

Counting Atoms in Compounds

There are three main components in a molecule

1. The symbols – represent which atoms are present
2. Brackets () show us which atoms are grouped – Example Na(OH): The brackets tell us the OH are bonded.
3. Numbers
 - I. Subscripts (smaller numbers below and to the right of a symbol) – Example: $\text{Cl}_2 \rightarrow$ The 2 is a subscript that tells us that there are two Cl atoms.
 - II. Coefficients: Numbers to the left of a compound which represent how many of that compound there is present – Example $2\text{H}_2\text{O}$ means that there are two, H_2O molecules present ($\text{H}_2\text{O} + \text{H}_2\text{O}$)

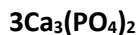
Directions to count atoms in any compound:

1. Write down the different elements in each compound.
2. Multiply each by their subscript (no subscript means 1). Example: Al_3 : 3 is the subscript, $\text{Al} \times 3 = 3 \text{ Al}$
3. If there are brackets, multiply each symbol inside the bracket by the number outside the bracket. Example: $\text{Na}(\text{SO}_4)_3$: 3 is outside the bracket and gets multiplied by the S and O but not the Na
4. Multiply each by the coefficient. Example: 4AlS : 4 is the coefficient $= 4 \times \text{Al} = 4 \text{ Al}$ and $4 \times \text{S} = 4 \text{ S}$
5. Write down how many atoms there are in total.

Examples:



- 1) Write down the different elements.
Mg
Cl
- 2) Multiply each element by their subscript
(remember – no subscript means one)
 $\text{Mg} \times 1 = 1 \text{ Mg}$
 $\text{Cl} \times 2 = 2 \text{ Cl}$
- 3) There are no brackets.
- 4) There are no coefficients.
- 5) Write down the total number of atoms for each element inside the compound.
1 Mg
2 Cl / 3 atoms total.



- 1) Write down the different elements.
Ca
P
O
- 2) Multiply each element by their subscript (remember – no subscript means one)
 $\text{Ca} \times 3 = 3 \text{ Ca}$
 $\text{P} \times 1 = 1 \text{ P}$
 $\text{O} \times 4 = 4 \text{ O}$
- 3) Multiply each symbol inside the bracket by the number outside the bracket.
3 Ca – no bracket = 3 Ca
 $1 \text{ P} \times 2 = 2 \text{ P}$
 $4 \text{ O} \times 2 = 8 \text{ O}$
- 4) Multiply each by the coefficient.
 $3 \text{ Ca} \times 3 = 9 \text{ Ca}$
 $2 \text{ P} \times 3 = 6 \text{ P}$
 $8 \text{ O} \times 3 = 24 \text{ O}$ / 39 atoms total



- 1) Write down the different elements.
Zn
S
O
- 2) Multiply each element by their subscript
(remember – no subscript means one)
 $\text{Zn} \times 1 = 1 \text{ Zn}$
 $\text{S} \times 1 = 1 \text{ S}$
 $\text{O} \times 4 = 4 \text{ O}$
- 3) There are no brackets.
- 4) Multiply each by the coefficient.
 $1 \text{ Zn} \times 2 = 2 \text{ Zn}$
 $1 \text{ S} \times 2 = 2 \text{ S}$
 $4 \text{ O} \times 2 = 8 \text{ O}$ / 12 atoms total

Practice – Counting Atoms

Name: _____

	List elements	Multiply subscript	Multiply bracket	Multiply coefficient	Total atoms
1. 3NaOH					
2. Li_2SO_4					
3. NH_4Cl					
4. Al_2O_3					
5. $2\text{Pb}(\text{SO}_4)_2$					
6. SnS_2					
7. 4 K_3N					
8. H_2SO_3					
9. $\text{Fe}(\text{OH})_3$					
10. 4MgCl_2					
11. $\text{NaC}_2\text{H}_3\text{O}_2$					
12. HNO_3					
13. AlSO_4					
14. $\text{Mn}_2(\text{SO}_3)_5$					
15. KMnO_4					
16. $\text{Ca}(\text{OH})_2$					

