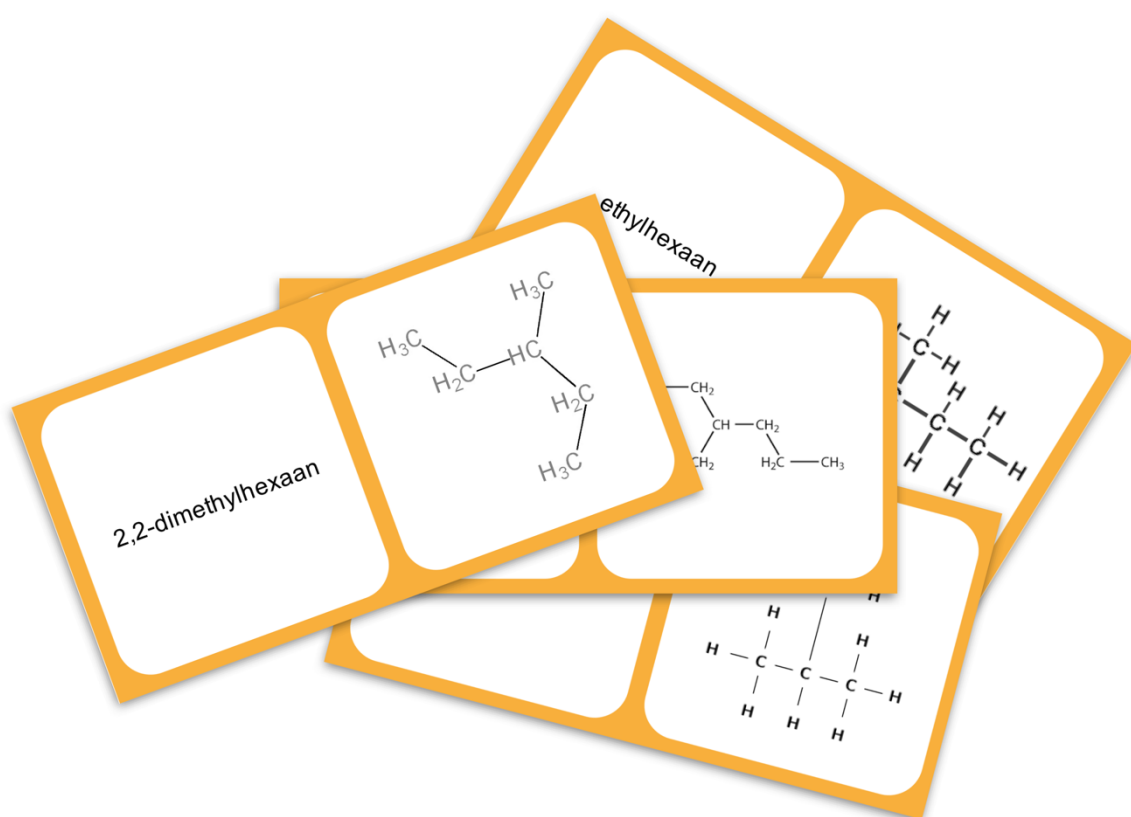


De alkanenslang

een activerende werkvorm



Erik van de Leur
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De alkanenslang, een activerende werkvorm

Met de woorden "Volgende week om deze tijd is het proefwerk over hoofdstuk 4", start ik een les over voeding met als hoofdonderdeel koolwaterstoffen in klas VW3x. Natuurlijk kunnen de leerlingen in deze laatste les voor de toets vragen stellen over het hoofdstuk en de opgaven, maar er zijn leerlingen die moeite hebben met de naamgeving en opbouw van de koolwaterstoffen. Goede reden dus om hier extra mee te oefenen.

Als docent natuur- en scheikunde ben ik altijd op zoek naar manieren om de leerlingen op een andere manier te laten werken met de theorie van het hoofdstuk. Practica worden in deze vakken veel gebruikt, maar er zijn ook andere manieren. Regelmatig blader ik nieuwsgierig door de reader 'Activerende werkvormen' (Flokstra, 2006) om inspiratie op te doen voor mijn lessen.

In de zomervakantie van 2015 valt mijn oog op werkvorm 4.25: Domino. Het idee van de alkanenslang is geboren. Digitale kladblaadjes komen tevoorschijn, en ik typ alle mogelijke koolwaterstofmoleculen op die havo-3 moet kennen. Dat is een mooi rijtje van het eenvoudige methaan tot het lastige 3,4-diet-hylhexaan, in totaal zijn het 28 moleculen. Voor de uitwerking heb ik me laten leiden door het ontwerp van collega Mayke Coppus. Zij is naast docent ook grafisch vormgever en heeft al eerder een kwartetspel met gereedschappen gemaakt voor in de technieklessen. De kleurstelling en vormgeving daarvan vormen een goede basis voor

het nieuwe dominospel. Vele muisklikken later zijn er zes sets kaarten ontworpen in verschillende kleurstellingen en volgordes, zodat de klassen in zes groepjes kunnen gaan werken. Bij elkaar kijken heeft weinig zin, omdat de volgorde van iedere set verschilt (zie figuur 1).

In de les

Het is maart 2016. Hoofdstuk 4 is bijna ten einde en de slang kan nu gebruikt gaan worden. De eerste klas van de dag is H3r. De kaartjes worden tevoorschijn gehaald en de groepjes worden gevormd. Ik leg de opdracht uit: "Maak een slang van de kaartjes, waarbij het einde van de slang weer aan moet kunnen sluiten op het begin. Vragen stellen aan de docent mag niet. Overleg met je groepje en houd de boeken gesloten. De groep die als eerste een correcte alkanenslang heeft gemaakt, wint."

De groepen staan klaar en de kaartjes worden uitgedeeld. Een goed moment om eens rond te kijken. Wie neemt in de groepjes de leiding? Zijn alle leerlingen erbij betrokken? Kunnen ze de theorie toepassen in deze opdracht? In de wijze van samenwerking binnen de groep zijn wel opvallende verschillen te zien. Zo duikt een van de



figuur 1: Een deel van de set.

Maar **nu** begrijp ik het wel

groepen als gekken op de kaartjes en begint met neerleggen, terwijl een andere groep rustig wat een goede werkwijze is. Na 10 minuten gaan de eerste vingers de lucht in. Ik controleer de slang, maar er zitten nog fouten in. Helaas, nog geen winnaar. In de tussentijd waren de vingers van een ander groepje al de lucht in gegaan, dus door naar het tweede groepje. Ook hier een paar kleine foutjes. "Wat was ook alweer



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Meneer, ik heb zoveel geleerd vandaag

het verschil tussen methyl- en ethyl-?”, vraag ik het groepje. “Of de zijgroepen één of twee koolstofatomen bevatten”, volgt al snel. “Ach, nu zie ik het. Een stomme fout”, concludeert de leerling.

De leerlingen gaan weer aan de slag en nu steekt het eerste groepje weer de vingers op. Nu hebben ze de slang helemaal goed. Er is een winnaar! Als beloning krijgen de winnaars nog wat lekkers uit de traktatiepot.

Verrijking voor vwo

Terug naar VW3x, een gecombineerde athe-neum- en gymnasiumklas. Hier beginnen we de eerste ronde met dezelfde kaartjes als bij havo-3. Een paar meiden zijn teleurgesteld als ze horen dat het boek niet open mag. “We hebben het rijtje methaan, ethaan, en zo nog niet geleerd”, wordt aangegeven. Maar terwijl de ene leerling dit uitspreekt, is een ander uit het groepje ze nog snel uit het

hoofd aan het leren. Want winnen willen ze toch wel.

Naast de alkanen, moet vwo-3 ook de alkenen, cycloalkanen en alcoholen kennen. Daarvoor heb ik een tweede kaartenset opgezet met deze extra koolwaterstoffen waar ook nog een aantal lastige alkanen aan toe zijn gevoegd; een complete set voor een tweede speelronde bij vwo-3. Om ze niet door elkaar te halen met de kaarten van havo-3, hebben deze kaarten een afwijkende achterzijde gekregen.

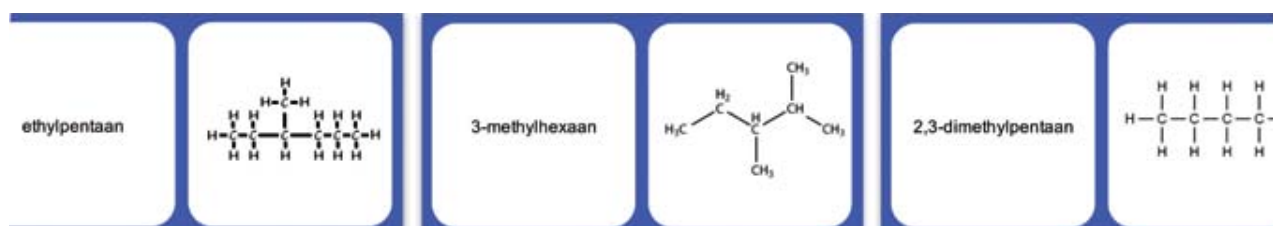
De tweede speelronde start. Het groepje met de meest fanatieke leerlingen gaat voortvarend van start. Als snel worden er kaarten aangelegd. “Zo, dat gaat goed bij jullie”, geef ik nog aan. “Is deze opdracht dan zoveel makkelijker?” Lars geeft het verhelderende antwoord: “Bij deze kaarten is het verschil tussen de moleculen helderder. Een cycloalkaan is bijvoorbeeld makkelijk

te onderscheiden van een alkeen, dus dit gaat veel sneller.” Ja, daar had ik bij het maken van de kaarten niet aan gedacht, maar uiteindelijk is dat helemaal niet erg. De leerlingen werken serieus aan de opdracht en oefenen goed met de naamgeving en daar gaat het om.

Leuk zijn ook de reacties van leerlingen. Al tijdens de opdracht hoor ik vanuit een meidengroepje ineens: “Maar nu begrijp ik het wel!” Maar de echte beloning kwam van Myrte aan het einde van de les met de woorden: “Meneer, ik heb zoveel geleerd vandaag en dit was ook nog eens de leukste les van het jaar.” ●

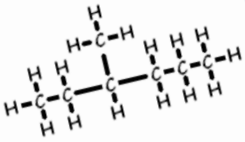
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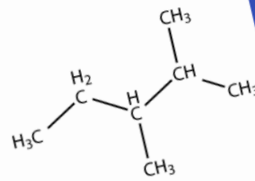


