

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Write **word equations** for the following reactions:

1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.
2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.
3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																				
Ag	1+																			
Al	3+																			
Zn	2+																			
1 H																				2 He
1.01																				4.00
3 Li	4 Be										5 B	6 C	7 N	8 O	9 F	10 Ne				
6.94	9.01										10.8	12.01	14.01	16.00	19.00	20.2				
11 Na	12 Mg										13 Al	14 Si	15 P	16 S	17 Cl	18 Ar				
22.99	24.31										26.98	28.09	30.97	32.07	35.45	39.9				
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			
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8			
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			
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3			
55 Cs	56 Ba	57-71 see below	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			
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)			
87 Fr	88 Ra	89-103 see below																		
(223)	(226)	below																		
57 La	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						
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0						
89 Ac	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						
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)						



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.

sodium iodide + potassium nitrate → potassium iodide + sodium nitrate

2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.

magnesium + carbon dioxide → magnesium oxide + carbon

3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.

sodium chloride + lead (II) nitrate → lead (II) chloride + sodium nitrate

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																																																																																																																																																																																																																																							
Ag	1+																																																																																																																																																																																																																																						
Al	3+																																																																																																																																																																																																																																						
Zn	2+																																																																																																																																																																																																																																						
1 H 1.01	2 He 4.00	3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	119 Uu	120 Uub	121 Uut	122 Uuq	123 Uuq	124 Uuq	125 Uuq	126 Uuq	127 Uuq	128 Uuq	129 Uuq	130 Uuq	131 Uuq	132 Uuq	133 Uuq	134 Uuq	135 Uuq	136 Uuq	137 Uuq	138 Uuq	139 Uuq	140 Uuq	141 Uuq	142 Uuq	143 Uuq	144 Uuq	145 Uuq	146 Uuq	147 Uuq	148 Uuq	149 Uuq	150 Uuq	151 Uuq	152 Uuq	153 Uuq	154 Uuq	155 Uuq	156 Uuq	157 Uuq	158 Uuq	159 Uuq	160 Uuq	161 Uuq	162 Uuq	163 Uuq	164 Uuq	165 Uuq	166 Uuq	167 Uuq	168 Uuq	169 Uuq	170 Uuq	171 Uuq	172 Uuq	173 Uuq	174 Uuq	175 Uuq	176 Uuq	177 Uuq	178 Uuq	179 Uuq	180 Uuq	181 Uuq	182 Uuq	183 Uuq	184 Uuq	185 Uuq	186 Uuq	187 Uuq	188 Uuq	189 Uuq	190 Uuq	191 Uuq	192 Uuq	193 Uuq	194 Uuq	195 Uuq	196 Uuq	197 Uuq	198 Uuq	199 Uuq	200 Uuq	201 Uuq	202 Uuq	203 Uuq	204 Uuq	205 Uuq	206 Uuq	207 Uuq	208 Uuq	209 Uuq	210 Uuq	211 Uuq	212 Uuq	213 Uuq	214 Uuq	215 Uuq	216 Uuq	217 Uuq	218 Uuq	219 Uuq	220 Uuq	221 Uuq	222 Uuq	223 Uuq	224 Uuq	225 Uuq	226 Uuq	227 Uuq	228 Uuq	229 Uuq	230 Uuq	231 Uuq	232 Uuq	233 Uuq	234 Uuq	235 Uuq	236 Uuq	237 Uuq	238 Uuq	239 Uuq	240 Uuq	241 Uuq	242 Uuq	243 Uuq	244 Uuq	245 Uuq	246 Uuq	247 Uuq	248 Uuq	249 Uuq	250 Uuq	251 Uuq	252 Uuq	253 Uuq	254 Uuq	255 Uuq	256 Uuq	257 Uuq	258 Uuq	259 Uuq	260 Uuq

Name

Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

- Gaseous hydrogen and gaseous oxygen react explosively to form water vapor.
- Magnesium metal burns in oxygen gas with a bright white light to make a white powder called magnesium oxide.
- Aluminum metal plus hydrogen chloride gas yields solid aluminum chloride plus hydrogen gas.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals								
1 H 1.01											Ag	1+						2 He 4.00	
3 Li 6.94	4 Be 9.01											Al	3+	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2
11 Na 22.99	12 Mg 24.31											Zn	2+	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8		
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3		
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)		
87 Fr (223)	88 Ra (226)	89-103 see below																	
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0					
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)					



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

- Gaseous hydrogen and gaseous oxygen react explosively to form water vapor.



- Magnesium metal burns in oxygen gas with a bright white light to make a white powder called magnesium oxide.



- Aluminum metal plus hydrogen chloride gas yields solid aluminum chloride plus hydrogen gas.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+																
Al	3+																
Zn	2+																
1 H	2 He																
1.01	4.00																
3 Li	4 Be																
6.94	9.01																
11 Na	12 Mg																
22.99	24.31																
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
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8
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
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55 Cs	56 Ba	57-71 see below	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
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
87 Fr	88 Ra	89-103 see below															
(223)	(226)	below															
57 La	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			
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0			
89 Ac	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			
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)			

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Write **word equations** for the following reactions:

- Silverware reacts with the sulfur in the air to become tarnished, producing silver sulfide.
- When sodium metal is placed in a beaker of water, hydrogen gas and a sodium hydroxide solution are formed.
- Aqueous barium nitrate reacts with sulfuric acid to yield a barium sulfate precipitate and nitric acid.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																				
Ag	1+																			
Al	3+																			
Zn	2+																			
1 H																				2 He
1.01																				4.00
3 Li	4 Be																			
6.94	9.01																			
11 Na	12 Mg																			
22.99	24.31																			
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			
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8			
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			
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3			
55 Cs	56 Ba	57-71 see below	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			
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)			
87 Fr	88 Ra	89-103 see below																		
(223)	(226)	below																		
57 La	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						
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0						
89 Ac	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						
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)						

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Write **word equations** for the following reactions:

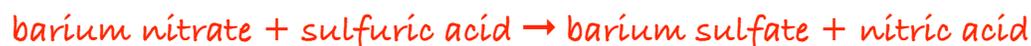
- Silverware reacts with the sulfur in the air to become tarnished, producing silver sulfide.



