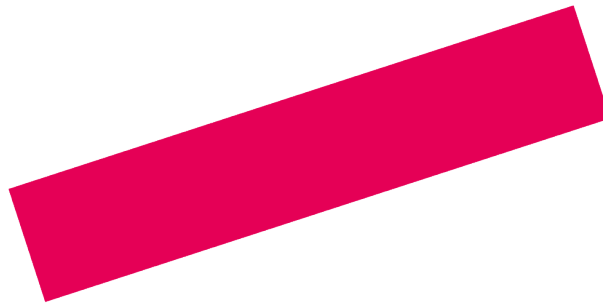


Academie toegepaste biowetenschappen en chemie

Chemie Course 3



Week 3: H10 & H12

Algemeen

Boek (McMurry)

Dit blok:

- Hoofdstuk 10 (Zuren en Basen)
- Hoofdstuk 12 (Organische chemie: alkanen)
- Hoofdstuk 13 (alkenen, alkynen en aromatische samenstellingen)

Geen tussentijdse toets

Leerstof H10

McMurry (7^e druk)

- 10.1 t/m 10.10, 10.12 t/m 10.14

McMurry (8^e druk)

- 10.1 t/m 10.6, 10.8 t/m 10.11

10.8 Zuur-base reacties

zuur met base geeft zout en water

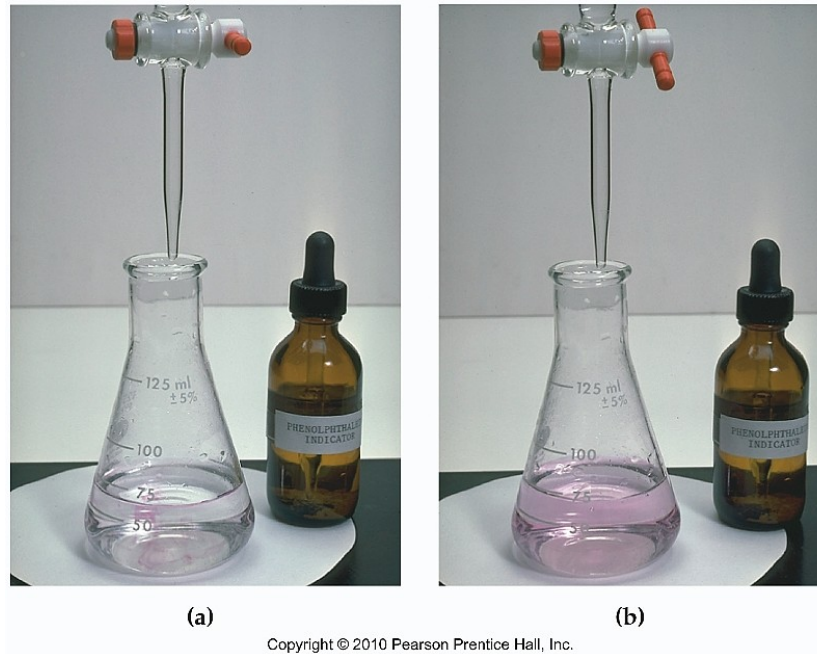
zuur met (bi)carbonaat (HCO_3^- / CO_3^{2-}) geeft daarbij ook koolzuurgas

zuur met ammonia/amine

10.13 Titreren

Titreren

- laboratoriumtechniek om hoeveelheid zuur of base in een monster te bepalen



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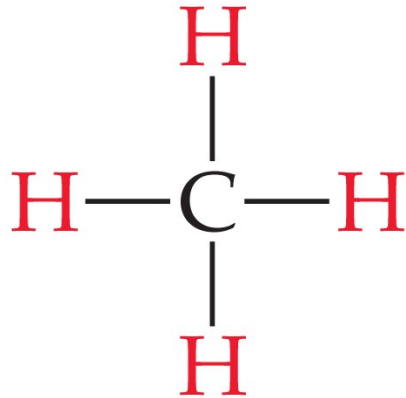
Inleiding hoofdstuk 12