Basiset Alkanenslang

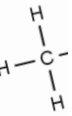
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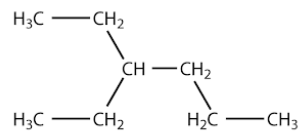
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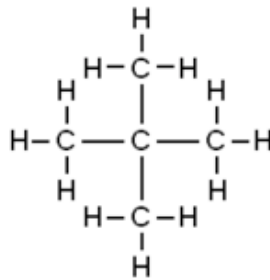
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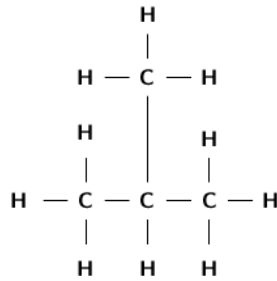
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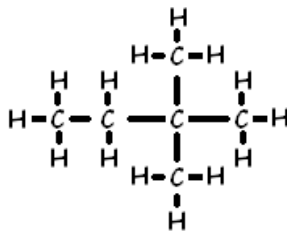
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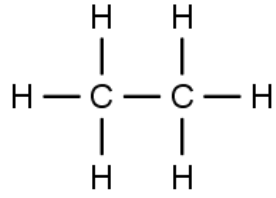
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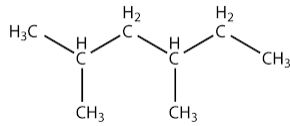
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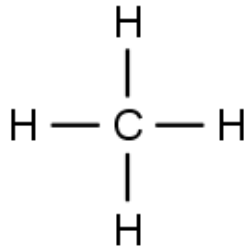
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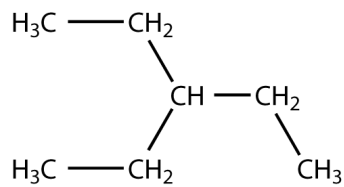
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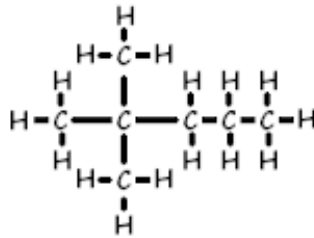
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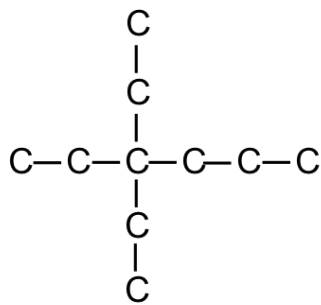
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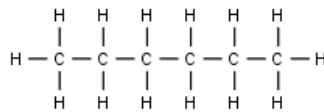
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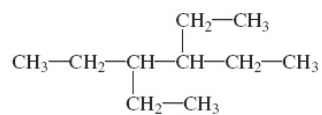
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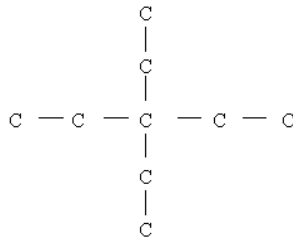
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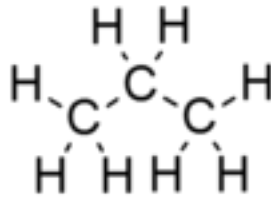
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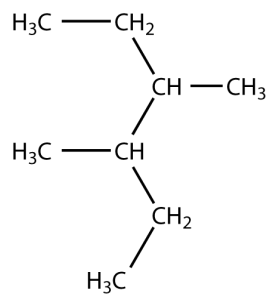
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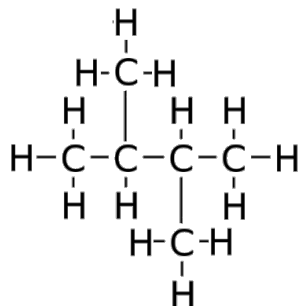
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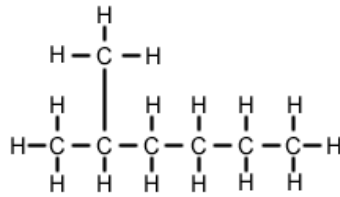
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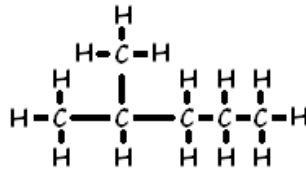
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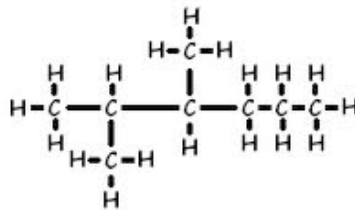
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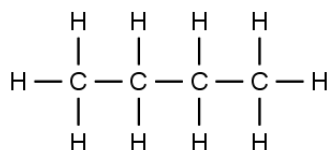
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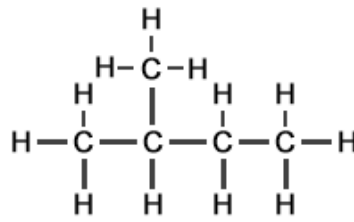
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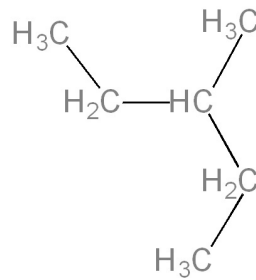
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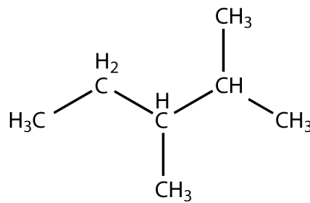
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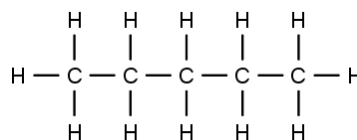
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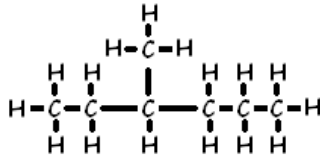
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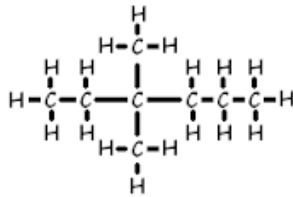
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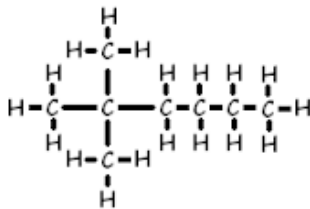
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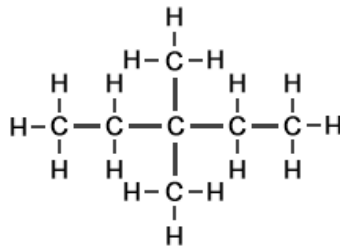
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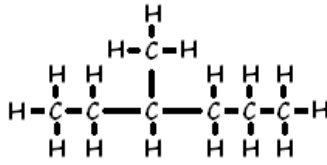
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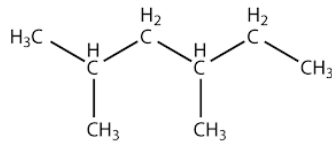
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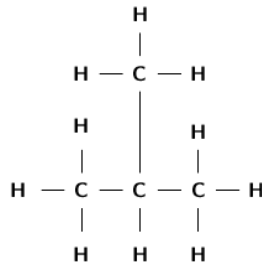
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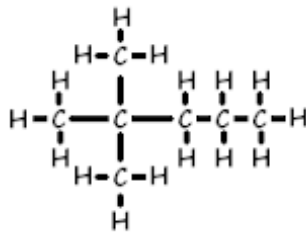
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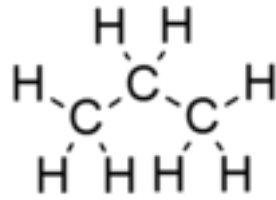
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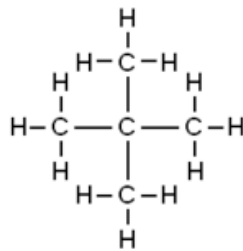
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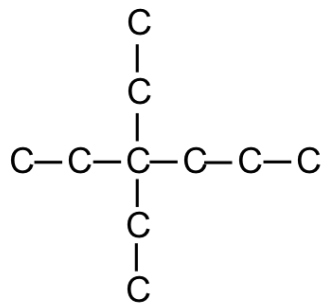
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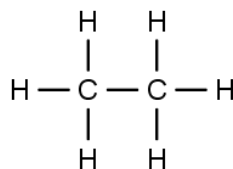
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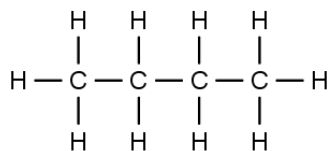
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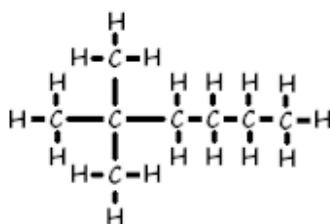
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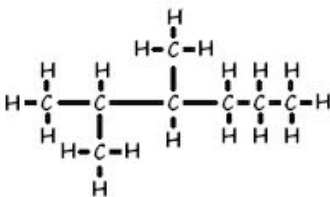
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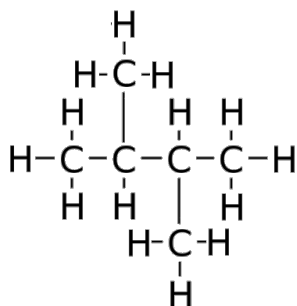
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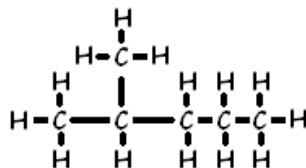
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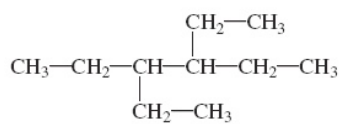
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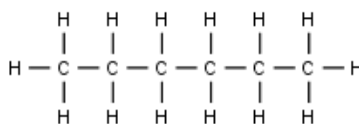
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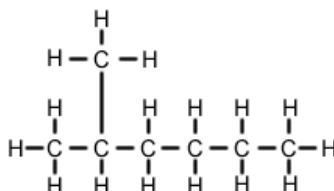
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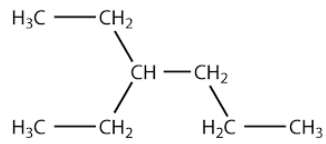
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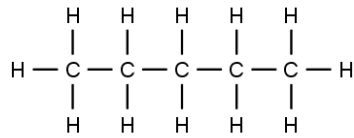
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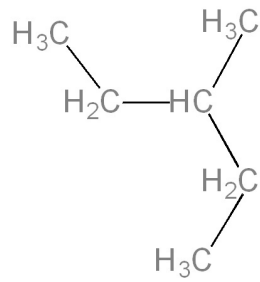
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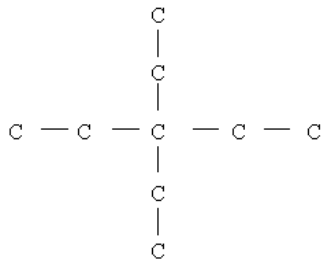
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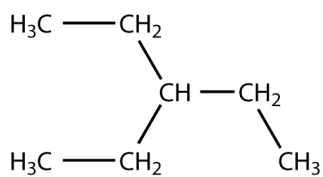
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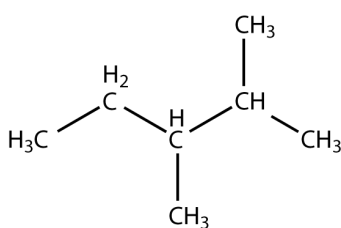
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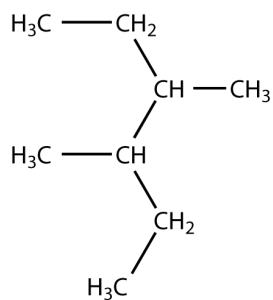
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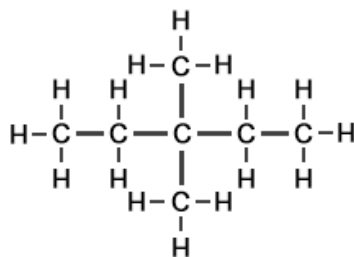
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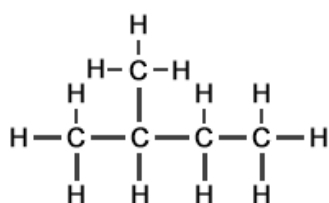
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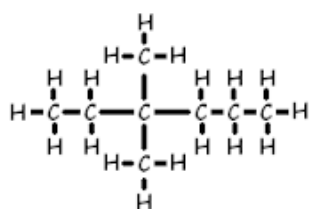
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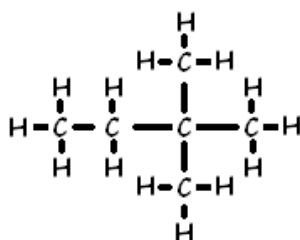
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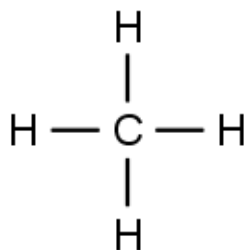
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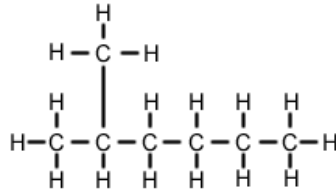
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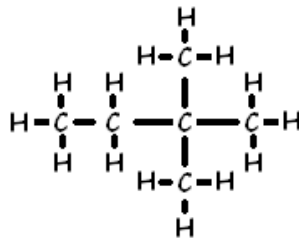
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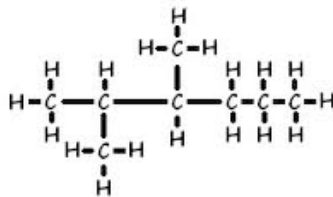
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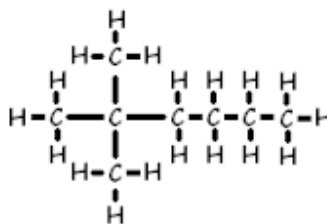
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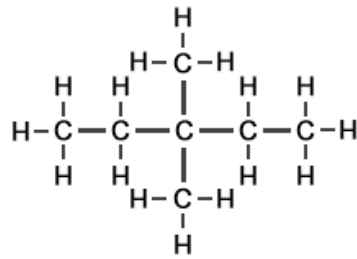
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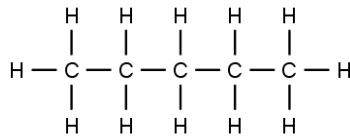
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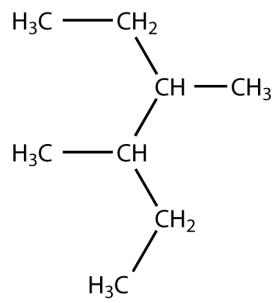
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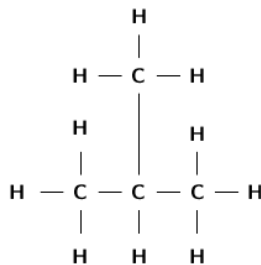
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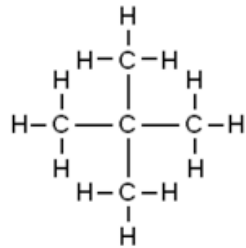
methylpropan



