

## Rekenen 2

		Atoomnummer	Pd	Relatieve atoommassa
		Symbool	Naam	Niet-metalen
001	H	Lithium	Wasserstoff	0.001
002	He	Beryllium	Wasserstoff	4.003
003	Li	Boron	Beryllium	14
004	Be	Magnesium	Wasserstoff	20
011	Na	Natrium	Kalium	22.99
012	Mg	Magnesium	Beryllium	24.31
013	Al	Aluminium	Wasserstoff	26.98
014	Si	Silicium	Wasserstoff	28.00
015	P	Fosfor	Zuurstof	30.97
016	S	Sulf	Zuurstof	32.06
017	Cl	Chloor	Fluor	35.45
018	Ar	Argon	Krypon	39.95
021	Sc	Scandium	Hooftgroepmetalen	44.96
022	Ti	Titanium	Alkalinetalen	47.87
023	V	Vanadium	Aardalkalimetalen	50.94
024	Cr	Chroom	Lantanoïden	52.00
025	Mn	Manganië	Actiniden	54.94
026	Fe	Ier	Metalloïden	55.85
027	Co	Kobalt		59.93
028	Ni	Nikkel		58.69
029	Ga	Gallium		61.95
030	Zn	Zink		65.39
031	In	Germanium		69.77
032	Ge	Asien		71.91
033	As	Antimoïne		74.92
034	Se	Selen		76.66
035	Br	Broom		79.90
036	Kr	Krypon		83.80
037	Rb	Rubidium	Edelgassen	84.91
038	Sr	Strontronium		87.67
039	Y	Ytterbium		88.91
040	Zr	Zirkonium		91.22
041	Nb	Niobium		92.91
042	Mo	Molibdénium		95.94
043	Tc	Teknetium		98.91
044	Ru	Ruthenium		101.04
045	Rh	Rodium		102.9
046	Pd	Palladium		106.4
047	Ag	Argentum		107.9
048	Cd	Cadmium		112.4
049	In	Indium		114.4
050	Sn	Tin		118.7
051	Sb	Sb		121.8
052	Te	Antimoïne		127.6
053	I	Jood		136.9
054	Xe	Xenon		131.3
055	Cs	Cs		132.9
056	Ba	Barium		137.3
057	La	Lantanoïden		138.9
058	Ce	Cerium		140.1
059	Pr	Praseodimum		140.9
060	Nd	Neodymium		141.2
061	Pm	Promethium		145.0
062	Sm	Samarium		150.4
063	Eu	Europium		152.0
064	Gd	Gadolinium		157.3
065	Tb	Terbium		158.9
066	Dy	Dysprosium		162.3
067	Ho	Holmium		164.9
068	Er	Erbium		167.3
069	Tm	Thulium		168.9
070	Yb	Ytterbium		173.0
071	Lu	Lutetium		175.0
072	Hf	Hafnium		178.5
073	Ta	Tantalium		180.9
074	W	Wolfrum		183.9
075	Re	Rhenium		186.2
076	Os	Osmium		190.2
077	Ir	Irindium		192.2
078	Pt	Patiëne		195.0
079	Au	Goud		196.9
080	Hg	Kwikk		200.6
081	Tl	Thallium		204.2
082	Pb	Loed		209.2
083	Bi	Bismut		209.0
084	Po	Potassium		209.9
085	At	Astatine		218.0
086	Rn	Ration		222.2
087	Fr	Francium		223.0
088	Ra	Rutherfordium		226.0
089	Ac	Actinium		227.0
090	Th	Thorium		228.0
091	Pa	Protactinium		228.0
092	U	Uraan		231.0
093	Np	Neprotactinium		237.0
094	Pu	Plutonium		239.0
095	Am	Americium		243.0
096	Cm	Curium		247.0
097	Bk	Berkelium		247.0
098	Cf	Californium		251.0
099	Es	Eisenium		253.0
100	Fm	Fermium		258.0
101	Md	Mendelevium		257.0
102	No	Nobelium		259.0
103	Lr	Lavrentium		262.0
104	Rf	Rutherfordium		267.0
105	Db	Dubium		268.0
106	Sg	Seaborium		269.0
107	Bh	Böhrium		270.0
108	Hs	Hossium		270.0
109	Mt	Mēnemium		270.0
110	Ds	Darmstadtium		270.0
111	Rg	Röntgenium		270.0
112	Cn	Copernicum		270.0
113	Nh	Nihonium		270.0
114	Fl	Flerovium		270.0
115	Mc	Moscovium		270.0
116	Lv	Livermorium		270.0
117	Ts	Teressine		270.0
118	Og	Oganesson		270.0
119				270.0

