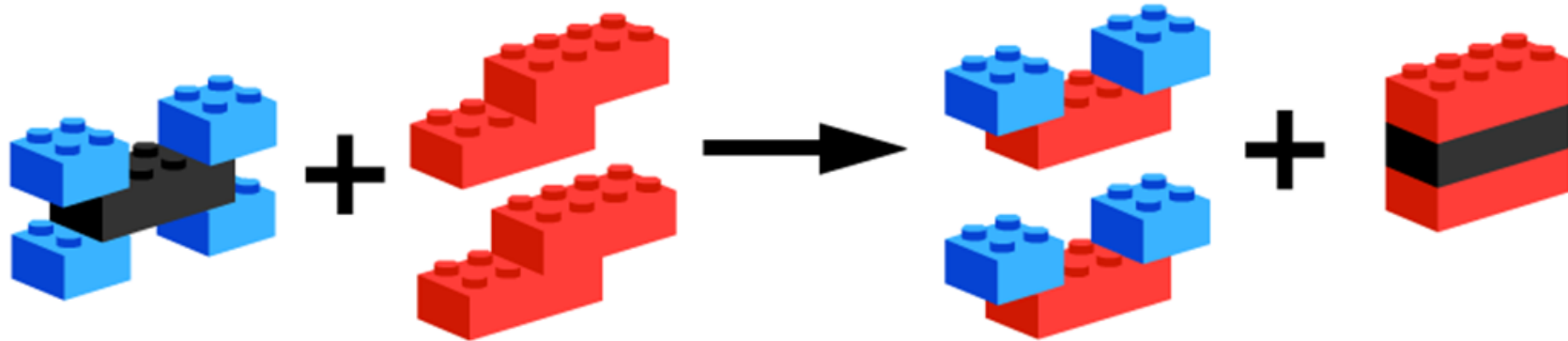


# *Moleculen maken uit atomen*

*V41 les 3*



# *Puzzelen met letters*

- Uit hoeveel verschillende letters bestaat het woord '*bodemchemie*'? Benoem ze.
- Maak tweetallen en verzin met deze letters zoveel mogelijk andere woorden.
  - **Schrijf ze allemaal op een blaadje. Dit mogen korte en lange woorden zijn. Hoeveel woorden kunnen jullie in 5 minuten samenstellen?**
- Hierna krijg je nog 2 minuten de tijd om een zo lang mogelijk nieuw woord samen te stellen uit dezelfde letters.