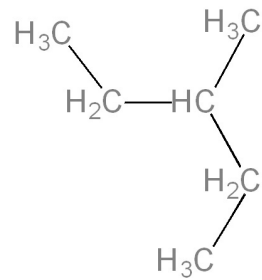
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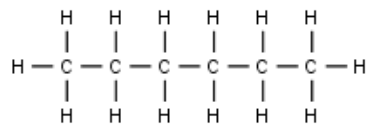
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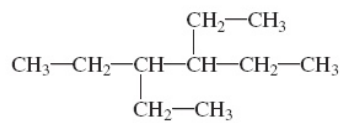
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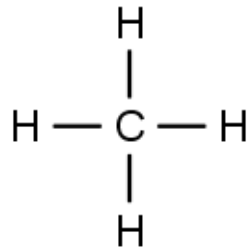
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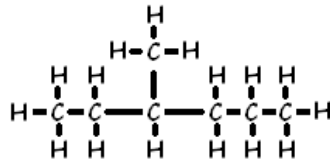
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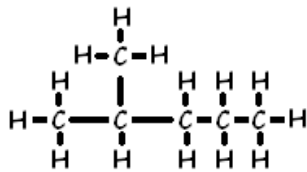
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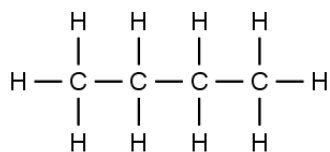
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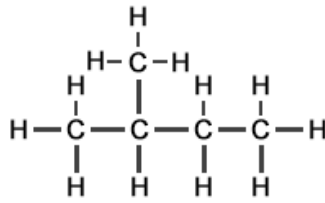
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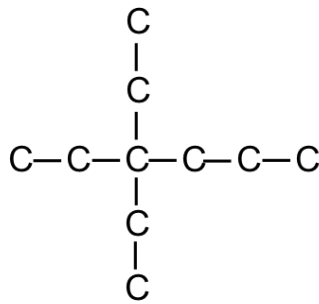
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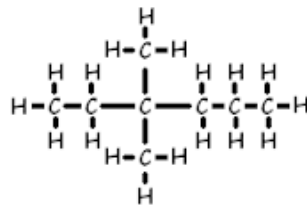
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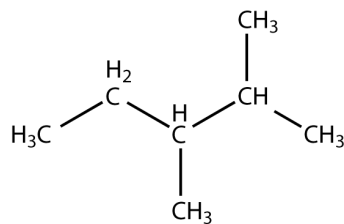
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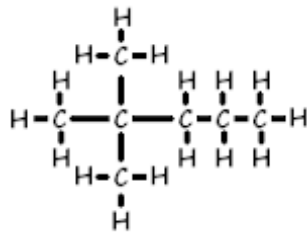
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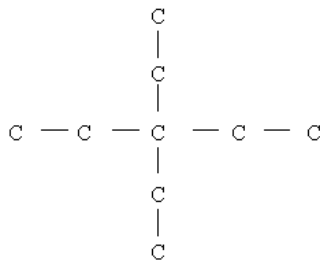
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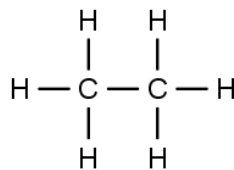
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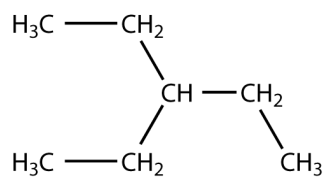
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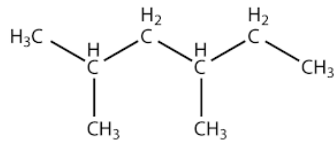
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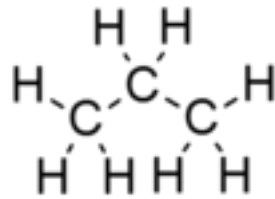
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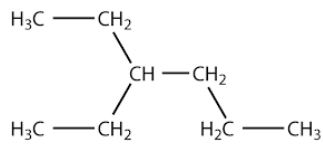
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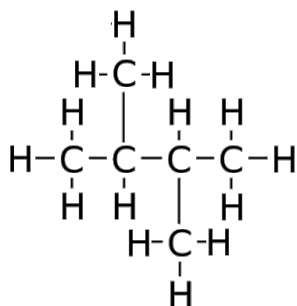
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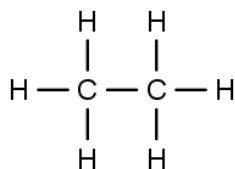
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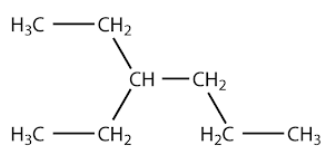
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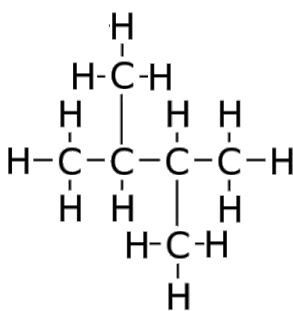
methaan



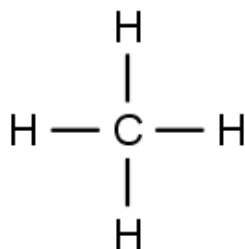
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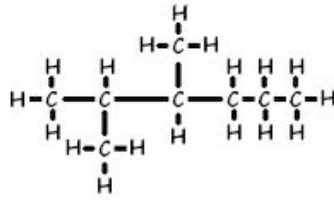
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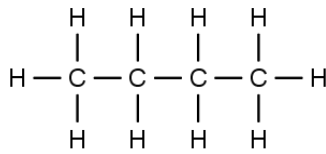
butaan



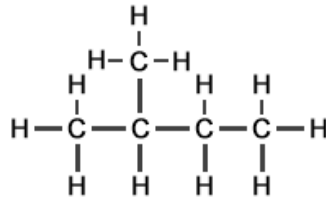
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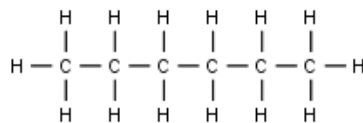
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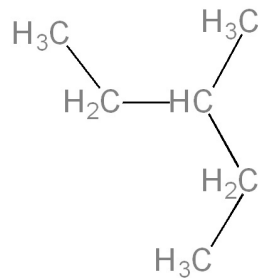
methylpropan



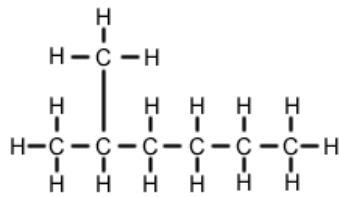
dimethylpropan



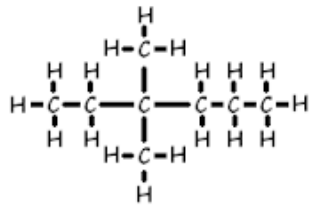
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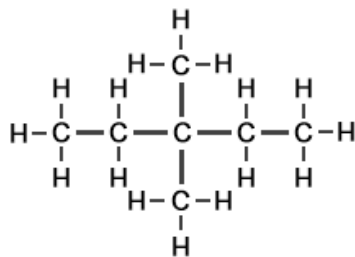
2,2-dimethylbutaan



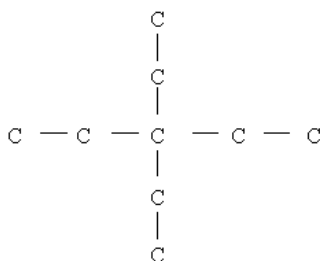
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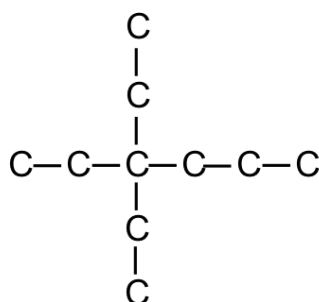
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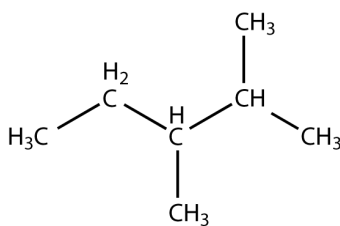
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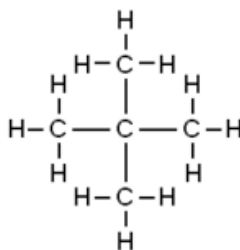
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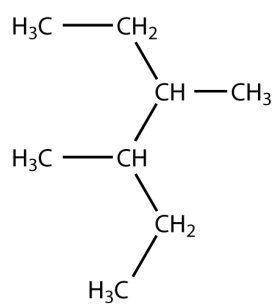
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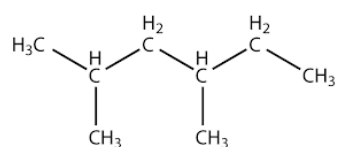
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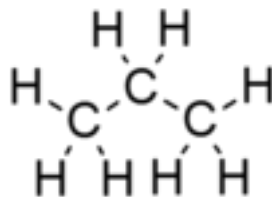
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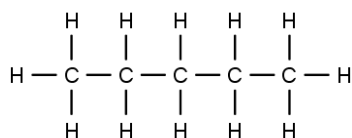
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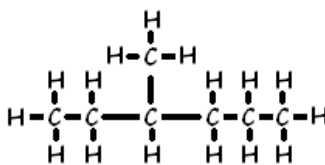
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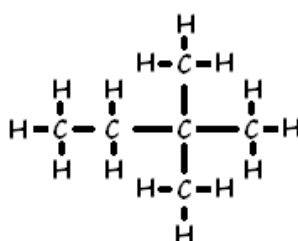
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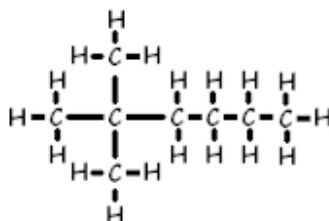
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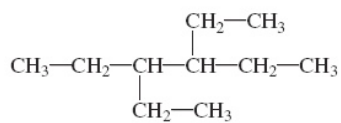
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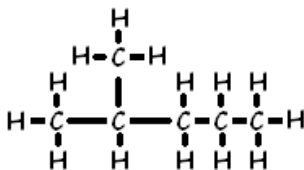
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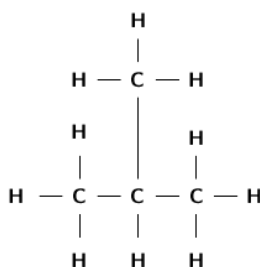
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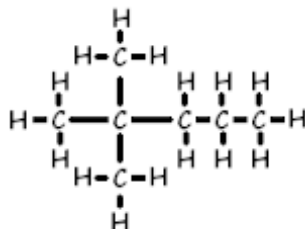
3,3-dimethylhexaan



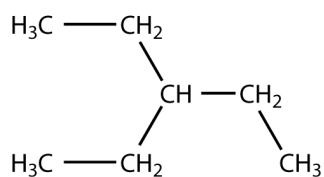
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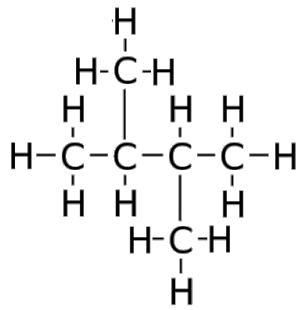
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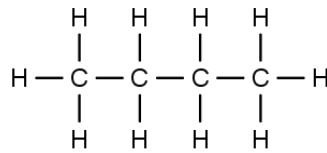
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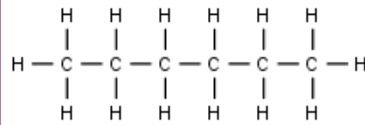
methaan



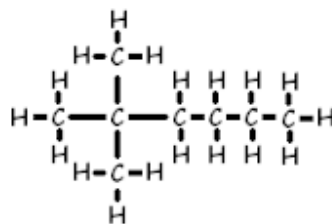
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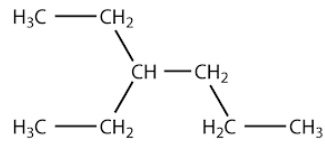
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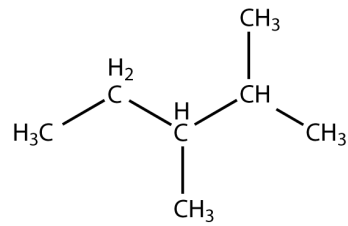
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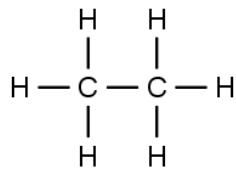
pentaan



