

Trace de cours

Activité 1 :

Tableau périodique des éléments chimiques

Groupe → I A II A III A IV A V A VI A VII A VIII I B II B III B IV B V B VI B VII B 18

Période ↓ 1 2 3 4 5 6 7

1 Hydrogène 1 H 1,007975

2 Lithium 3 Li 6,9395 Béryllium 4 Be 9,012183

3 Sodium 11 Na 22,98976928 Magnésium 12 Mg 24,3055

4 Potassium 19 K 39,0983 (1) Calcium 20 Ca 40,078 (4)

5 Rubidium 37 Rb 85,4678 (3) Strontium 38 Sr 87,62 (1)

6 Césium 55 Cs 132,905452 Baryum 56 Ba 137,327 (7)

7 Francium 87 Fr [223] Radium 88 Ra [226]

nom de l'élément (gaz, liquide ou solide à 0°C et 101,3 kPa)
numéro atomique
symbole chimique
masse atomique relative (ou celle de l'isotope le plus stable)
[CIAAW "Atomic Weights 2013" + rev. 2015]

Tableau périodique des éléments chimiques (détail des éléments 1 à 118) :

13 Aluminium 13 Al 26,9815385 14 Silicium 14 Si 28,085 (1) 15 Phosphore 15 P 30,97376200 16 Soufre 16 S 32,0675 17 Chlore 17 Cl 35,451 18 Argon 18 Ar 39,948 (1)

19 Potassium 19 K 39,0983 (1) 20 Calcium 20 Ca 40,078 (4) 21 Scandium 21 Sc 44,955908 (6) 22 Titane 22 Ti 47,867 (1) 23 Vanadium 23 V 50,9415 (1) 24 Chrome 24 Cr 51,9961 (6) 25 Manganèse 25 Mn 54,938044 26 Fer 26 Fe 55,845 (2) 27 Cobalt 27 Co 58,933194 28 Nickel 28 Ni 58,6934 (4) 29 Cuivre 29 Cu 63,546 (3) 30 Zinc 30 Zn 65,38 (2) 31 Gallium 31 Ga 69,723 (1) 32 Germanium 32 Ge 72,630 (8) 33 Arsenic 33 As 74,921595 34 Sélénium 34 Se 78,971 (8) 35 Brome 35 Br 79,904 36 Krypton 36 Kr 83,798 (2)

37 Rubidium 37 Rb 85,4678 (3) 38 Strontium 38 Sr 87,62 (1) 39 Yttrium 39 Y 88,90584 40 Zirconium 40 Zr 91,224 (2) 41 Niobium 41 Nb 92,90637 42 Molybdène 42 Mo 95,95 (1) 43 Technétium 43 Tc [98] 44 Ruthénium 44 Ru 101,07 (2) 45 Rhodium 45 Rh 102,90550 46 Palladium 46 Pd 106,42 (1) 47 Argent 47 Ag 107,8682 (2) 48 Cadmium 48 Cd 112,414 (4) 49 Indium 49 In 114,818 (1) 50 Étain 50 Sn 118,710 (7) 51 Antimoine 51 Sb 121,760 (1) 52 Tellure 52 Te 127,60 (3) 53 Iode 53 I 126,90447 54 Xénon 54 Xe 131,293 (6)

55 Césium 55 Cs 132,905452 56 Baryum 56 Ba 137,327 (7) 57-71 Lanthanides 57 Lanthane 57 La 138,90547 58 Cérium 58 Ce 140,116 (1) 59 Praseodyme 59 Pr 140,90766 60 Néodyme 60 Nd 144,242 (3) 61 Prométhium 61 Pm [145] 62 Samarium 62 Sm 150,36 (2) 63 Europium 63 Eu 151,964 (1) 64 Gadolinium 64 Gd 157,25 (3) 65 Terbium 65 Tb 158,92535 66 Dysprosium 66 Dy 162,500 (1) 67 Holmium 67 Ho 164,93033 68 Erbium 68 Er 167,259 (3) 69 Thulium 69 Tm 168,93422 70 Ytterbium 70 Yb 173,045 71 Lutétium 71 Lu 174,9668