- When sodium metal is placed in a beaker of water, hydrogen gas and a sodium hydroxide solution are formed.



- Aqueous barium nitrate reacts with sulfuric acid to yield a barium sulfate precipitate and nitric acid.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																																																																																																																							
Ag	1+																																																																																																																						
Al	3+																																																																																																																						
Zn	2+																																																																																																																						
1 H 1.01	2 He 4.00	3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.
2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.
3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+																
Al	3+																
Zn	2+																
1 H 1.01	2 He 4.00																
3 Li 6.94	4 Be 9.01																
11 Na 22.99	12 Mg 24.31																
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.



2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.



3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																					
Ag	1+																				
Al	3+																				
Zn	2+																				
1 H																				2 He	
1.01																				4.00	
3 Li	4 Be																				10 Ne
6.94	9.01																				20.2
11 Na	12 Mg																				18 Ar
22.99	24.31																				39.9
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				
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8				
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				
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3				
55 Cs	56 Ba	57-71 see below	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				
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)				
87 Fr	88 Ra	89-103 see below																			
(223)	(226)	below																			
57 La	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							
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0							
89 Ac	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							
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)							

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Write **word equations** for the following reactions:

1. Aqueous sodium hydroxide reacts with carbon dioxide gas to yield soluble sodium carbonate and liquid water.
2. Solid aluminum hydroxide reacts with nitric acid to yield soluble aluminum nitrate and liquid water.
3. Solid magnesium oxide reacts with hydrochloric acid to yield a solution of magnesium chloride and liquid water.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+																
Al	3+																
Zn	2+																
1 H 1.01	2 He 4.00																
3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2										
11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9										
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

- Aqueous sodium hydroxide reacts with carbon dioxide gas to yield soluble sodium carbonate and liquid water.



- Solid aluminum hydroxide reacts with nitric acid to yield soluble aluminum nitrate and liquid water.



- Solid magnesium oxide reacts with hydrochloric acid to yield a solution of magnesium chloride and liquid water.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																																																																																																																																																																																																																																							
Ag	1+																																																																																																																																																																																																																																						
Al	3+																																																																																																																																																																																																																																						
Zn	2+																																																																																																																																																																																																																																						
1 H 1.01	2 He 4.00	3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	119 Uu	120 Uub	121 Uut	122 Uuq	123 Uuq	124 Uuq	125 Uuq	126 Uuq	127 Uuq	128 Uuq	129 Uuq	130 Uuq	131 Uuq	132 Uuq	133 Uuq	134 Uuq	135 Uuq	136 Uuq	137 Uuq	138 Uuq	139 Uuq	140 Uuq	141 Uuq	142 Uuq	143 Uuq	144 Uuq	145 Uuq	146 Uuq	147 Uuq	148 Uuq	149 Uuq	150 Uuq	151 Uuq	152 Uuq	153 Uuq	154 Uuq	155 Uuq	156 Uuq	157 Uuq	158 Uuq	159 Uuq	160 Uuq	161 Uuq	162 Uuq	163 Uuq	164 Uuq	165 Uuq	166 Uuq	167 Uuq	168 Uuq	169 Uuq	170 Uuq	171 Uuq	172 Uuq	173 Uuq	174 Uuq	175 Uuq	176 Uuq	177 Uuq	178 Uuq	179 Uuq	180 Uuq	181 Uuq	182 Uuq	183 Uuq	184 Uuq	185 Uuq	186 Uuq	187 Uuq	188 Uuq	189 Uuq	190 Uuq	191 Uuq	192 Uuq	193 Uuq	194 Uuq	195 Uuq	196 Uuq	197 Uuq	198 Uuq	199 Uuq	200 Uuq	201 Uuq	202 Uuq	203 Uuq	204 Uuq	205 Uuq	206 Uuq	207 Uuq	208 Uuq	209 Uuq	210 Uuq	211 Uuq	212 Uuq	213 Uuq	214 Uuq	215 Uuq	216 Uuq	217 Uuq	218 Uuq	219 Uuq	220 Uuq	221 Uuq	222 Uuq	223 Uuq	224 Uuq	225 Uuq	226 Uuq	227 Uuq	228 Uuq	229 Uuq	230 Uuq	231 Uuq	232 Uuq	233 Uuq	234 Uuq	235 Uuq	236 Uuq	237 Uuq	238 Uuq	239 Uuq	240 Uuq	241 Uuq	242 Uuq	243 Uuq	244 Uuq	245 Uuq	246 Uuq	247 Uuq	248 Uuq	249 Uuq	250 Uuq	251 Uuq	252 Uuq	253 Uuq	254 Uuq	255 Uuq	256 Uuq	257 Uuq	258 Uuq	259 Uuq	260 Uuq