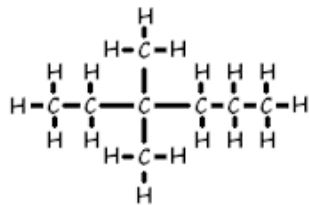
hexaan



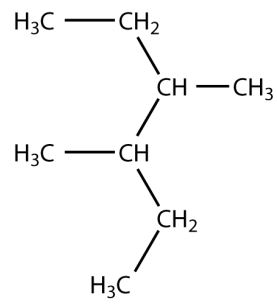
methylpropan



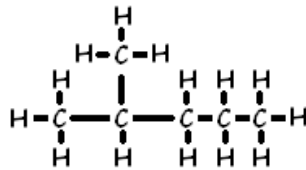
dimethylpropan



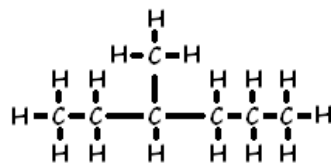
methylbutaan



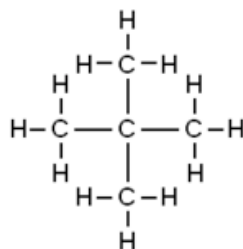
2,2-dimethylbutaan



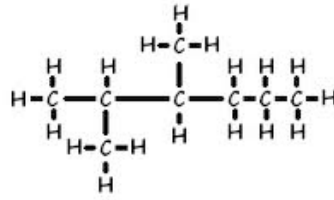
2,3-dimethylbutaan



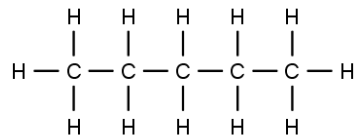
2-methylpentaan



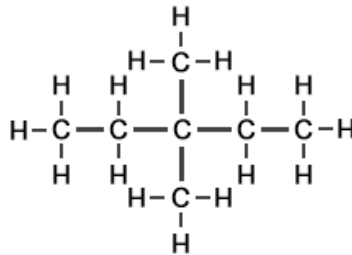
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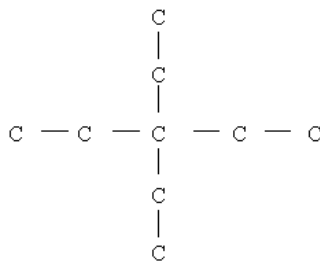
ethylpentaan



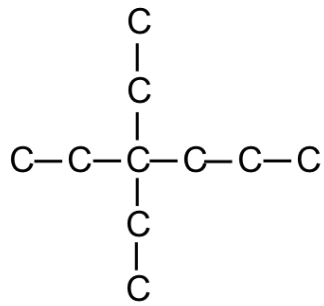
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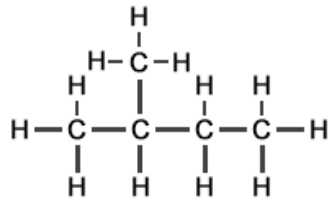
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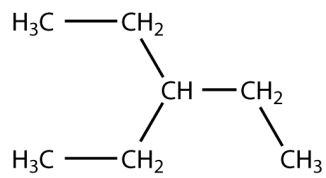
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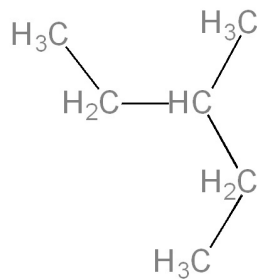
diethylpentaan



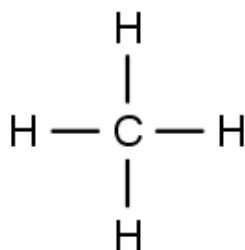
2-methylhexaan



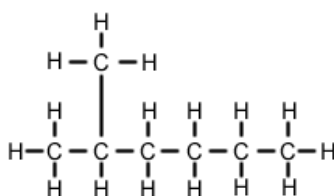
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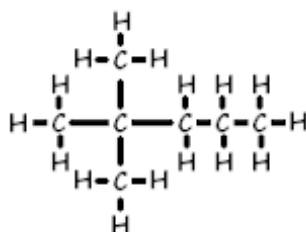
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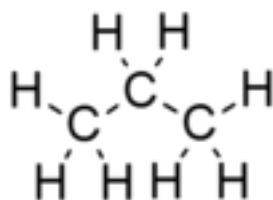
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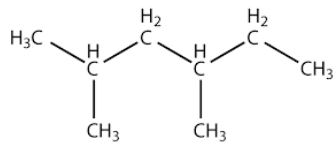
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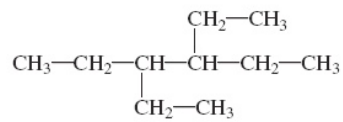
2,4-dimethylhexaan



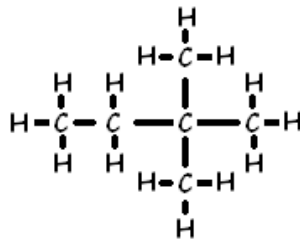
3,3-dimethylhexaan



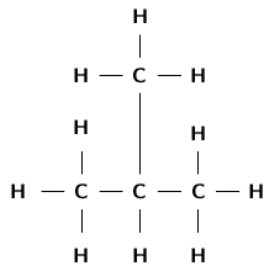
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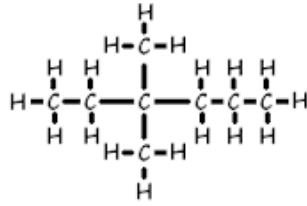
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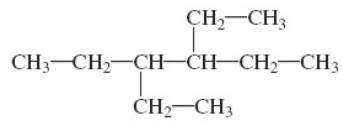
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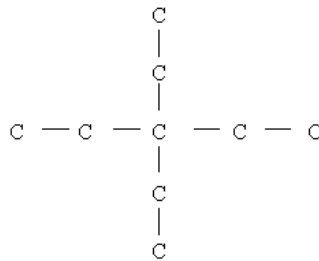
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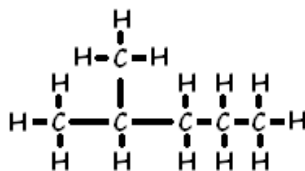
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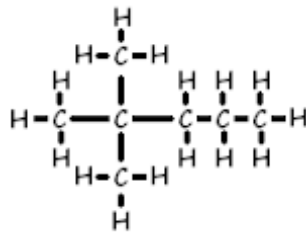
propaan



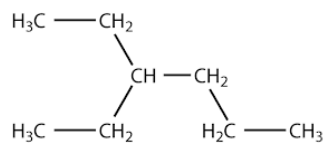
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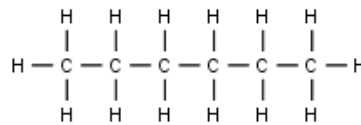
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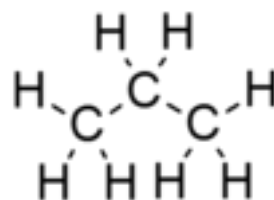
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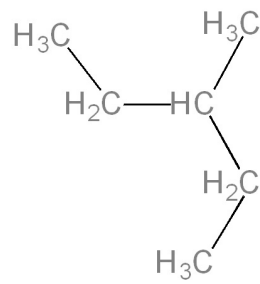
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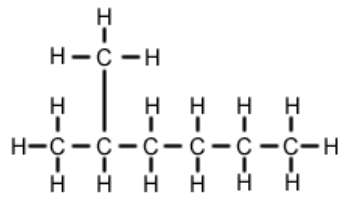
dimethylpropan



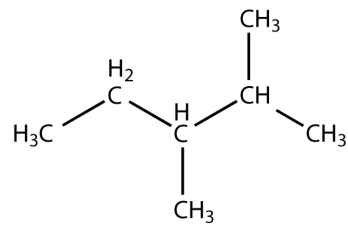
methylbutaan



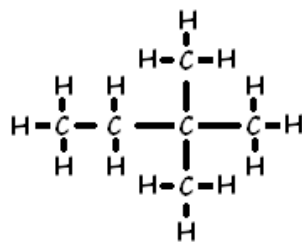
2,2-dimethylbutaan



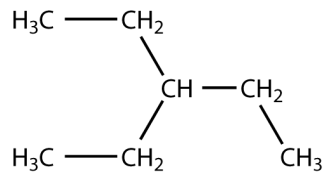
2,3-dimethylbutaan



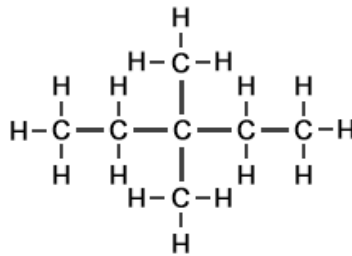
2-methylpentaan



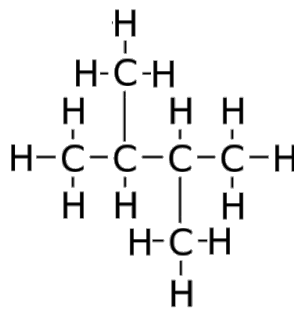
3-methylpentaan



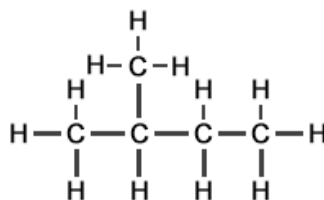
ethylpentaan



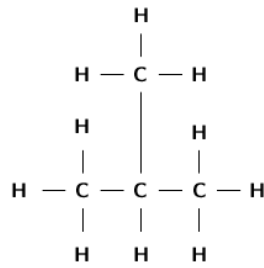
2,2-dimethylpentaan



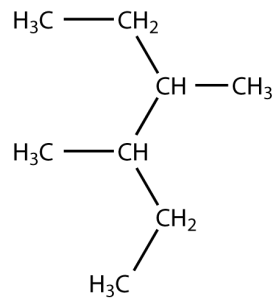
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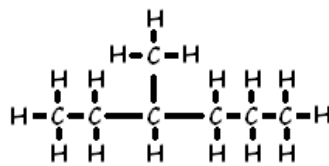
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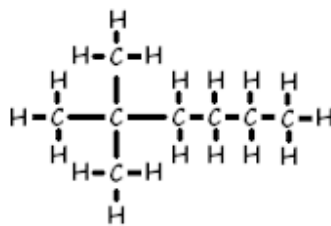
diethylpentaan



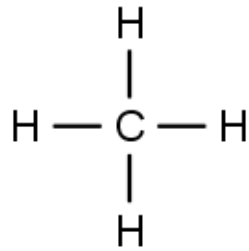
2-methylhexaan



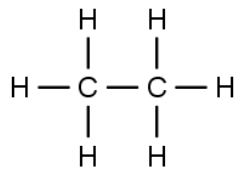
3-methylhexaan



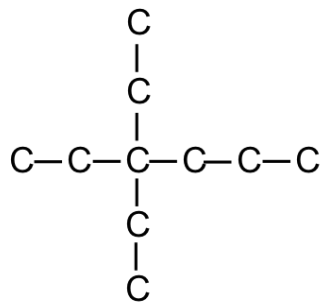
ethylhexaan



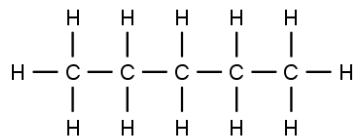
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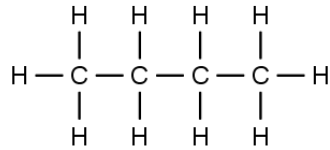
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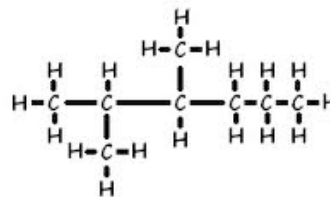
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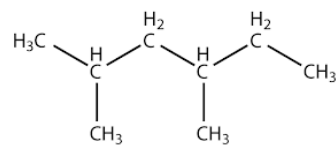
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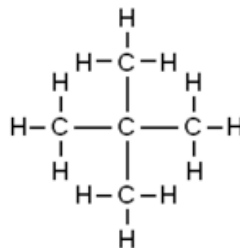
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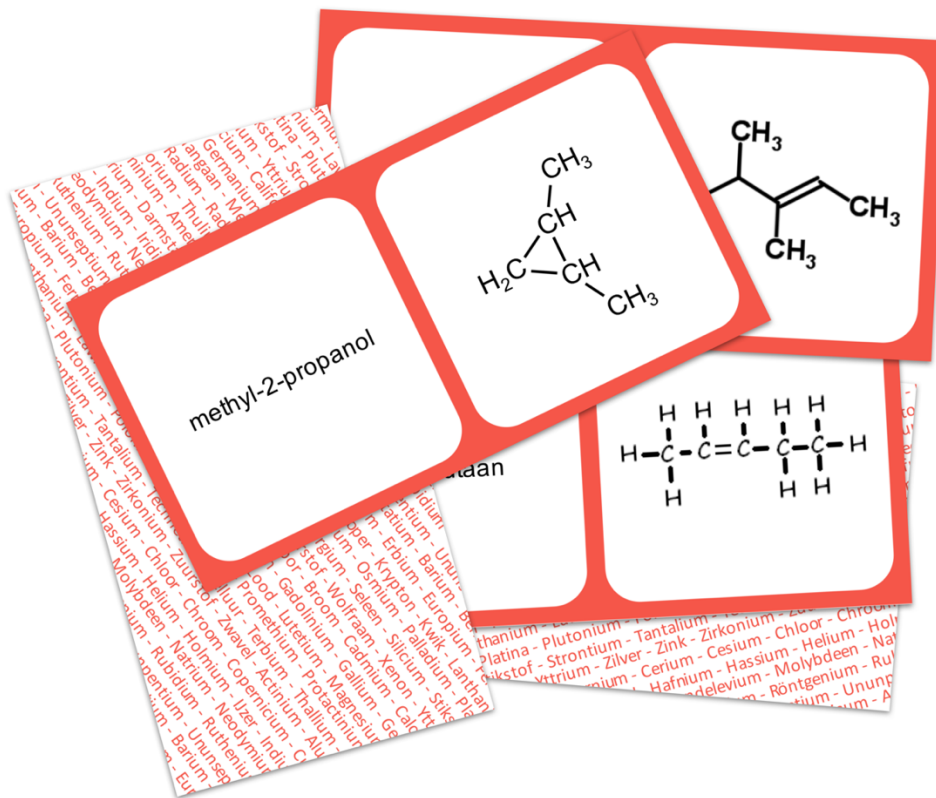
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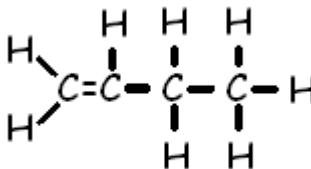
3,4-diethylhexaan



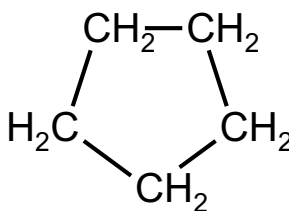
Uitbereiding Alkanenslang oude naamgeving!