organisch versus anorganisch

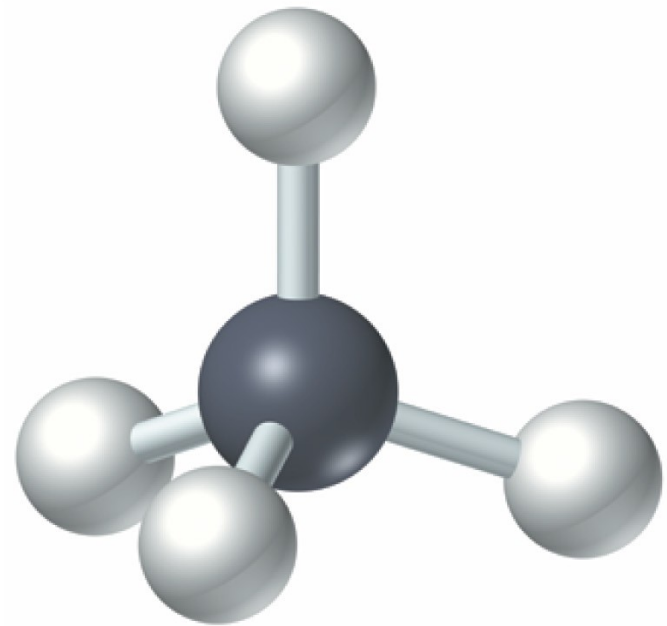
- levend versus mineraal
- lage smelt- en kookpunten versus hoge smelt- en kookpunten
- niet geleidend versus geleidend

12.1 Organische moleculen

koolstof is tetravalent: altijd 4 bindingen

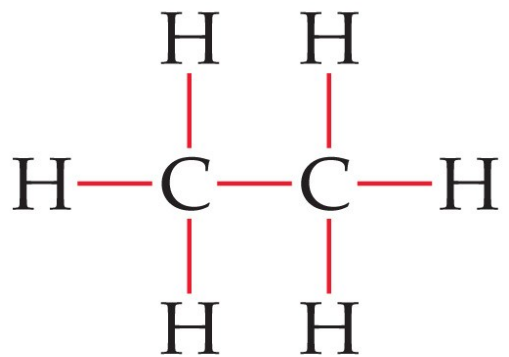


Methane, CH₄

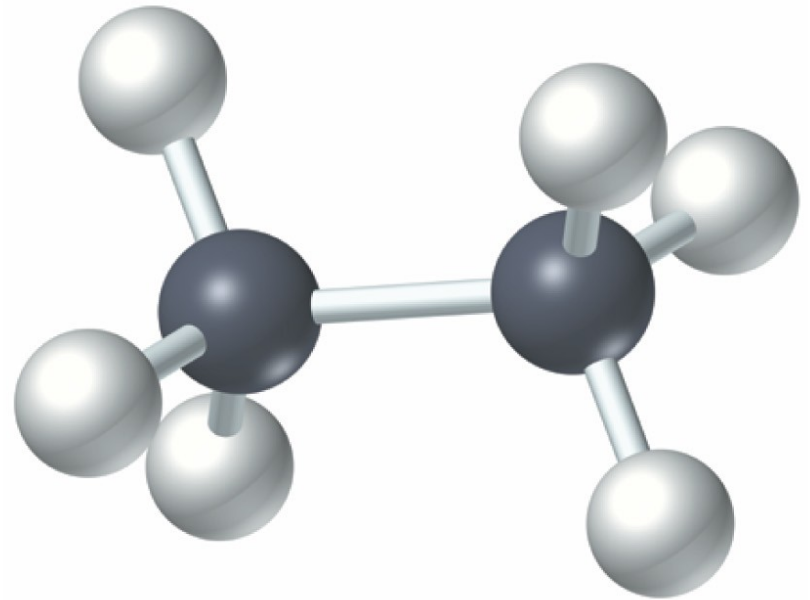


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Organische moleculen hebben covalente bindingen