## Mol, aantal deeltjes, Avogadro, massa, molaire massa

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- 1 Bereken het aantal moleculen in 3,0 mol water.
- 2 Bereken het aantal moleculen in 3,0 mol chloorgas.
- 3 Bereken het aantal moleculen in 2,5 mol ammoniak ( $\text{NH}_3(\text{g})$ ).
- 4  $N = 1,5 \cdot 10^{24}$   $\text{CO}_2$ -moleculen. Bereken hoeveel mol dat is.
- 5  $N = 3,0 \cdot 10^{23}$   $\text{Br}_2$ -moleculen. Bereken hoeveel mol dat is.
- 6 Bereken het aantal mol moleculen in 34 gram ammoniak ( $\text{NH}_3(\text{g})$ ).
- 7 Bereken het aantal mol moleculen in 23 gram alcohol ( $\text{C}_2\text{H}_6\text{O}(\text{l})$ ).
- 8 Bereken de massa in gram van 4,5 mol methaan ( $\text{CH}_4(\text{g})$ ).
- 9 Bereken de massa in gram van 0,50 mol hydrazine ( $\text{N}_2\text{H}_4(\text{g})$ ).
- 10 Bereken het aantal moleculen van 25 gram zwavelzuur ( $\text{H}_2\text{SO}_4(\text{l})$ ).
- 11 Bereken het aantal moleculen van 9,7 gram keukenzout ( $\text{NaCl}(\text{s})$ ).
- 12 Bereken de massa in gram van  $1,2 \cdot 10^{24}$  watermoleculen.
- 13 Bereken de massa in gram van  $1,2 \cdot 10^{24}$  glucosemoleculen ( $\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$ ).
- 14 Bereken het aantal moleculen van 100 mL aceton ( $\text{C}_3\text{H}_6\text{O}(\text{l})$ ,  $\rho = 0,79 \text{ g/mL}$ ).
- 15 Bereken het volume in mL van  $4,0 \cdot 10^{23}$  chloroformmoleculen ( $\text{CHCl}_3(\text{l})$ ,  $\rho = 1,5 \text{ g/mL}$ ).

## Uitwerkingen

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1 H<sub>2</sub>O:  $n = 3,0 \text{ mol}$   
 $N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$   
 $N = n \cdot N_A = 3 \cdot 6,02 \cdot 10^{23} = 1,8 \cdot 10^{24} \text{ moleculen}$

2  $N = 1,8 \cdot 10^{24} \text{ moleculen}$

3  $N = 1,5 \cdot 10^{24} \text{ moleculen}$

4 CO<sub>2</sub>:  $N = 1,5 \cdot 10^{24} \text{ moleculen}$   
 $N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$   
 $n = \frac{N}{N_A} = \frac{1,5 \cdot 10^{24}}{6,02 \cdot 10^{23}} = 2,5 \text{ mol CO}_2$

5  $n = 0,50 \text{ mol Br}_2$

6 NH<sub>3</sub>:  $m = 34 \text{ g}$   
 $M = 17,034 \text{ g/mol}$   
 $n = \frac{m}{M} = \frac{34}{17,034} = 2,0 \text{ mol NH}_3\text{-moleculen}$

7  $n = 0,50 \text{ mol C}_2\text{H}_6\text{O-moleculen}$

8 CH<sub>4</sub>:  $n = 4,5 \text{ mol}$   
 $M = 16,042 \text{ g/mol}$   
 $m = n \cdot M = 4,5 \cdot 16,042 = 72 \text{ g CH}_4$

9  $m = 16 \text{ g N}_2\text{H}_4$

10 H<sub>2</sub>SO<sub>4</sub>:  $m = 25 \text{ g}$   
 $M = 98,076 \text{ g/mol}$   
 $n = \frac{m}{M} = \frac{25}{98,076} = 0,25 \text{ mol}$   
 $N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$   
 $N = n \cdot N_A = 0,25 \cdot 6,02 \cdot 10^{23} = 1,5 \cdot 10^{23} \text{ H}_2\text{SO}_4\text{-moleculen}$

11  $N = 1,0 \cdot 10^{23} \text{ NaCl-moleculen}$

12 H<sub>2</sub>O: N = 1,2 · 10<sup>24</sup> moleculen

$$N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$$

$$n = \frac{N}{N_A} = \frac{1,2 \cdot 10^{24}}{6,02 \cdot 10^{23}} = 2,0 \text{ mol}$$

$$M = 18,016 \text{ g/mol}$$

$$m = n \cdot M = 2,0 \cdot 18,016 = 36 \text{ g}$$

13 m = 359 g

14 C<sub>3</sub>H<sub>6</sub>O: V = 100 mL

$$\rho = 0,79 \text{ g/mL}$$

$$m = \rho \cdot V = 0,79 \cdot 100 = 79 \text{ g}$$

$$M = 58,078 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{79}{58,078} = 1,4 \text{ mol}$$

$$N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$$

$$N = n \cdot N_A = 1,4 \cdot 6,02 \cdot 10^{23} = 8,2 \cdot 10^{23} \text{ moleculen}$$

15 CHCl<sub>3</sub>: N = 4,0 · 10<sup>23</sup> moleculen

$$N_A = 6,02 \cdot 10^{23} \text{ mol}^{-1}$$

$$n = \frac{N}{N_A} = \frac{4,0 \cdot 10^{23}}{6,02 \cdot 10^{23}} = 0,66 \text{ mol}$$

$$M = 119,368 \text{ g/mol}$$

$$m = n \cdot M = 0,66 \cdot 119,368 = 79 \text{ g}$$

$$\rho = 1,5 \text{ g/mL}$$

$$V = \frac{79}{1,5} = 53 \text{ g}$$