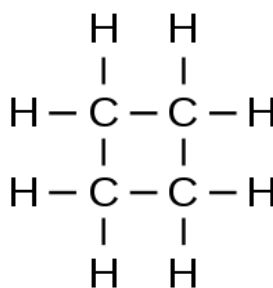
2,2,3-trimethylbutaan



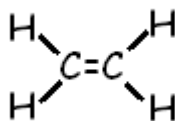
2,2,4-trimethylpentaan



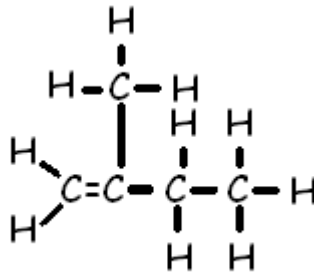
ethyl-2-methylpentaan



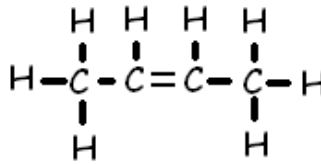
2-methyl-4-ethylhexaan



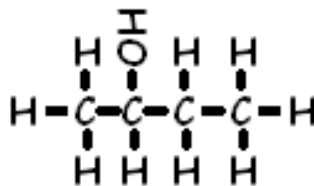
etheen



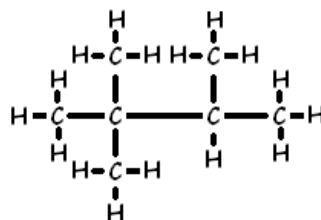
propeen



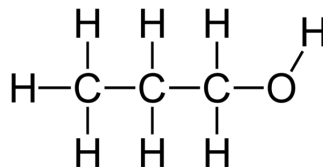
1-buteen



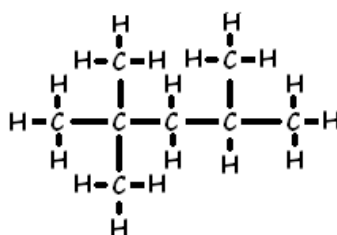
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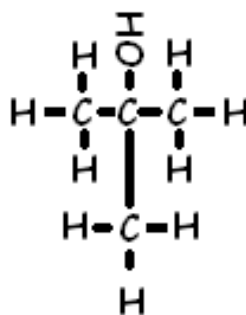
2-penteen