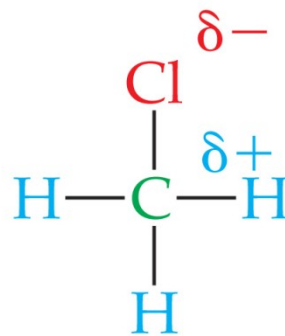


Ethane, C_2H_6



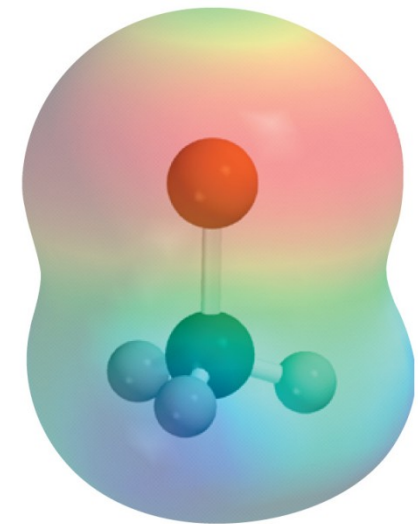
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Organische moleculen bevatten **polaire** covalente bindingen als koolstof gebonden is aan een elektronegatief element (rechts in het PS)

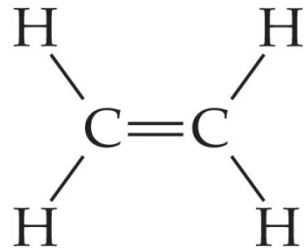


Chloromethane, CH_3Cl

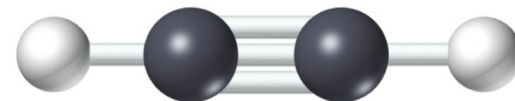
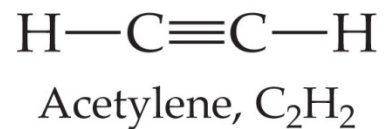
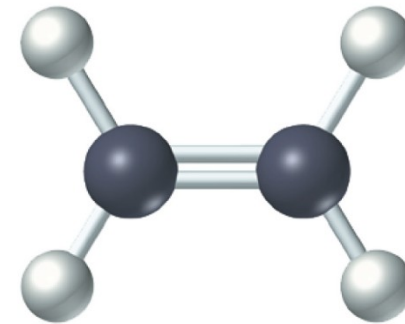
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Koolstof kan dubbele of driedubbele bindingen vormen door meer dan twee elektronen te delen met een “buur”atoom.

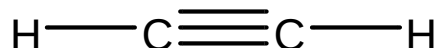
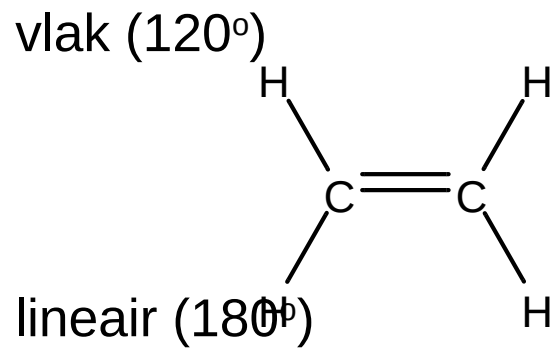
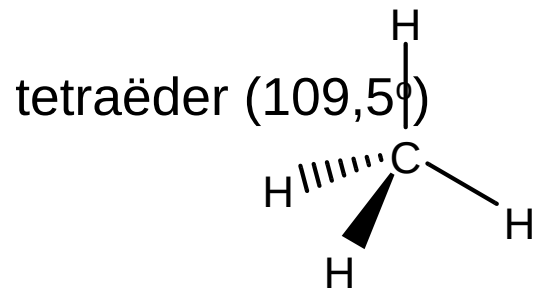


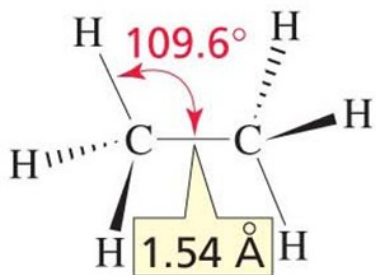
Ethylene



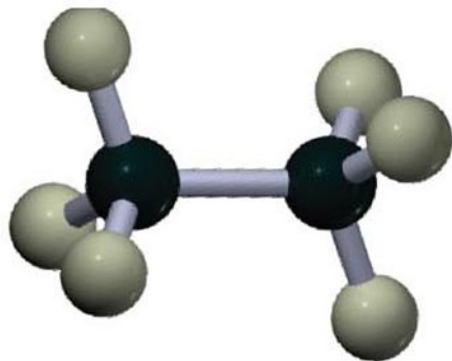
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Vorm en bindingshoeken