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

1. Calcium carbonate will come apart when you heat it to leave calcium oxide and carbon dioxide.
2. Sodium carbonate and water are produced when sodium hydroxide neutralizes carbonic acid.
3. Sodium phosphate and water are created when phosphoric acid is added to sodium hydroxide.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																					
Ag	1+																				
Al	3+																				
Zn	2+																				
1 H																				2 He	
1.01																				4.00	
3 Li	4 Be																				
6.94	9.01																				
11 Na	12 Mg																				
22.99	24.31																				
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				
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8				
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				
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3				
55 Cs	56 Ba	57-71 see below	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				
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)				
87 Fr	88 Ra	89-103 see below																			
(223)	(226)	below																			
57 La	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							
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0							
89 Ac	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							
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)							



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

1. Calcium carbonate will come apart when you heat it to leave calcium oxide and carbon dioxide.

sodium carbonate → calcium oxide + carbon dioxide

2. Sodium carbonate and water are produced when sodium hydroxide neutralizes carbonic acid.

sodium hydroxide + carbonic acid → sodium carbonate + water

3. Sodium phosphate and water are created when phosphoric acid is added to sodium hydroxide.

phosphoric acid + sodium hydroxide → sodium phosphate + water

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+						2	He									
Al	3+	5	6	7	8	9	10										
Zn	2+	B	C	N	O	F	Ne										
		13	14	15	16	17	18										
		Al	Si	P	S	Cl	Ar										
		26.98	28.09	30.97	32.07	35.45	39.9										
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
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8
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
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	see below	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
132.9	137.3		178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
87	88	89-103															
Fr	Ra	see below															
(223)	(226)																
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0			
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103			
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)			



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **skeleton chemical equations** for the following reactions:

- A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.
- Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.
- A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.

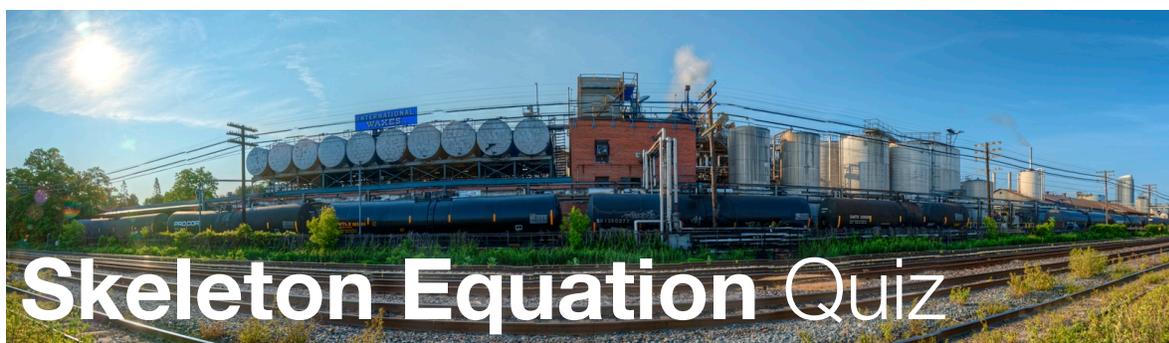
Multivalent Metals

Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions

bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals																		
											Ag	1+						2											
											Al	3+						He											
											Zn	2+						4.00											
1 H 1.01				4 Be 9.01												10 Ne 20.2													
3 Li 6.94				12 Mg 24.31												18 Ar 39.9													
11 Na 22.99	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8											
87 Fr (223)	88 Ra (226)	89-103 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)											
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **skeleton chemical equations** for the following reactions:

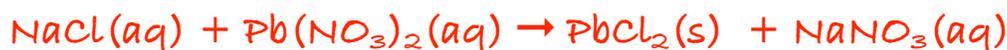
1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.



2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.



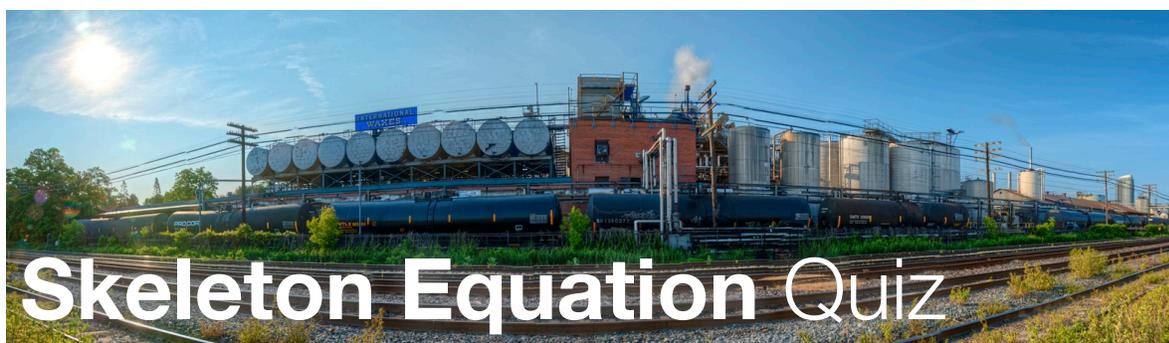
3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01															10 Ne 20.2	
11 Na 22.99	12 Mg 24.31															18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **skeleton chemical equations** for the following reactions:

1. If you add hot steam to methane, you will get hydrogen and carbon dioxide.



2. Solid lithium oxide and water make a lithium hydroxide solution.



3. Solid zinc metal reacts with sulfuric acid to yield aqueous zinc sulfate and hydrogen gas.



Multivalent Metals

Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions

bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

Other Metals																				
Ag	1+																			
Al	3+																			
Zn	2+																			
1 H																				2 He
1.01																				4.00
3 Li	4 Be																			10 Ne
6.94	9.01																			20.2
11 Na	12 Mg																			18 Ar
22.99	24.31																			39.9
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			
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8			
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			
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3			
55 Cs	56 Ba	57-71 see below	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			
132.9	137.3	below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)			
87 Fr	88 Ra	89-103 see below																		
(223)	(226)	below																		
57 La	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						
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0						
89 Ac	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						
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)						



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **skeleton chemical equations** for the following reactions:

- Solid magnesium oxide reacts with hydrochloric acid to yield a solution of magnesium chloride and liquid water.
- Aqueous sodium hydroxide reacts with carbon dioxide gas to yield soluble sodium carbonate and liquid water.
- Aqueous barium nitrate reacts with sulfuric acid to yield a barium sulfate precipitate and nitric acid.

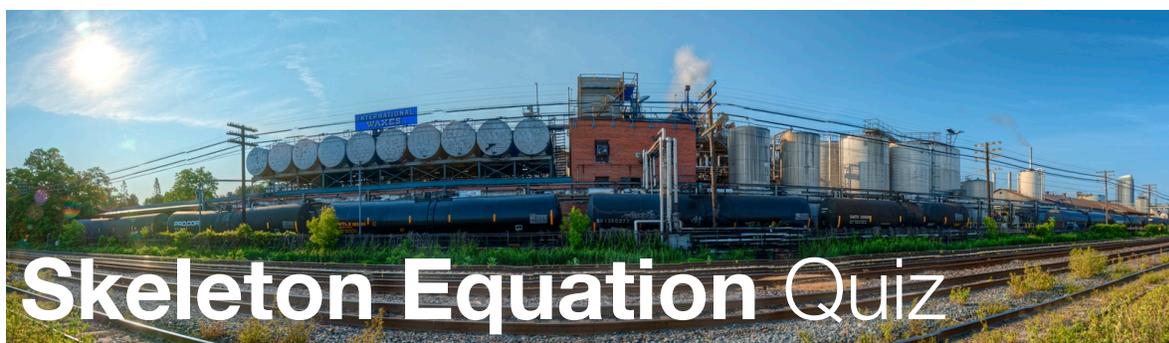
Multivalent Metals

Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions

bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01															10 Ne 20.2	
11 Na 22.99	12 Mg 24.31															18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **skeleton chemical equations** for the following reactions:

- Solid magnesium oxide reacts with hydrochloric acid to yield a solution of magnesium chloride and liquid water.



- Aqueous sodium hydroxide reacts with carbon dioxide gas to yield soluble sodium carbonate and liquid water.



- Aqueous barium nitrate reacts with sulfuric acid to yield a barium sulfate precipitate and nitric acid.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

Other Metals																																																																																																																							
Ag	1+																																																																																																																						
Al	3+																																																																																																																						
Zn	2+																																																																																																																						
1 H 1.01	2 He 4.00	3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)



C3.4

write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **balanced chemical equations** for the following reactions:

1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.
2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.
3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.

Multivalent Metals

Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions

bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+	5	6	7	8	9	10										
Al	3+	B	C	N	O	F	Ne										
Zn	2+	13	14	15	16	17	18										
		Al	Si	P	S	Cl	Ar										
		26.98	28.09	30.97	32.07	35.45	39.9										
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
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8
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
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	see below	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
132.9	137.3	see below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
87	88	89-103															
Fr	Ra	see below															
(223)	(226)	below															
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0			
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103			
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)			



C3.4

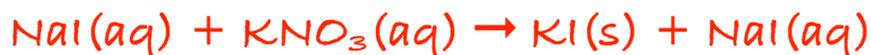
write word equations and balanced chemical equations for simple chemical reactions

C3.8

identify simple ionic compounds, simple compounds involving polyatomic ions, molecular compounds, & acids, using the periodic table & a list of the most common polyatomic ions, & write the formulae

Write **balanced chemical equations** for the following reactions:

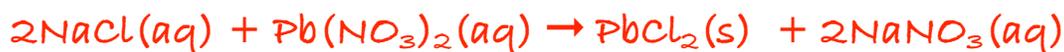
1. A solution of sodium iodide is added to a solution of potassium nitrate to make a potassium iodide precipitate and a sodium nitrate solution.