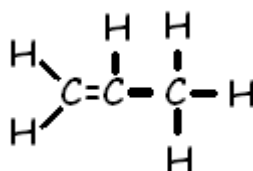
2-methyl-1-buteen



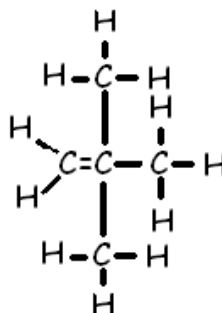
2,2-dimethylpropeen



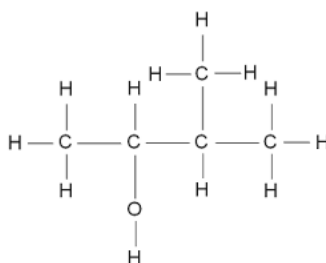
3,4-dimethyl-
2-penteen



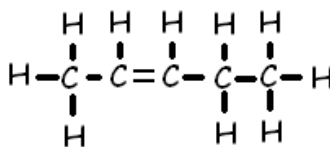
cyclobutaan



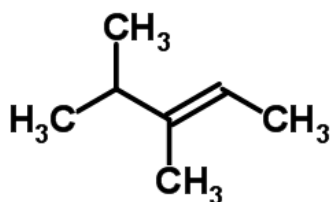
cyclopentaan



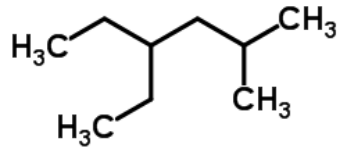
methylcyclobutaan



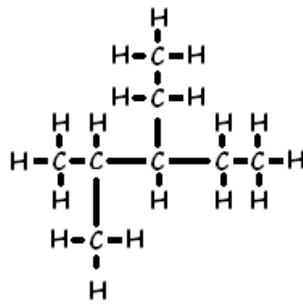
1,2-dimethyl
cyclopropan



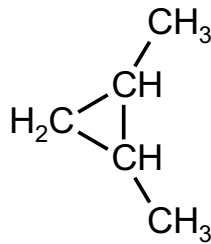
2-butanol



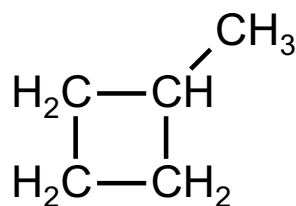
1-propanol



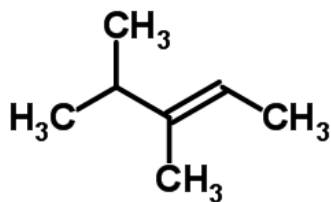
methyl-2-propanol



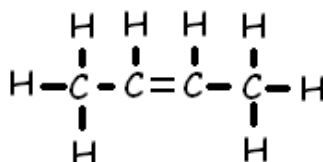
3-methyl-2-butanol



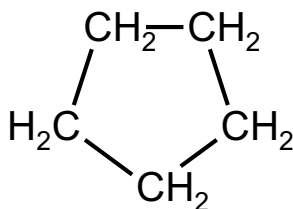
2,2,3-trimethylbutaan



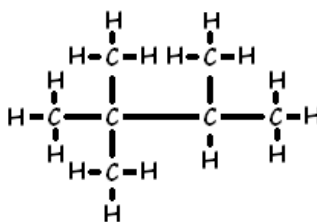
2,2,4-trimethylpentaan



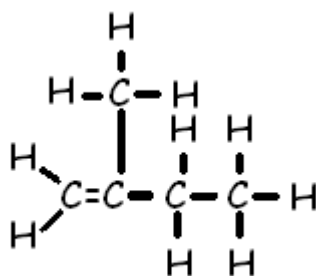
ethyl-2-methylpentaan



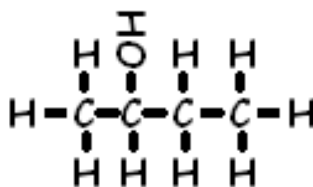
2-methyl-4-ethylhexaan



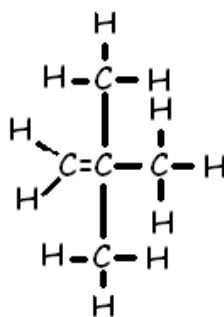
etheen



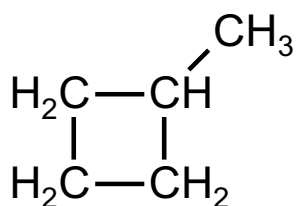
propeen



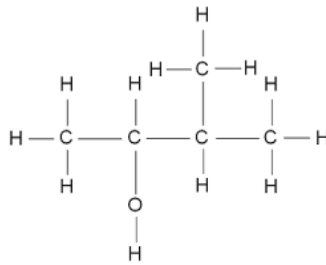
1-buteen



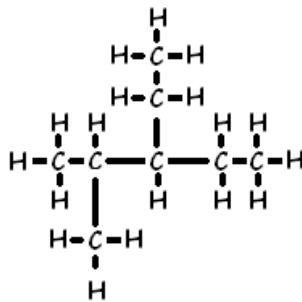
2-buteen



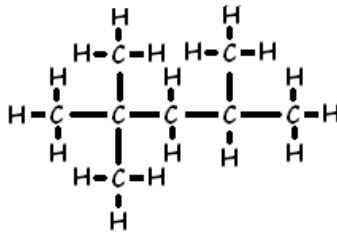
2-penteen



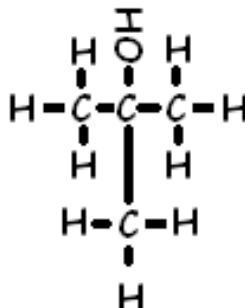
2-methyl-1-buteen



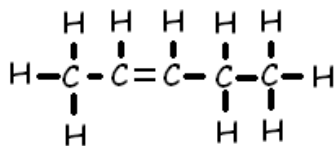
2,2-dimethylpropeen



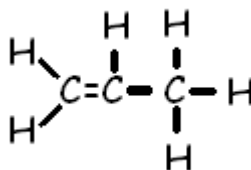
3,4-dimethyl-
2-penteen



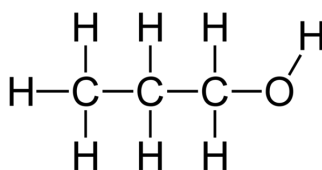
cyclobutaan



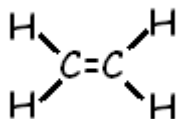
cyclopentaan



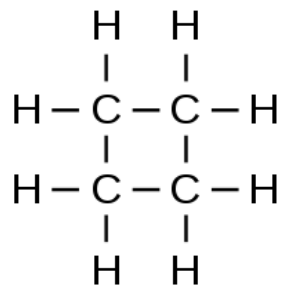
methylcyclobutaan



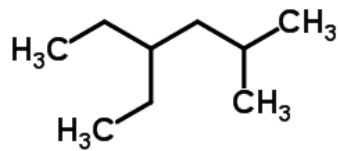
1,2-dimethyl
cyclopropan



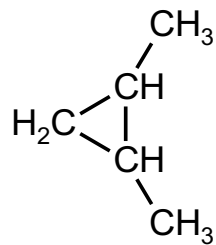
2-butanol



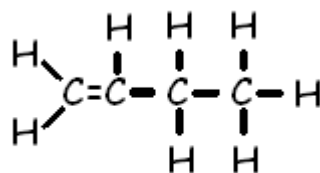
1-propanol



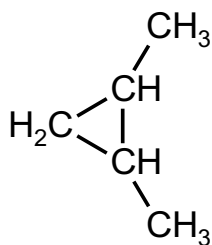
methyl-2-propanol



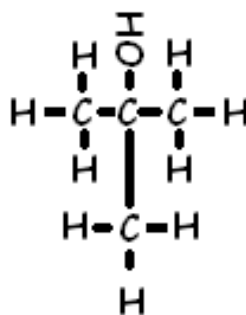
3-methyl-2-butanol



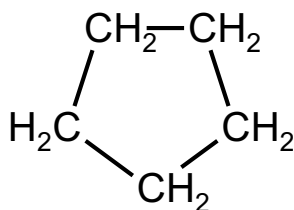
2,2,3-trimethylbutaan



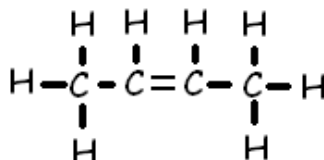
2,2,4-trimethylpentaan



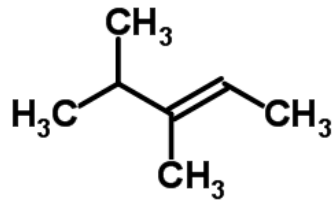
ethyl-2-methylpentaan



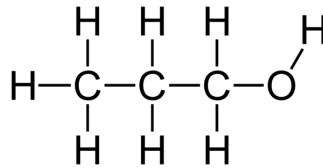
2-methyl-4-ethylhexaan



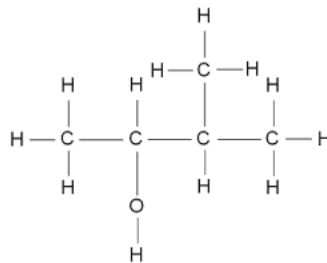
etheen



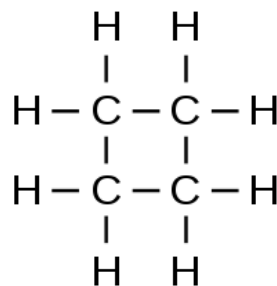
propeen



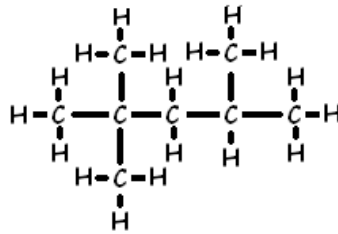
1-buteen



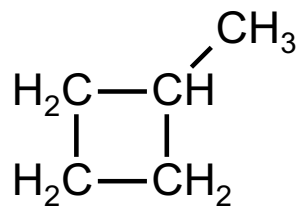
2-buteen



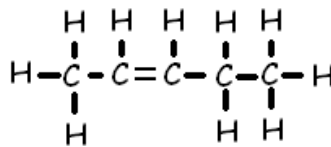
2-penteen



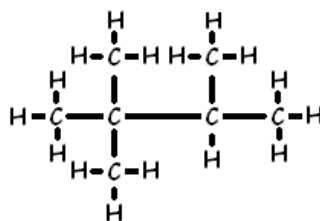
2-methyl-1-buteen



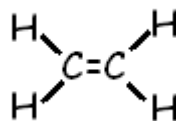
2,2-dimethylpropeen



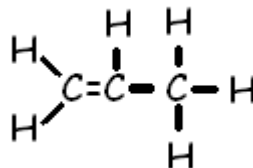
3,4-dimethyl-
2-penteen



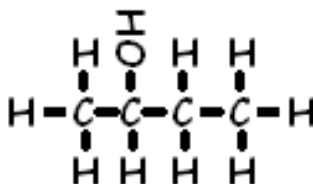
cyclobutaan



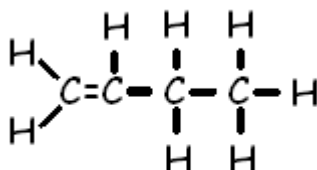
cyclopentaan



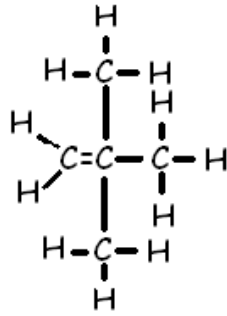
methylcyclobutaan



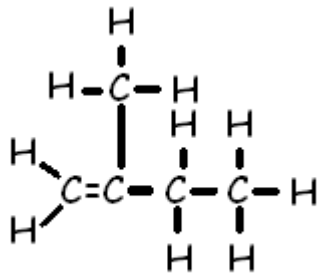
1,2-dimethyl
cyclopropan



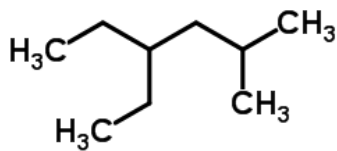
2-butanol



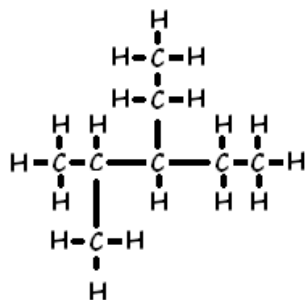
1-propanol



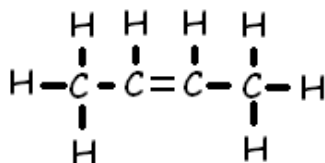
methyl-2-propanol



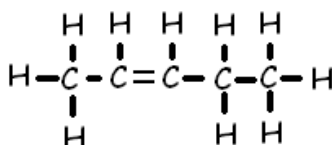
3-methyl-2-butanol



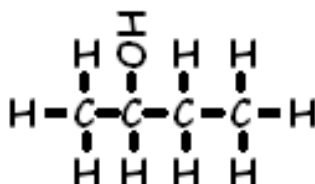
2,2,3-trimethylbutaan



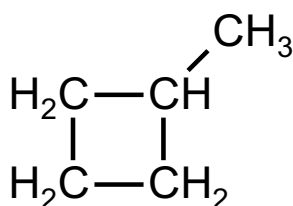
2,2,4-trimethylpentaan



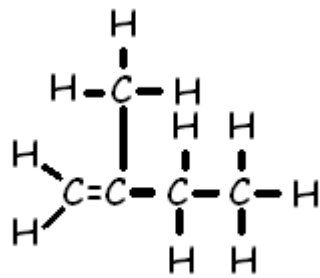
ethyl-2-methylpentaan



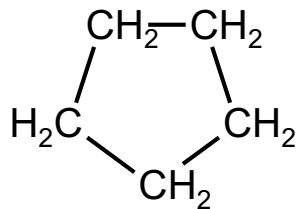
2-methyl-4-ethylhexaan



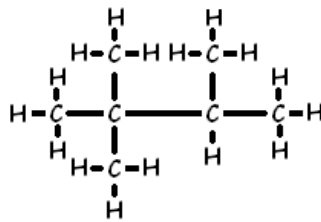
etheen



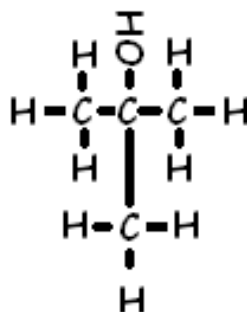
propeen



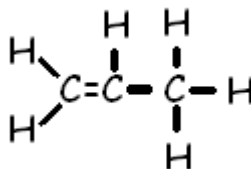
1-buteen



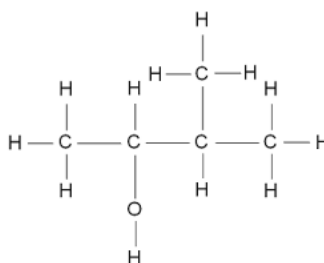
2-buteen



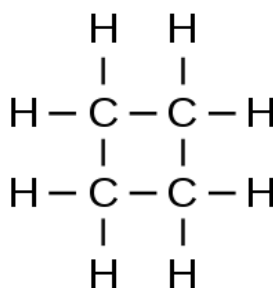
2-penteen



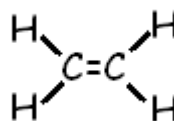
2-methyl-1-buteen