Practice – Counting Atoms

Name: ANSWER KEY

	List elements	Multiply subscript	Multiply bracket	Multiply coefficient	Total atoms
1. 3NaOH	Na O H	Na x 1 = 1 Na O x 1 = 1 O H x 1 = 1 H	1 Na 1 O 1 H	1 Na x 3 = 3 Na 1 O x 3 = 3 O 1 H x 3 = 3 H	9 atoms
2. Li ₂ SO ₄	Li S O	Li x 2 = 2 Li S x 1 = 1 S O x 4 = 4 O	2 Li 1 S 4 O	2 Li 1 S 4 O	7 atoms
3. NH ₄ Cl	N H Cl	N x 1 = 1 N H x 4 = 4 H Cl x 1 = 1 Cl	1 N 4 H 1 Cl	1 N 4 H 1 Cl	6 atoms
4. Al ₂ O ₃	Al O	Al x 2 = 2 Al O x 3 = 3 O	2 Al 3 O	2 Al 3 O	5 atoms
5. 2Pb(SO ₄) ₂	Pb S O	Pb x 1 = 1 Pb S x 1 = 1 S O x 4 = 4 O	1 Pb 1 S x 2 = 2 S 4 O x 2 = 8 O	1 Pb x 2 = 2 Pb 2 S x 2 = 4 S 8 O x 2 = 16 O	22 atoms
6. SnS ₂	Sn S	Sn x 1 = 1 Sn S x 2 = 2 S	1 Sn 2 S	1 Sn 2 S	3 atoms
7. 4K ₃ N	K N	K x 3 = 3 K N x 1 = 1 N	3 K 1 N	3 K x 4 = 12 K 1 N x 4 = 4 N	16 atoms
8. H ₂ SO ₃	H S O	H x 2 = 2 H S x 1 = 1 S O x 3 = 3 O	2 H 1 S 3 O	2 H 1 S 3 O	6 atoms
9. Fe(OH) ₃	Fe O H	Fe x 1 = 1 Fe O x 1 = 1 O H x 1 = 1 H	1 Fe 1 O x 3 = 3 O 1 H x 3 = 3 H	1 Fe 3 O 3 H	7 atoms
10. 4MgCl ₂	Mg Cl	Mg x 1 = 1 Mg Cl x 2 = 2 Cl	1 Mg 2 Cl	1 Mg x 4 = 4 Mg 2 Cl x 4 = 8 Cl	12 atoms
11. NaC ₂ H ₃ O ₂	Na C H O	Na x 1 = 1 Na C x 2 = 2 C H x 3 = 3 H O x 2 = 2 O	1 Na 2 C 3 H 2 O	1 Na 2 C 3 H 2 O	8 atoms
12. HNO ₃	H N O	H x 1 = 1 H N x 1 = 1 N O x 3 = 3 O	1 H 1 N 3 O	1 H 1 N 3 O	5 atoms
13. AlSO ₄	Al S O	Al x 1 = 1 Al S x 1 = 1 S O x 4 = 4 O	1 Al 1 S 4 O	1 Al 1 S 4 O	6 atoms
14. Mn ₂ (SO ₃) ₃	Mn S O	Mn x 2 = 2 Mn S x 1 = 1 S O x 3 = 3 O	2 Mn 1 S x 3 = 3 S 3 O x 3 = 9 O	2 Mn 3 S 9 O	14 atoms
15. KMnO ₄	K Mn O	K x 1 = 1 K Mn x 1 = 1 Mn O x 4 = 4 O	1 K 1 Mn 4 O	1 K 1 Mn 4 O	6 atoms
16. Ca(OH) ₂	Ca O H	Ca x 1 = 1 Ca O x 1 = 1 O H x 1 = 1 H	1 Ca 1 O x 2 = 2 O 1 H x 2 = 2 H	1 Ca 2 O 2 H	5 atoms

THE SAMPLE