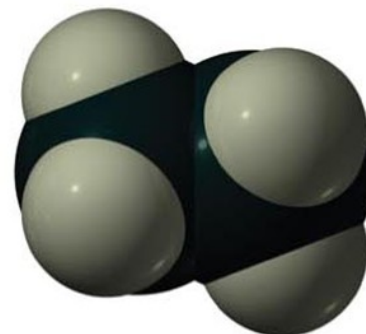




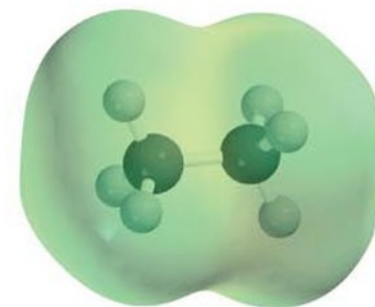
perspective formula of ethane



ball-and-stick model of ethane

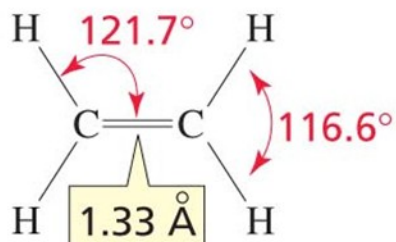


space-filling model of ethane



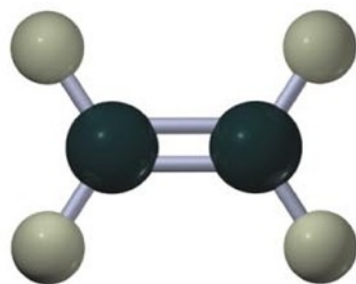
electrostatic potential map for ethane

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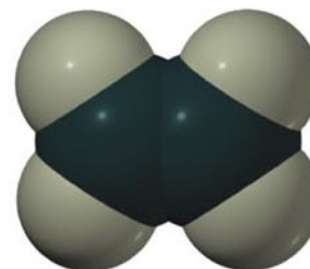


a double bond consists of one σ bond and one π bond

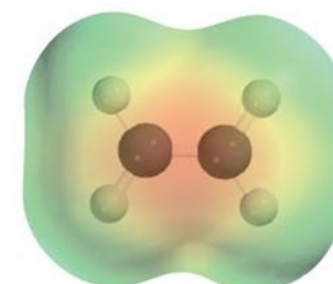
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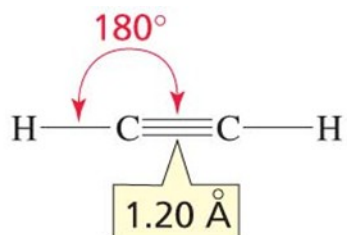
ball-and-stick model of ethene



space-filling model of ethene



electrostatic potential map for ethene

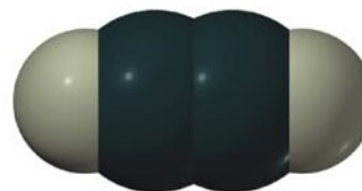


a triple bond consists of one σ bond and two π bonds

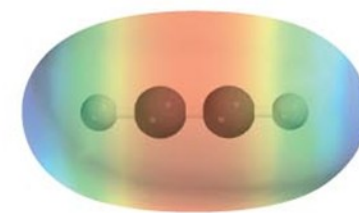
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ball-and-stick model of ethyne

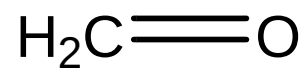
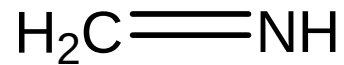