2. Magnesium metal plus gaseous carbon dioxide yields solid magnesium oxide plus solid carbon.



3. A sodium chloride solution reacts with a lead (II) nitrate solution to yield a lead (II) chloride precipitate and aqueous sodium nitrate.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

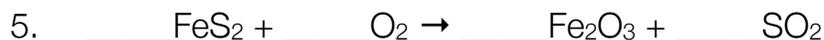
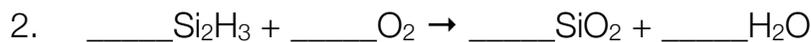
1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01															10 Ne 20.2	
11 Na 22.99	12 Mg 24.31															18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			

C3.4

write word equations and balanced chemical equations for simple chemical reactions



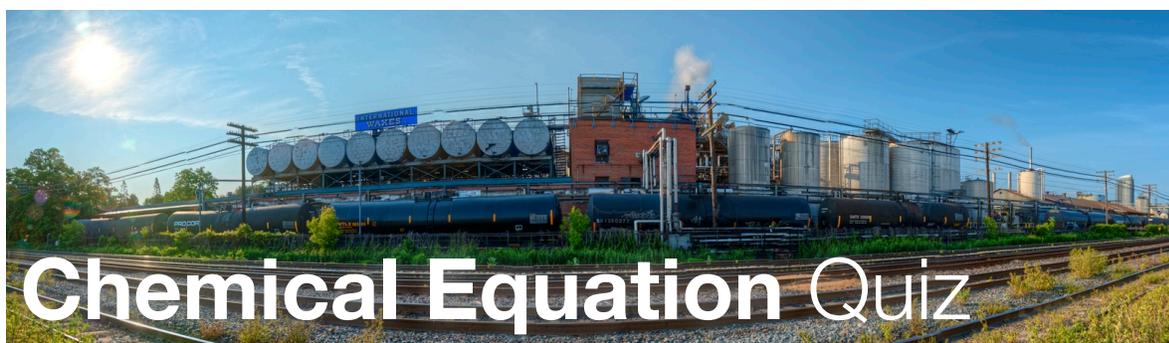
Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals									
											Ag	1+						2		
											Al	3+						He		
											Zn	2+						4.00		
1 H 1.01				4 Be 9.01												10 Ne 20.2				
3 Li 6.94				12 Mg 24.31												18 Ar 39.9				
11 Na 22.99	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8			
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3			
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lr (260)						
																		61 Pm (147)		
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0							
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)						

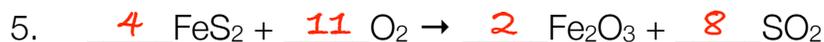
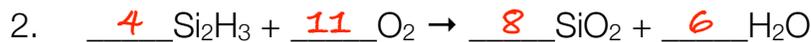


Chemical Equation Quiz

C3.4

write word equations and balanced chemical equations for simple chemical reactions

Balance the following chemical equations:



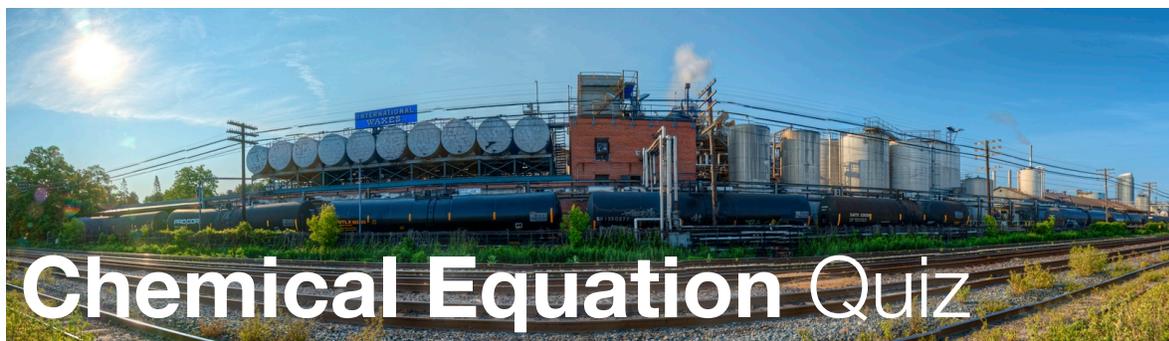
Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

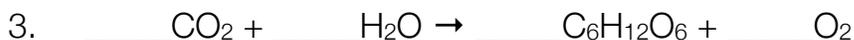
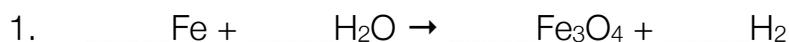
Other Metals																	
Ag	1+																
Al	3+																
Zn	2+																
1 H	2 He																
1.01	4.00																
3 Li	4 Be																
6.94	9.01																
11 Na	12 Mg																
22.99	24.31																
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8
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
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55 Cs	56 Ba	57-71 see below	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
132.9	137.3	see below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
87 Fr	88 Ra	89-103 see below															
(223)	(226)	see below															
57 La	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			
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0			
89 Ac	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			
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)			

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals																																																																																		
											Ag	1+						2																																																																											
											Al	3+						He																																																																											
											Zn	2+						4.00																																																																											
1 H 1.01	3 Li 6.94	4 Be 9.01	11 Na 22.99	12 Mg 24.31	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	87 Fr (223)	88 Ra (226)	89-103 see below	104 Ac (227)	105 Th 232.0	106 Pa (231)	107 U 238.0	108 Np (237)	109 Pu (242)	110 Am (243)	111 Cm (247)	112 Bk (247)	113 Cf (251)	114 Es (252)	115 Fm (257)	116 Md (258)	117 No (259)	118 Lr (260)

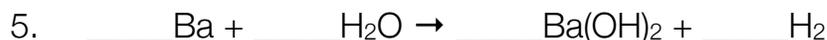


Chemical Equation Quiz

C3.4

write word equations and balanced chemical equations for simple chemical reactions

Balance the following chemical equations:



Multivalent Metals

Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions

bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

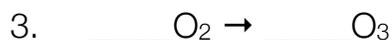
Other Metals																																																																																																																							
Ag	1+																																																																																																																						
Al	3+																																																																																																																						
Zn	2+																																																																																																																						
1 H 1.01	2 He 4.00	3 Li 6.94	4 Be 9.01	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)