# Puzzelen in de scheikunde

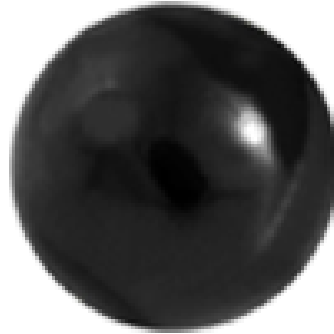


## Periodiek Systeem der Elementen

1 IA New Original	2 IIA	3	4	5	6	7	8	9	10	11	12	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA VIA	
H Hydrogen 1.00794	He Helium 4.002602	Li Lithium 6.941	Be Beryllium 9.012182	B Boron 10.811	C Carbon 12.011	N Nitrogen 14.00643	O Oxygen 15.999	F Fluorine 18.9984032	Ne Neon 20.1797	Na Sodium 22.98976928	Mg Magnesium 24.304	Al Aluminum 26.9815385	Si Silicon 28.0855	P Phosphorus 30.973761998	S Sulfur 32.06	Cl Chlorine 35.453	Ar Argon 39.948	
K Potassium 39.0983	Ca Calcium 40.078	Sc Scandium 44.955912	Ti Titanium 47.88	V Vanadium 50.9415	Cr Chromium 51.9961	Mn Manganese 54.938044	Fe Iron 55.845	Co Cobalt 58.933195	Ni Nickel 58.6934	Cu Copper 63.546	Zn Zinc 65.38	Ga Gallium 69.723	Ge Germanium 72.64	As Arsenic 74.9216	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.798	
Rb Rubidium 85.4678	Sr Strontium 87.62	Y Yttrium 88.90584	Zr Zirconium 91.224	Nb Niobium 92.90638	Mo Molybdenum 95.94	Tc Technetium 98	Ru Ruthenium 101.07	Rh Rhodium 102.90550	Pd Palladium 106.42	Ag Silver 107.8682	Cd Cadmium 112.411	In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.757	Te Tellurium 127.6	I Iodine 126.905	Xe Xenon 131.29	
Cs Cesium 132.90545	Ba Barium 137.327	La Lanthanum 138.90547		Hf Hafnium 178.49	Ta Tantalum 180.94788	W Tungsten 183.84	Re Rhenium 186.207	Os Osmium 190.23	Ir Iridium 192.222	Pt Platinum 195.084	Au Gold 196.966569	Hg Mercury 200.59	Tl Thallium 204.3833	Pb Lead 207.2	Bi Bismuth 208.98038	Po Polonium 209	At Astatine 210	Rn Radon 222
Fr Francium 223	Ra Radium 226	Ac Actinium 227		Rf Rutherfordium 261	Db Dubnium 262	Sg Seaborgium 263	Bh Bohrium 264	Hs Hassium 265	Mt Meitnerium 266	Ds Darmstadtium 267	Rg Roentgenium 268	Uub Ununbium 269	Uut Ununtrium 270	Uuq Ununquadium 271	Uup Ununpentium 272	Uuh Ununhexium 273	Uus Ununseptium 274	Uuo Ununoctium 284
Atomic masses in parentheses are those of the most stable or common isotope.																		
<p>Note: The subgroup numbers 1-18 were adopted in 1988 by the International Union of Pure and Applied Chemistry. The names of elements 112-118 are the IUPAC equivalents of those numbers.</p>																		

**Letters zijn atomen,  
woorden zijn moleculen!**

# *Puzzelen met atomen*



**= koolstofatoom, C**



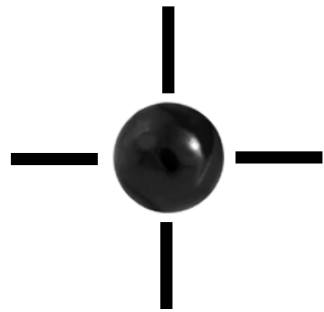
**= waterstofatoom, H**



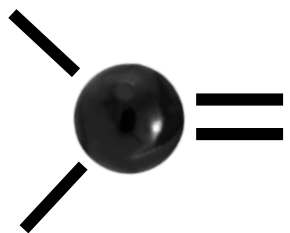
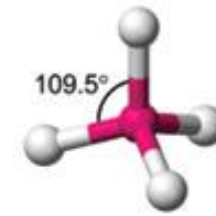
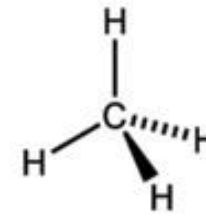
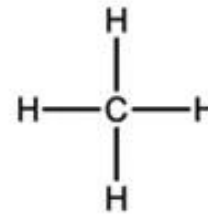
**= zuurstofatoom, O**

# Koolstofatoom

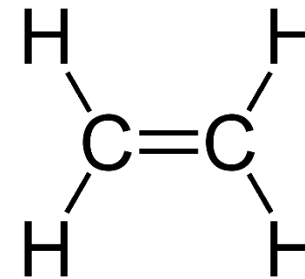
- Bij moleculen maakt elk koolstofatoom **4 bindingen**



zoals bijvoorbeeld bij aardgas:  
(methaangas)



zoals bijvoorbeeld bij etheengas:

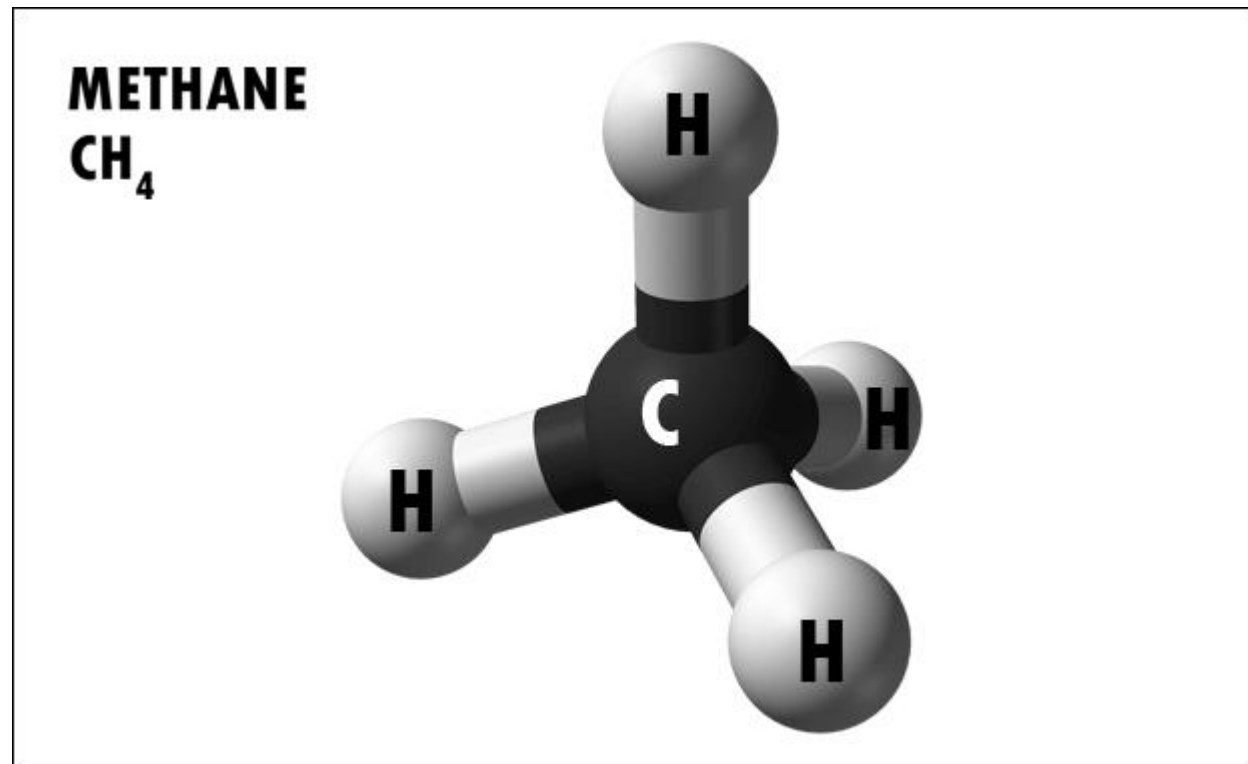
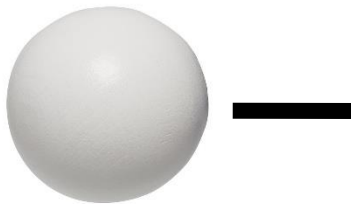


zoals bijvoorbeeld bij ethyngas:



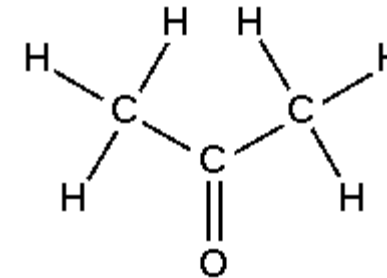
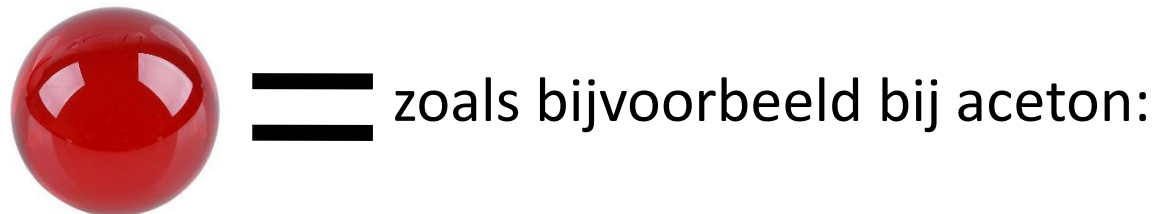
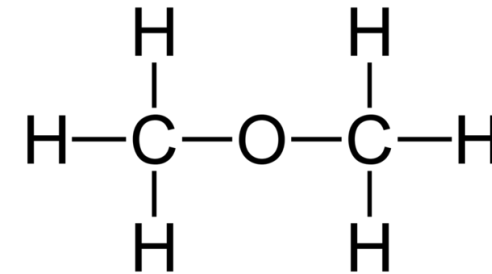
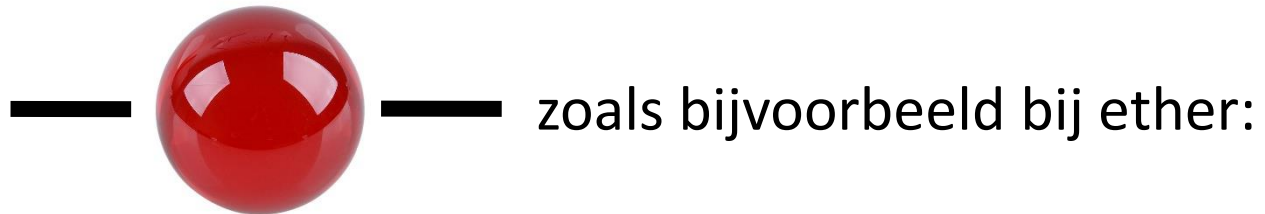
# Waterstofatoom