space-filling model of ethyne



electrostatic potential map for ethyne

Organische moleculen bevatten waterstof en vaak stikstof en zuurstof



12.2 Functionele groepen

Meer dan 18.000.000 verbindingen

Systematische benadering

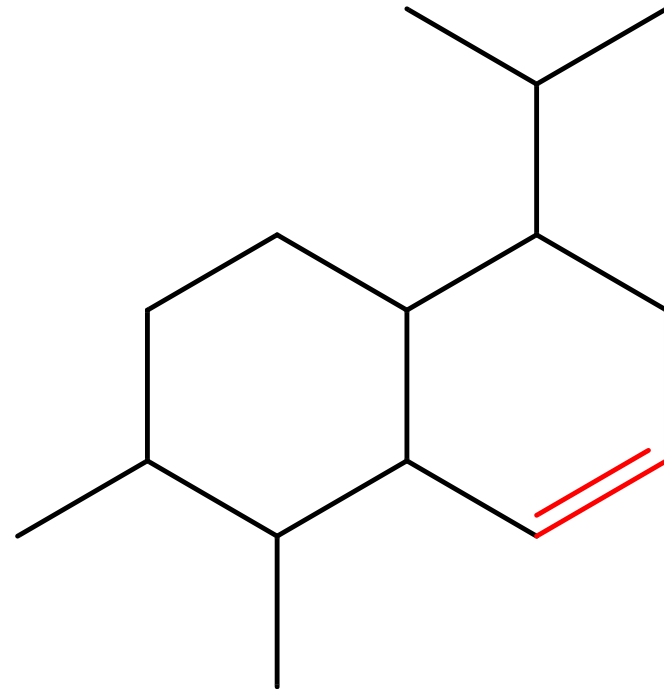
Functionele groep

- atoom of atoomgroep die voor een groot deel de chemische en fysische eigenschappen van het molecuul bepaalt

Elke functionele groep is onderdeel van een groter molecuul

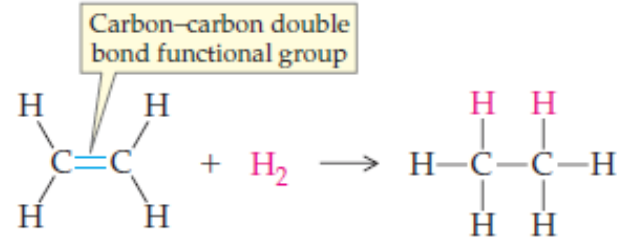
- Een molecuul kan meerdere functionele groepen bevatten

Verbindingen met dezelfde functionele groep reageren
gelijkwaardig!

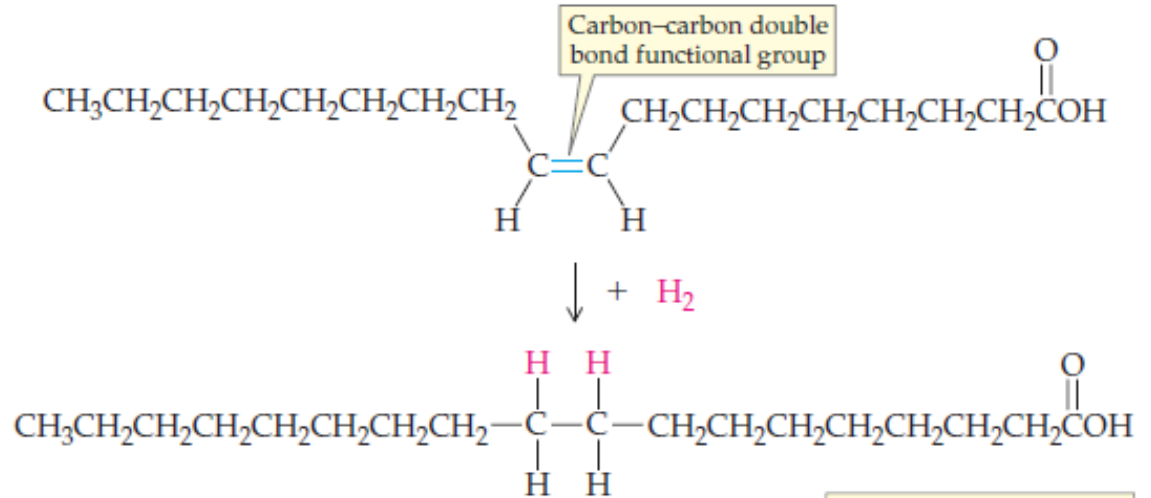


Een voorbeeld

(a) Reaction of ethene with hydrogen



(b) Reaction of oleic acid with hydrogen



(c) Reaction of ethene with water

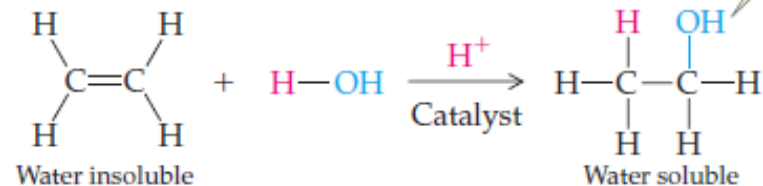

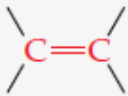
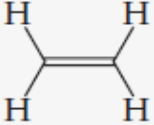