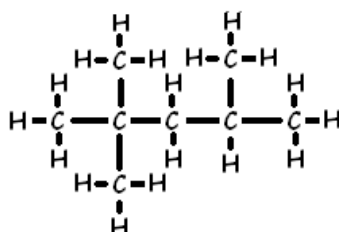
2,2-dimethylpropeen



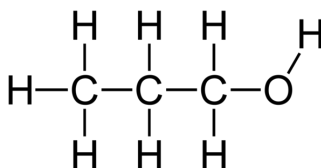
3,4-dimethyl-
2-penteen



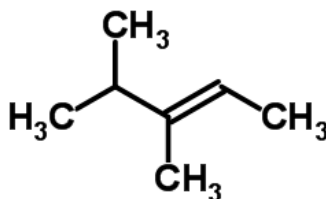
cyclobutaan



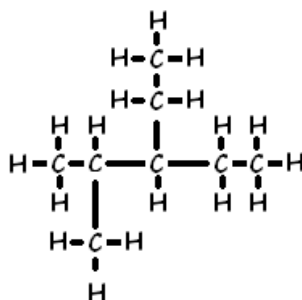
cyclopentaan



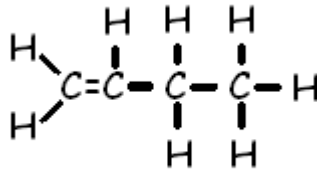
methylcyclobutaan



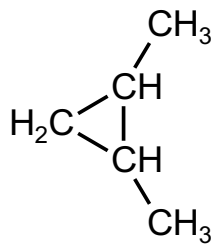
1,2-dimethyl
cyclopropan



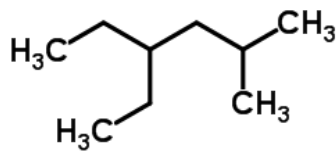
2-butanol



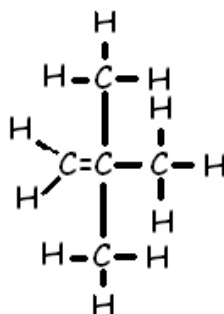
1-propanol



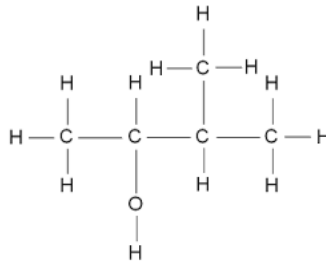
methyl-2-propanol



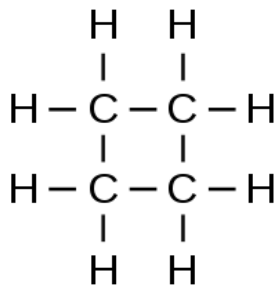
3-methyl-2-butanol



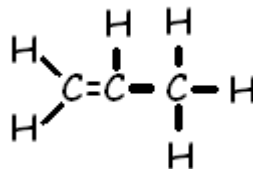
2,2,3-trimethylbutaan



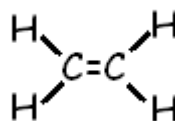
2,2,4-trimethylpentaan



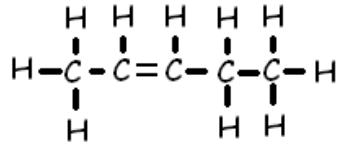
ethyl-2-methylpentaan



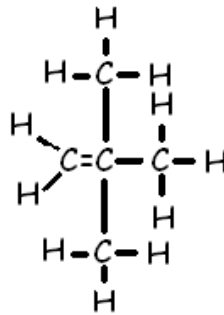
2-methyl-4-ethylhexaan



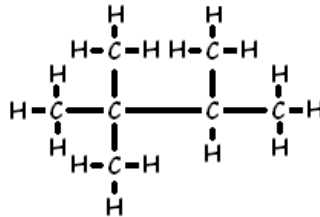
etheen



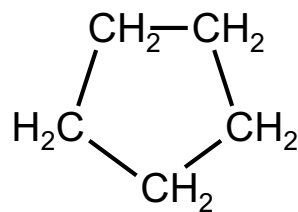
propeen



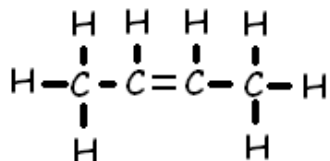
1-buteen



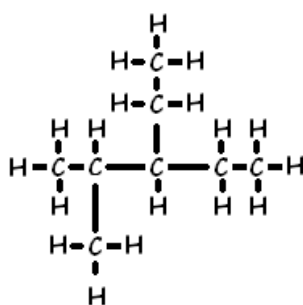
2-buteen



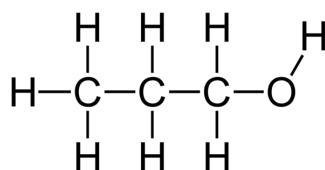
2-penteen



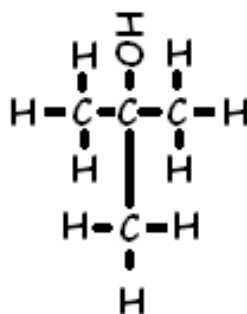
2-methyl-1-buteen



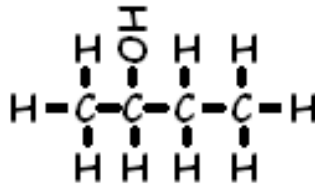
2,2-dimethylpropeen



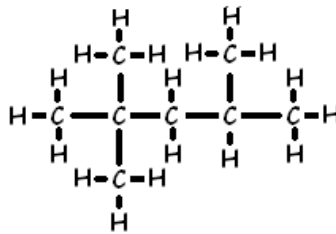
3,4-dimethyl-
2-penteen



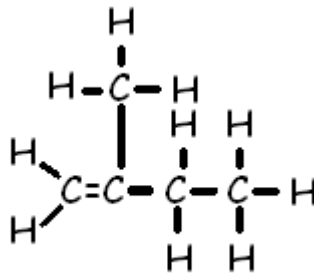
cyclobutaan



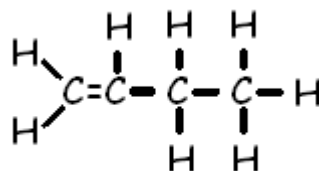
cyclopentaan



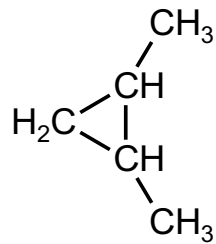
methylcyclobutaan



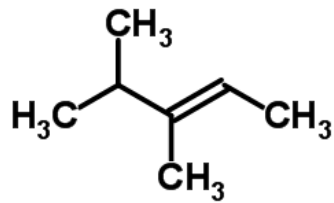
1,2-dimethyl
cyclopropan



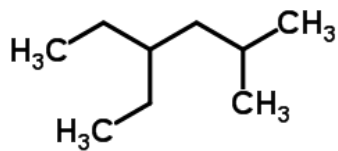
2-butanol



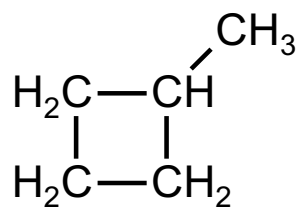
1-propanol



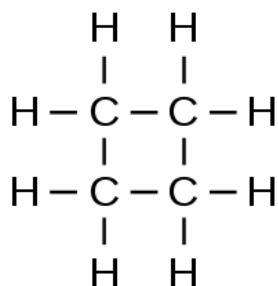
methyl-2-propanol



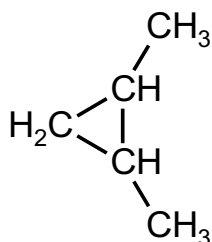
3-methyl-2-butanol



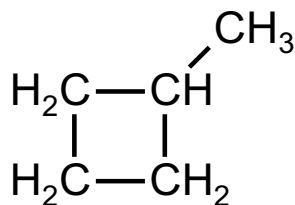
2,2,3-trimethylbutaan



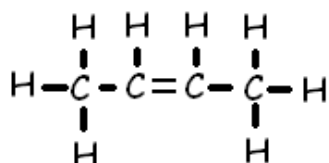
2,2,4-trimethylpentaan



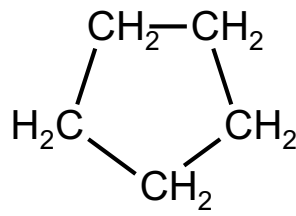
ethyl-2-methylpentaan



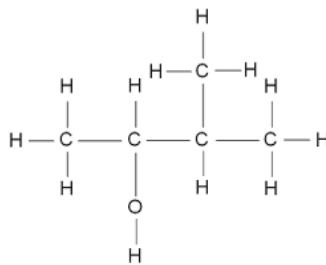
2-methyl-4-ethylhexaan



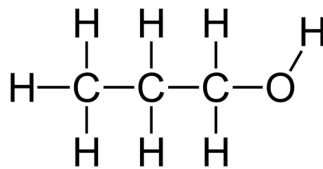
etheen



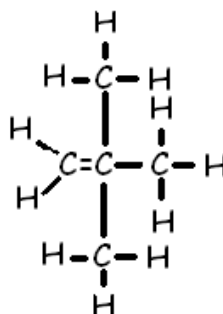
propeen



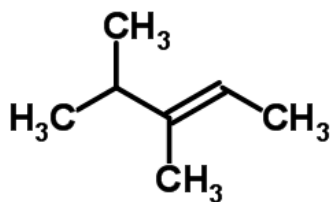
1-buteen



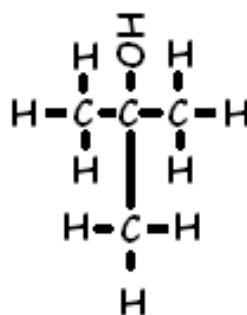
2-buteen



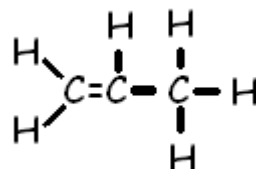
2-penteen



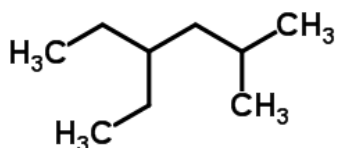
2-methyl-1-buteen



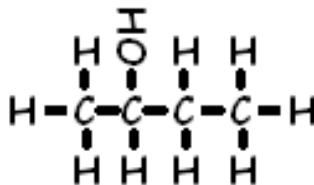
2,2-dimethylpropeen



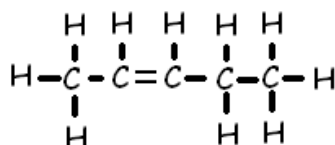
3,4-dimethyl-
2-penteen



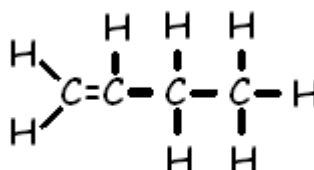
cyclobutaan



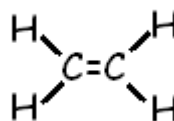
cyclopentaan



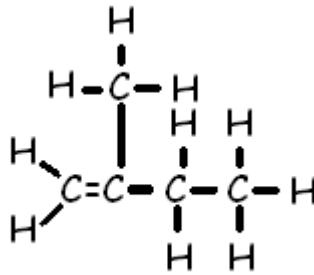
methylcyclobutaan



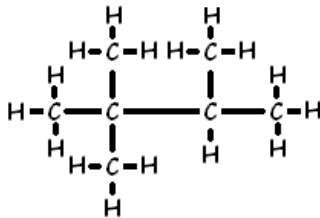
1,2-dimethyl
cyclopropaan



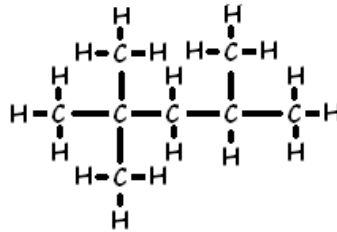
2-butanol



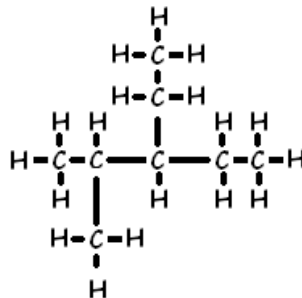
1-propanol



methyl-2-propanol



3-methyl-2-butanol



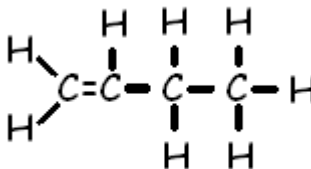
Uitbereiding Alkanenslang

IUPAC

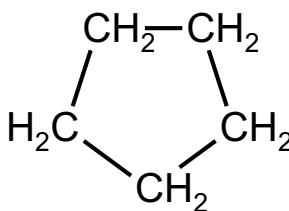
The image shows three overlapping red-bordered cards with white backgrounds, each containing a chemical structure and its name. The cards are tilted and overlap each other.

- Top-left card:** Contains the name "methyl-2-propanol".
- Top-right card:** Contains a skeletal structure of 2-methyl-2-butene, showing a four-carbon chain with a double bond between the second and third carbons, and a methyl group attached to the second carbon.
- Bottom-right card:** Contains a skeletal structure of pentane, showing a five-carbon chain with single bonds between all carbons, and hydrogen atoms attached to each carbon.