- Bij moleculen maken kan elk waterstofatoom ***slechts 1 binding*** maken



# Zuurstofatoom

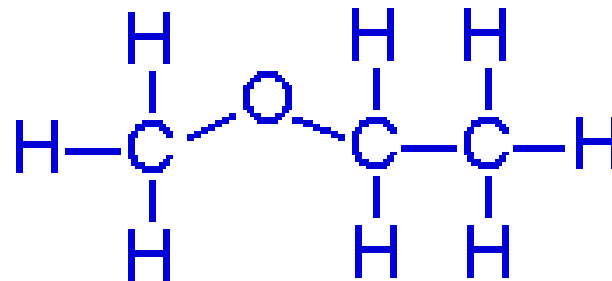
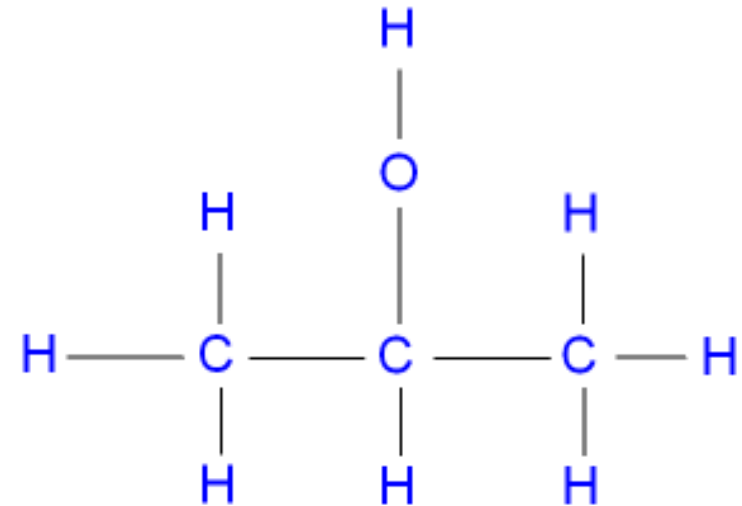
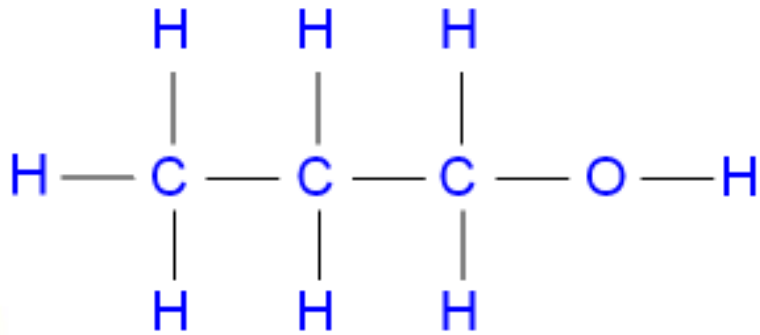
- Bij moleculen maakt elk zuurstofatoom **2 bindingen**



# Moleculen maken

Hoeveel verschillende stoffen kan je maken uit:

- **3 C-atomen**
- **8 H-atomen**
- **1 O-atoom**





# Oefening



= koolstofatoom, C



= waterstofatoom, H



= zuurstofatoom, O

Stel je hebt:

- **7 koolstofatomen** (zwarte bolletjes)
- **16 waterstofatomen** (witte bolletjes)
- **1 zuurstofatoom** (rood bolletje)

Hoeveel verschillende moleculen kan je hier uit samenstellen?