C3.4

write word equations and balanced chemical equations for simple chemical reactions



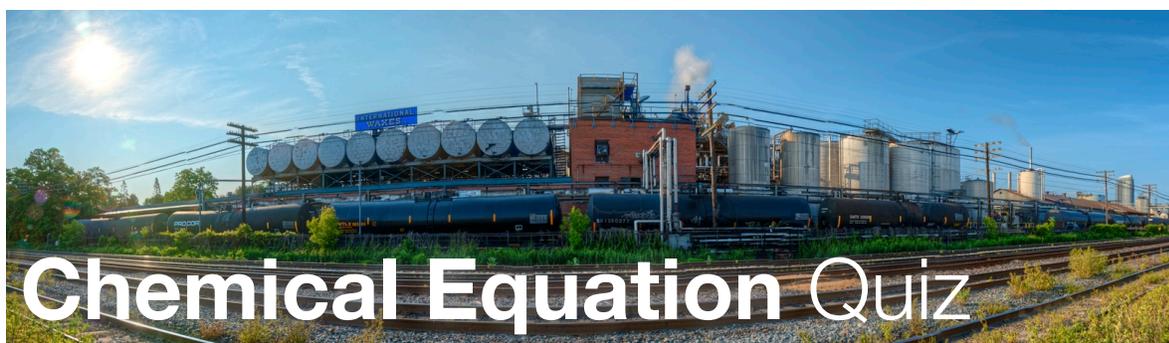
Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

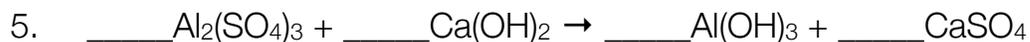
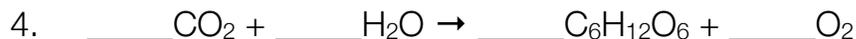
Other Metals																					
Ag	1+																				
Al	3+																				
Zn	2+																				
1 H																				2 He	
1.01																				4.00	
3 Li	4 Be																				10 Ne
6.94	9.01																				20.2
11 Na	12 Mg																				18 Ar
22.99	24.31																				39.9
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				
39.10	40.08	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.69	63.55	65.41	69.7	72.6	74.9	79.0	79.90	83.8				
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				
85.5	87.6	88.9	91.2	92.9	95.9	(99)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3				
55 Cs	56 Ba	57-71 see below	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				
132.9	137.3	see below	178.5	180.9	183.9	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)				
87 Fr	88 Ra	89-103 see below																			
(223)	(226)	see below																			
57 La	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							
138.9	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0							
89 Ac	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							
(227)	232.0	(231)	238.0	(237)	(242)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)							



C3.4

write word equations and balanced chemical equations for simple chemical reactions

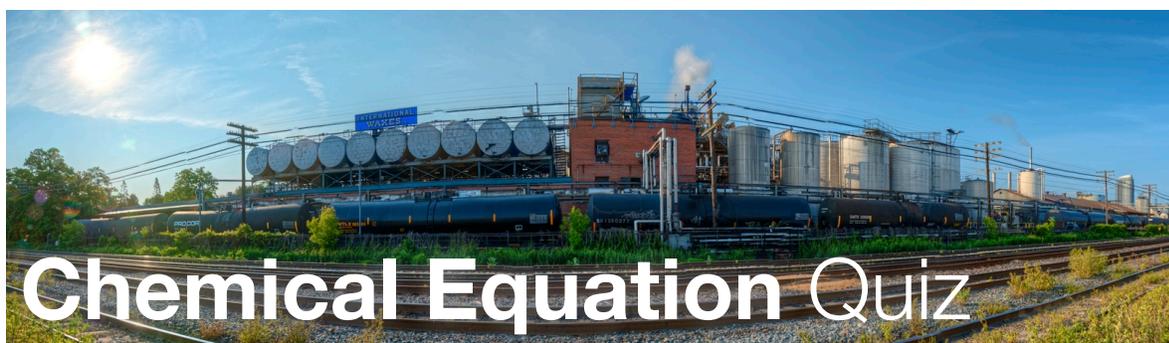
Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

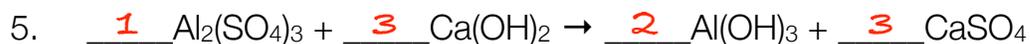
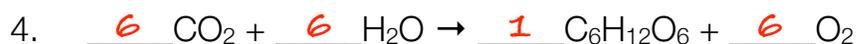
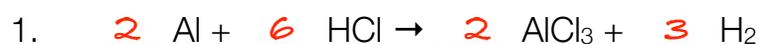
											Other Metals																								
											Ag	1+						2	He																
											Al	3+						10	Ne																
											Zn	2+						18	Ar																
1 H 1.01				4 Be 9.01												5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	20.2 Ne														
3 Li 6.94				12 Mg 24.31	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8													
11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3										
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)																					



C3.4

write word equations and balanced chemical equations for simple chemical reactions