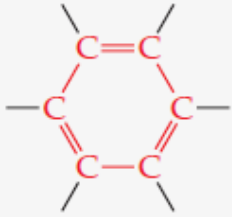
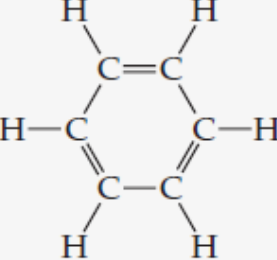
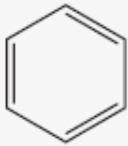
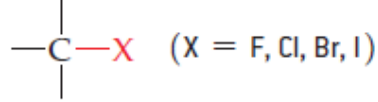
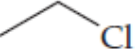
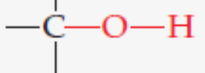
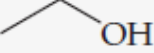
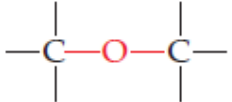
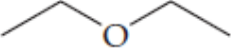
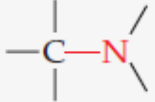
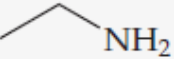
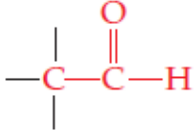
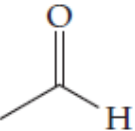


Table 12.1 Some Important Families of Organic Molecules

Family Name	Functional Group Structure*	Simple Example	Line Structure	Name Suffix
Alkane (Chapter 12)	No readily reactive bonds. Contains only C—H and C—C single bonds	CH ₃ CH ₂ CH ₃ Propane		-ane
Alkene (Chapter 13)		H ₂ C=CH ₂ Ethene		-ene
Alkyne (Chapter 13)		H—C≡C—H Ethyne		-yne
Aromatic (Chapter 13)		 Benzene		None
Alkyl halide (Chapters 12, 14)		CH ₃ CH ₂ Cl Chloroethane		None
Alcohol (Chapter 14)		CH ₃ CH ₂ OH Ethanol		-ol
Ether (Chapter 14)		CH ₃ CH ₂ —O—CH ₂ CH ₃ Diethyl ether		None
Amine (Chapter 16)		CH ₂ CH ₃ NH ₂ Ethanamine		-amine
Aldehyde (Chapter 15)		CH ₃ —C(=O)—H Ethanal		-al

Ketone (Chapter 15)		$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$ Acetone		-one
Carboxylic acid (Chapter 17)		$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ Acetic acid		-ic acid
Anhydride (Chapter 17)		$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$ Acetic anhydride		None
Ester (Chapter 17)		$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_3$ Methyl acetate		-ate
Amide (Chapter 17)		$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ Acetamide		-amide
Thiol (Chapter 14)		$\text{CH}_3\text{CH}_2\text{SH}$ Ethanethiol		None
Disulfide (Chapter 14)		CH_3SSCH_3 Dimethyl disulfide		None
Sulfide (Chapter 14)		$\text{CH}_3\text{CH}_2\text{SCH}_3$ Ethyl methyl sulfide		None

The bonds shown in RED refer to the functional group of interest and the atoms required.

The bonds whose connections are not specified are assumed to be attached to carbon or hydrogen atoms in the rest of the molecule.

worked example 12.2

- a. Teken een amine met de formule C_2H_7N
- b. Teken een alkyn met de formule C_3H_4
- c. Teken een ether met de formule $C_4H_{10}O$

Bronnen

Afbeeldingen afkomstig van:

- McMurry - Fundamentals of general, organic, and biological chemistry. 7th edition, uitgever: Pearson.
 - Veplicht boek boekenlijst opleiding