La*	lanthanum	57
178.5	Hf	hafnium	72
180.9	Ta	tantalum	73
183.8	W	tungsten	74
186.2	Re	rhenium	75
190.2	Os	osmium	76
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209.0	Bi	bismuth	83
209.0	Po	polonium	84
210	At	astatine	85
222	Rn	radon	86

Elements with atomic numbers 112-116 have been reported but not fully authenticated

* Lanthanide series
* Actinide series

140	Ce	cerium	58
141	Pr	praseodymium	59
144	Nd	neodymium	60
147	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
232	Th	thorium	90
231	Pa	protactinium	91
238	U	uranium	92
237	Np	neptunium	93
242	Pu	plutonium	94
243	Am	americium	95
247	Cm	curium	96
245	Bk	berkelium	97
251	Cf	californium	98
254	Es	einsteinium	99
253	Fm	fermium	100
256	Md	mendeleevium	101
254	No	nobelium	102
257	Lr	lawrencium	103