72 Hf 178,49 (2) 73 Ta 180,94788 74 W 183,84 (1) 75 Re 186,207 (1) 76 Os 190,23 (3) 77 Ir 192,217 (3) 78 Pt 195,084 (8) 79 Or 79 Au 196,966569 80 Mercure 80 Hg 200,592 (3) 81 Thallium 81 Tl 204,3835 82 Plomb 82 Pb 207,2 (1) 83 Bismuth 83 Bi 208,98040 84 Polonium 84 Po [209] 85 Astat 85 At [210] 86 Radon 86 Rn [222]

87 Fr [223] 88 Ra [226] 89-103 Actinides 89 Actinium 89 Ac [227] 90 Thorium 90 Th 232,0377 91 Protactinium 91 Pa 231,03588 92 Uranium 92 U 238,02891 93 Neptunium 93 Np [237] 94 Pluton 94 Pu [244] 95 Américium 95 Am [243] 96 Curium 96 Cm [247] 97 Bérkélium 97 Bk [247] 98 Californium 98 Cf [251] 99 Einsteinium 99 Es [252] 100 Fermium 100 Fm [257] 101 Mendélévium 101 Md [258] 102 Nobelium 102 No [259] 103 Lawrencium 103 Lr [266]

110 Ds [281] 111 Rg [282] 112 Cn [285] 113 Nh [286] 114 Fl [289] 115 Mc [289] 116 Lv [293] 117 Ts [294] 118 Og [294]

119 [295] 120 [296] 121 [297] 122 [298] 123 [299] 124 [300] 125 [301] 126 [302] 127 [303] 128 [304] 129 [305] 130 [306] 131 [307] 132 [308] 133 [309] 134 [310] 135 [311] 136 [312] 137 [313] 138 [314] 139 [315] 140 [316] 141 [317] 142 [318] 143 [319] 144 [320] 145 [321] 146 [322] 147 [323] 148 [324] 149 [325] 150 [326] 151 [327] 152 [328] 153 [329] 154 [330] 155 [331] 156 [332] 157 [333] 158 [334] 159 [335] 160 [336] 161 [337] 162 [338] 163 [339] 164 [340] 165 [341] 166 [342] 167 [343] 168 [344] 169 [345] 170 [346] 171 [347] 172 [348] 173 [349] 174 [350] 175 [351] 176 [352] 177 [353] 178 [354] 179 [355] 180 [356] 181 [357] 182 [358] 183 [359] 184 [360] 185 [361] 186 [362] 187 [363] 188 [364] 189 [365] 190 [366] 191 [367] 192 [368] 193 [369] 194 [370] 195 [371] 196 [372] 197 [373] 198 [374] 199 [375] 200 [376] 201 [377] 202 [378] 203 [379] 204 [380] 205 [381] 206 [382] 207 [383] 208 [384] 209 [385] 210 [386] 211 [387] 212 [388] 213 [389] 214 [390] 215 [391] 216 [392] 217 [393] 218 [394] 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Activité 2 : Conservation de la masse

On observe qu'il y a **conservation de la masse** au cours d'une transformation chimique : c'est à dire que la masse de ce qu'on avait au départ (les réactifs) est égale à la masse de ce qu'il y a à la fin (les produits).

Mais comment cela peut-il s'expliquer en termes d'atomes et de molécules?

Activité 3 :

Partie 1 :

Au cours d'une transformation chimique, les atomes composant les molécules des réactifs se réarrangent pour former les molécules des produits. Les molécules de réactifs sont donc détruites mais pas leurs atomes, qui sont redistribués pour former les produits.

Il y a donc conservation des atomes. C'est pour cela que la masse est conservée. Comme disais A. Lavoisier : « *Rien ne se perd, rien ne se crée, tout se transforme* ».

Une transformation chimique (ce qui se passe réellement) est modélisée par une **réaction chimique** (la description choisie par les scientifiques) qui ne détaille que l'état initial et l'état final.

L'équation de la réaction est un bilan dans lequel les molécules sont notées avec leur formule chimique.

Par exemple : $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$



Partie 2 :

- Une **équation** de réaction **équilibrée** exprime la conservation des atomes : il y a le même nombre d'atomes du côté des réactifs et de celui des produits.
- Dans une équation de réaction équilibrée, on a ajusté le nombre des molécules (réactifs et/ou produits) concernées par la réaction, sans modifier leur formule.