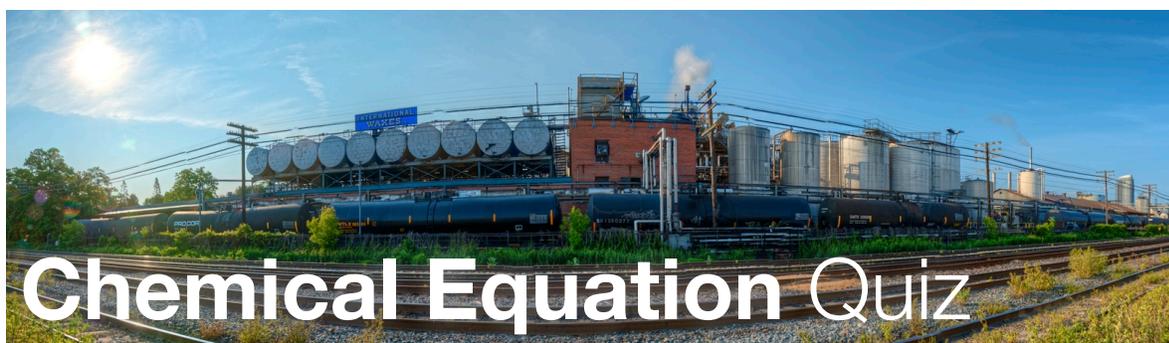
Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01															10 Ne 20.2	
11 Na 22.99	12 Mg 24.31															18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			

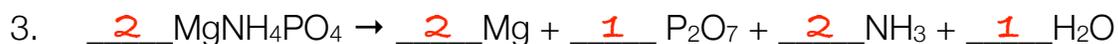
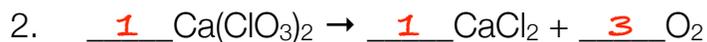


Chemical Equation Quiz

C3.4

write word equations and balanced chemical equations for simple chemical reactions

Balance the following chemical equations:



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals												
											Ag	1+						2					
											Al	3+						He					
											Zn	2+						4.00					
1 H 1.01				4 Be 9.01												10 Ne 20.2							
3 Li 6.94				12 Mg 24.31												9 F 19.00							
11 Na 22.99				20 Ca 40.08												8 O 16.00							
19 K 39.10	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8							
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3						
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)						
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lu 175.0									
											61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0		
											91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)

Name Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

- Calcium and aluminum chloride react in a single displacement reaction.
- Iron and oxygen react in a synthesis reaction.
- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals									
1 H 1.01											Ag	1+						2 He 4.00		
3 Li 6.94	4 Be 9.01											Al	3+	5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2	
11 Na 22.99	12 Mg 24.31											Zn	2+	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8			
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3			
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra (226)	89-103 see below																		
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0						
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)						



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

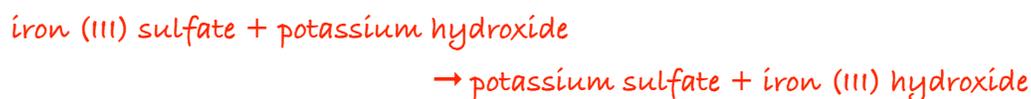
- Calcium and aluminum chloride react in a single displacement reaction.



- Iron and oxygen react in a synthesis reaction.



- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals											
											Ag	1+						2				
											Al	3+						He				
											Zn	2+						4.00				
1 H 1.01				3 Li 6.94	4 Be 9.01												5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2
11 Na 22.99	12 Mg 24.31	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8			
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3					
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)					
87 Fr (223)	88 Ra (226)	89-103 see below																				
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0								
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)								

Name Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **word equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.
- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.
- Lead (II) nitrate and sodium iodide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals																	
											Ag	1+						2	He									
											Al	3+																
											Zn	2+																
1 H 1.01				4 Be 9.01												5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2							
3 Li 6.94				12 Mg 24.31												13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9							
11 Na 22.99	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8										
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3											
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)											
87 Fr (223)	88 Ra (226)	89-103 see below												57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
														89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Chemical Reaction Quiz

Write **word equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.



- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.



- Lead (II) nitrate and sodium iodide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

Other Metals																	
Ag	1+																
Al	3+																
Zn	2+																
1 H 1.01	2 He 4.00																
3 Li 6.94	4 Be 9.01															10 Ne 20.2	
11 Na 22.99	12 Mg 24.31															18 Ar 39.9	
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 see below															
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)			

Name

Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **skeleton equations** for the following reactions:

- Calcium and aluminum chloride react in a single displacement reaction.
- Iron and oxygen react in a synthesis reaction.
- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals										
1 H 1.01				4 Be 9.01												2 He 4.00					
3 Li 6.94															Ag 107.87	1+ Au 196.97					
11 Na 22.99	12 Mg 24.31												Al 26.98	3+ Ga 69.72							
												Zn 65.38	2+ Cd 112.41								
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8				
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3				
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)				
87 Fr (223)	88 Ra (226)	89-103 see below																			
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0							
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)							



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **skeleton equations** for the following reactions:

- Calcium and aluminum chloride react in a single displacement reaction.



- Iron and oxygen react in a synthesis reaction.



- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals																					
											Ag	1+						2														
											Al	3+						He														
											Zn	2+						4.00														
1 H 1.01				3 Li 6.94	4 Be 9.01												10 Ne 20.2															
11 Na 22.99	12 Mg 24.31												13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9														
19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8															
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3															
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)															
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lr (260)																		
																		57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
																		89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)

C3.4

write word equations and balanced chemical equations for simple chemical reactions



Chemical Reaction Quiz

Write **skeleton equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.
- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.
- Lead (II) nitrate and sodium iodide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals										
											Ag	1+						2	He		
											Al	3+						10	Ne		
											Zn	2+						18	Ar		
1 H 1.01				4 Be 9.01												5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.2
3 Li 6.94				12 Mg 24.31												13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9
11 Na 22.99	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8			
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3				
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)				
87 Fr (223)	88 Ra (226)	89-103 see below																			
			57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0				
			89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)				



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **skeleton equations** for the following reactions:

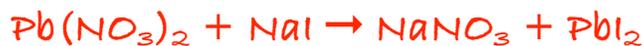
1. Aluminum and iron (II) oxide react in a single displacement reaction.



2. Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.



3. Lead (II) nitrate and sodium iodide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals									
											Ag	1+						2		
											Al	3+						He		
											Zn	2+						4.00		
1 H 1.01				4 Be 9.01												10 Ne 20.2				
3 Li 6.94				12 Mg 24.31												9 F 19.00				
11 Na 22.99				20 Ca 40.08												8 O 16.00				
19 K 39.10	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8				
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3			
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lr (260)						
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0						
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)						

Name

Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **balanced equations** for the following reactions:

- Calcium and aluminum chloride react in a single displacement reaction.
- Iron and oxygen react in a synthesis reaction.
- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals																								
											Ag	1+						2																	
											Al	3+						He																	
											Zn	2+						4.00																	
1 H 1.01				4 Be 9.01												10 Ne 20.2																			
3 Li 6.94				12 Mg 24.31												9 F 19.00																			
11 Na 22.99				19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8														
13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.9	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3												
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	87 Fr (223)	88 Ra (226)	89-103 see below	89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0																					
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)																					



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **balanced equations** for the following reactions:

- Calcium and aluminum chloride react in a single displacement reaction.



- Iron and oxygen react in a synthesis reaction.



- Iron (III) sulfate and potassium hydroxide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals																														
											Ag	1+						2																							
											Al	3+						He																							
											Zn	2+						4.00																							
1 H 1.01				4 Be 9.01												10 Ne 20.2																									
3 Li 6.94				12 Mg 24.31												18 Ar 39.9																									
11 Na 22.99	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8																							
13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3																			
12 Mg 24.31	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8	55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)					
87 Fr (223)	88 Ra (226)	89-103 see below												87 Fr (223)	88 Ra (226)	89-103 see below												87 Fr (223)	88 Ra (226)	89-103 see below											
											57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0																
											89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)																

Name Section

Chemistry



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **balanced equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.
- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.
- Lead (II) nitrate and sodium iodide react in a double displacement reaction.

Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO ₃ ⁻	-1
carbonate	CO ₃ ²⁻	-2
hydroxide	OH ⁻	-1
nitrate	NO ₃ ⁻	-1
nitrite	NO ₂ ⁻	-1
phosphate	PO ₄ ³⁻	-3
sulfate	SO ₄ ²⁻	-2
sulfite	SO ₃ ²⁻	-2
ammonium	NH ₄ ⁺	+1

											Other Metals																					
											Ag	1+						2	He													
											Al	3+																				
											Zn	2+																				
1 H 1.01				4 Be 9.01												10 Ne 20.2																
3 Li 6.94				12 Mg 24.31												18 Ar 39.9																
11 Na 22.99	19 K 39.10	20 Ca 40.08	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8														
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3															
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)															
87 Fr (223)	88 Ra (226)	89-103 see below												108 Hs (277)	109 Mt (278)	110 Ds (285)	111 Rg (286)															
																		57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
																		89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **balanced equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.



- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.



- Lead (II) nitrate and sodium iodide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals									
											Ag	1+						2		
											Al	3+						He		
											Zn	2+						4.00		
1 H 1.01				4 Be 9.01												10 Ne 20.2				
3 Li 6.94				12 Mg 24.31												9 F 19.00				
11 Na 22.99				20 Ca 40.08												8 O 16.00				
19 K 39.10	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8				
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3			
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lr (260)						
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0						
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)						



C3.4

write word equations and balanced chemical equations for simple chemical reactions

Write **balanced equations** for the following reactions:

- Aluminum and iron (II) oxide react in a single displacement reaction.



- Iron (III) chloride and ammonium hydroxide react in a double displacement reaction.



- Lead (II) nitrate and sodium iodide react in a double displacement reaction.



Multivalent Metals		
Symbol	Most common charge	Other charge
Cu	2+	1+
Hg	2+	1+
Au	3+	1+
Fe	3+	2+
Co	2+	3+
Ni	2+	3+
Pb	2+	4+
Sn	4+	2+

Polyatomic Ions		
bicarbonate	HCO_3^-	-1
carbonate	CO_3^{2-}	-2
hydroxide	OH^-	-1
nitrate	NO_3^-	-1
nitrite	NO_2^-	-1
phosphate	PO_4^{3-}	-3
sulfate	SO_4^{2-}	-2
sulfite	SO_3^{2-}	-2
ammonium	NH_4^+	+1

											Other Metals									
											Ag	1+						2		
											Al	3+						He		
											Zn	2+						4.00		
1 H 1.01				4 Be 9.01												10 Ne 20.2				
3 Li 6.94				12 Mg 24.31												9 F 19.00				
11 Na 22.99				20 Ca 40.08												8 O 16.00				
19 K 39.10	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.90	36 Kr 83.8				
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3			
55 Cs 132.9	56 Ba 137.3	57-71 see below	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)			
87 Fr (223)	88 Ra (226)	89-103 see below												103 Lr (260)						
57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0						
89 Ac (227)	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)						