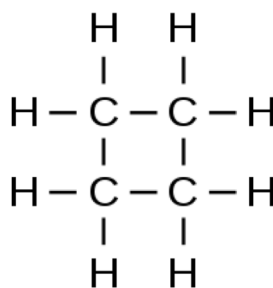
2,2,3-trimethylbutaan



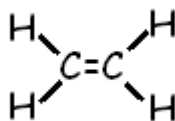
2,2,4-trimethylpentaan



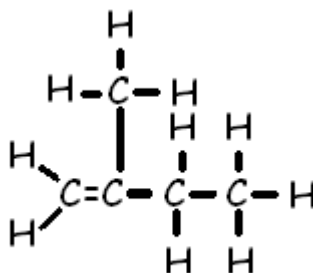
ethyl-2-methylpentaan



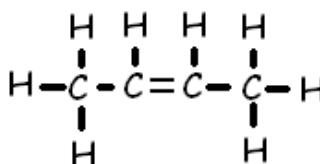
2-methyl-4-ethylhexaan



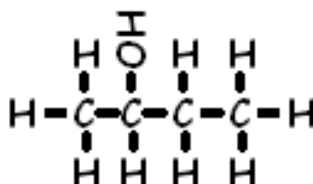
etheen



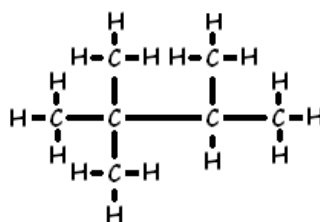
propene



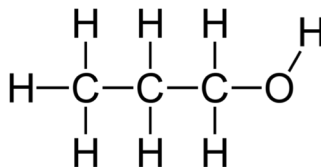
but-1-ene



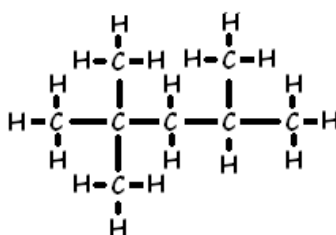
but-2-ene



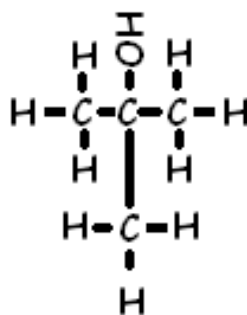
pent-2-een



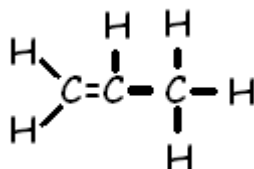
2-methylbut-1-een



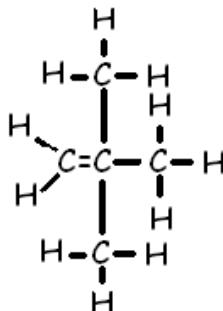
2,2-dimethylpropeen



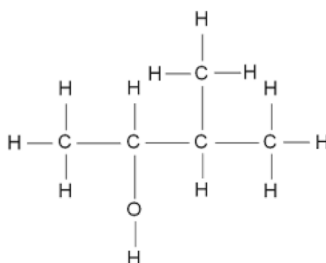
3,4-dimethyl-
pent-2-een



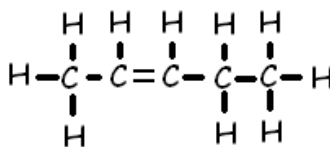
cyclobutaan



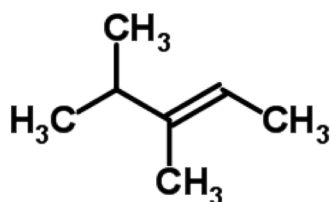
cyclopentaan



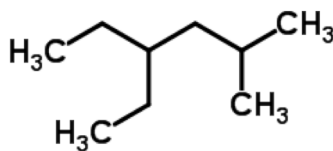
methylcyclobutaan



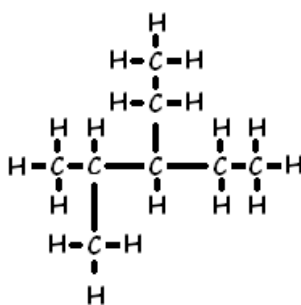
1,2-dimethyl-
cyclopropan



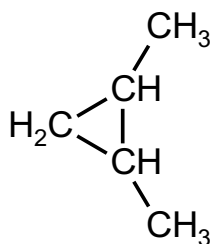
butaan-2-ol



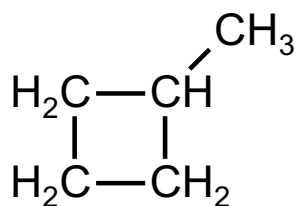
propaan-1-ol



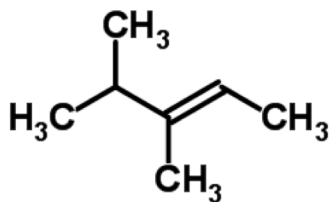
Methylpropan-2-ol



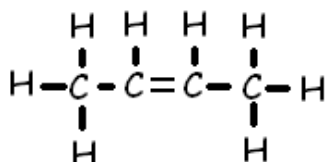
3-methylbutaan-2-ol



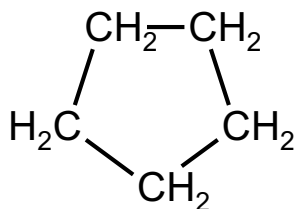
2,2,3-trimethylbutaan



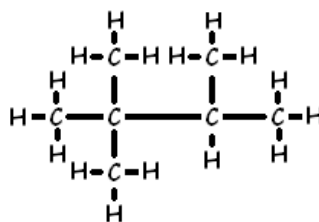
2,2,4-trimethylpentaan



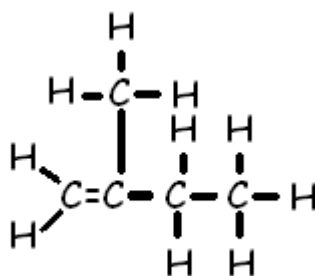
ethyl-2-methylpentaan



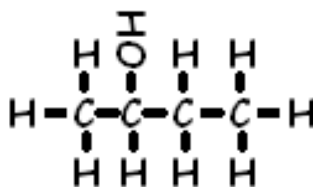
2-methyl-4-ethylhexaan



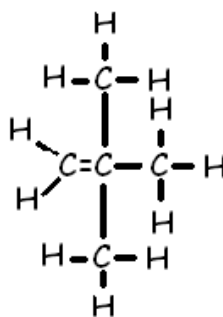
etheen



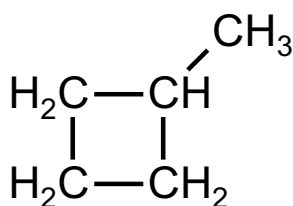
propeen



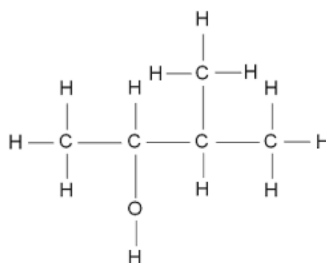
but-1-een



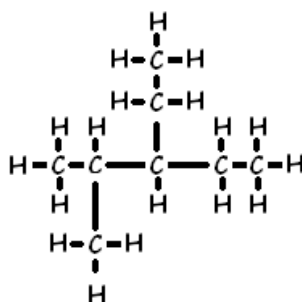
but-2-een



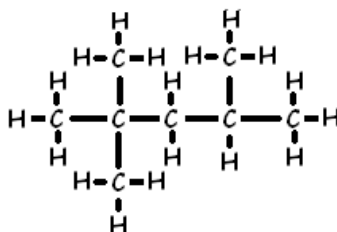
pent-2-een



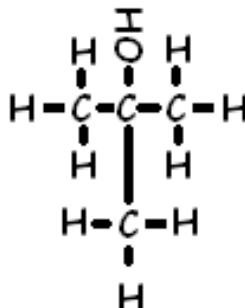
2-methylbut-1-een



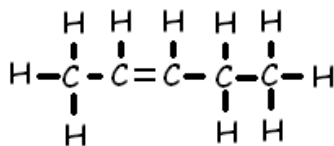
2,2-dimethylpropeen



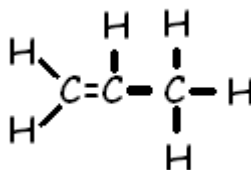
3,4-dimethyl-
pent-2-een



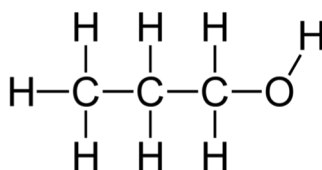
cyclobutaan



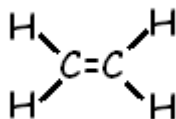
cyclopentaan



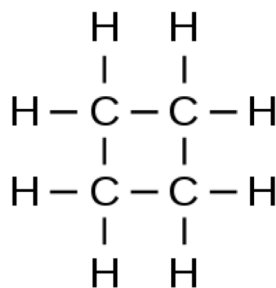
methylcyclobutaan



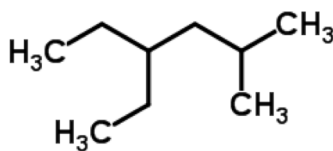
1,2-dimethyl-
cyclopropan



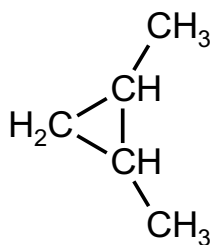
butaan-2-ol



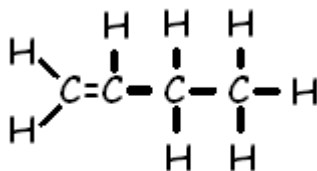
propaan-1-ol



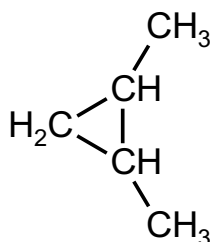
methylpropan-2-ol



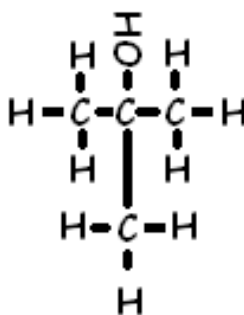
3-methylbutaan-2-ol



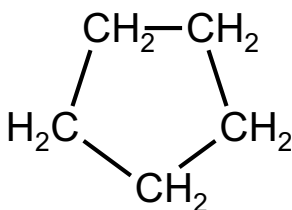
2,2,3-trimethylbutaan



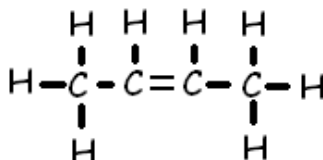
2,2,4-trimethylpentaan



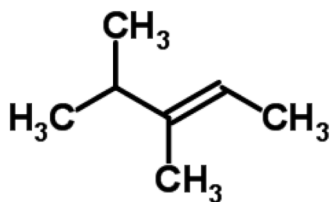
ethyl-2-methylpentaan



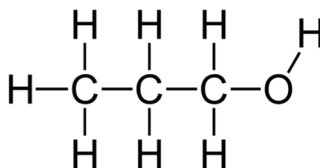
2-methyl-4-ethylhexaan



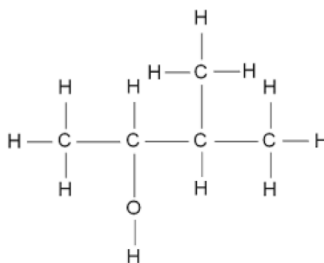
etheen



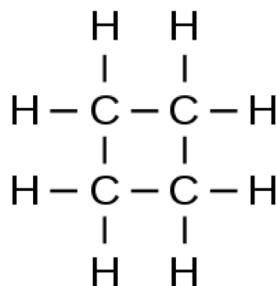
propeen



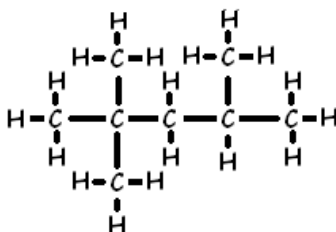
but-1-een



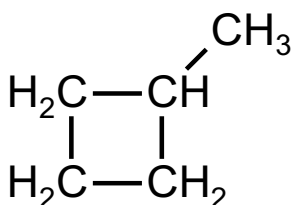
but-2-een



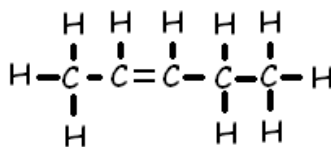
pent-2-een



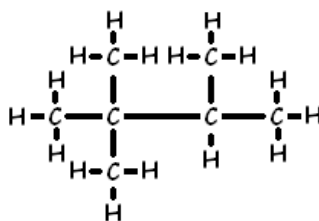
2-methylbut-1-een



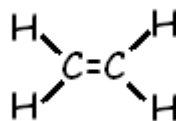
2,2-dimethylpropeen



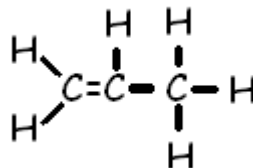
3,4-dimethyl-
pent-2-een



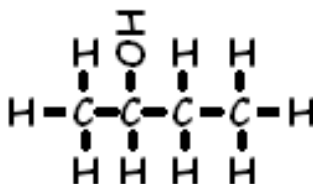
cyclobutaan



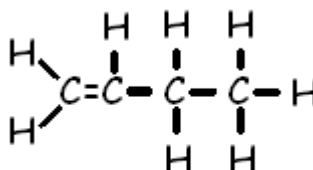
cyclopentaan



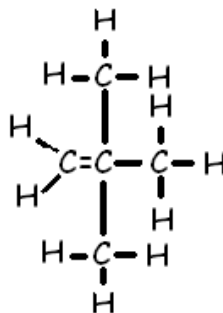
methylcyclobutaan



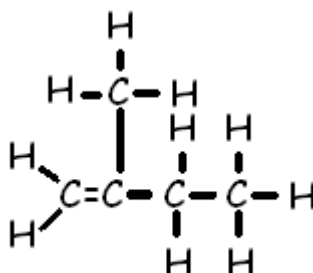
1,2-dimethyl-
cyclopropan



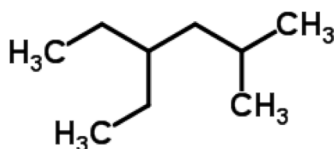
butaan-2-ol



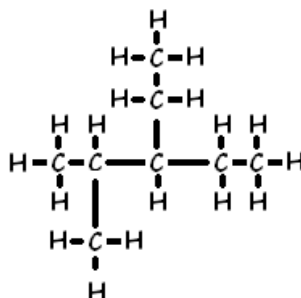
propaan-1-ol



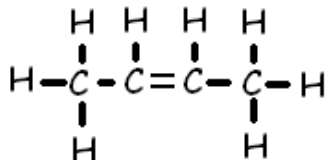
methylpropaan-2-ol



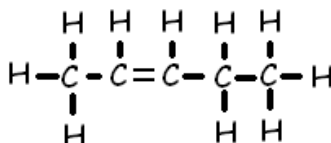
3-methylbutaan-2-ol



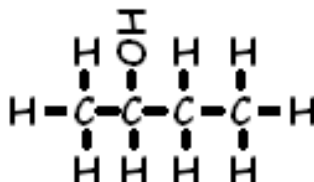
2,2,3-trimethylbutaan



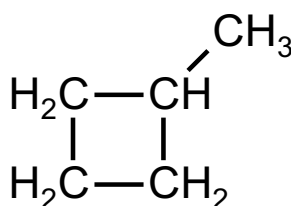
2,2,4-trimethylpentaan



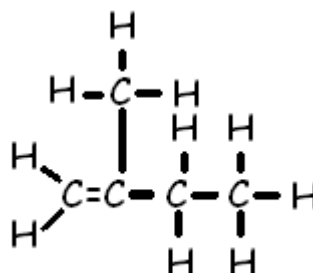
ethyl-2-methylpentaan



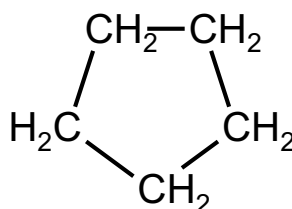
2-methyl-4-ethylhexaan



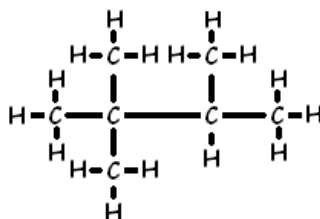
etheen



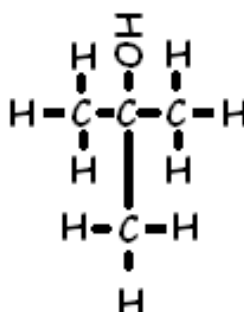
propeen



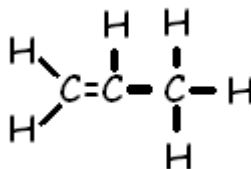
but-1-een



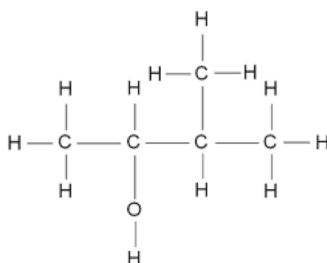
but-2-een



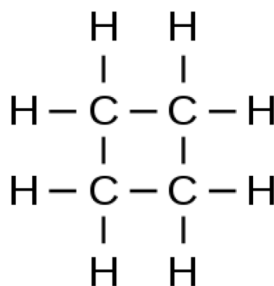
pent-2-een



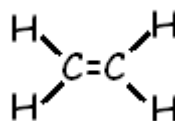
2-methylbut-1-een



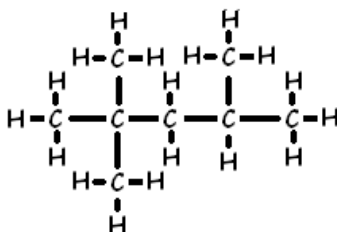
2,2-dimethylpropeen



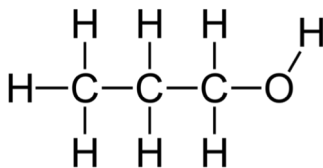
3,4-dimethyl-
pent-2-een



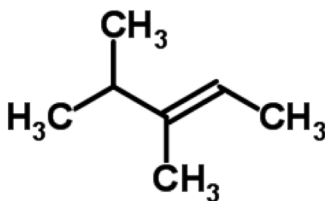
cyclobutaan



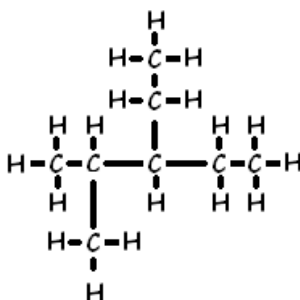
cyclopentaan



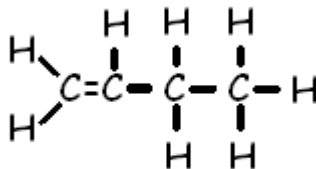
methylcyclobutaan



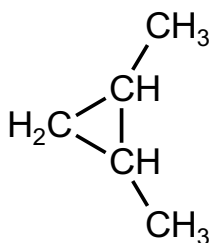
1,2-dimethyl-
cyclopropan



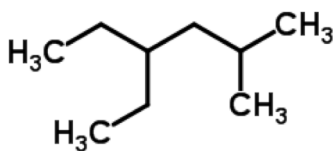
butaan-2-ol



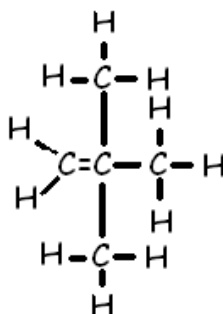
propaan-1-ol



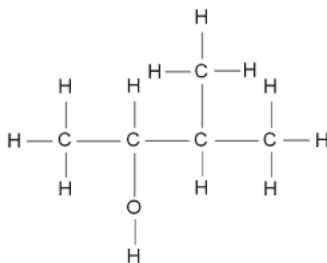
methylpropaan-2-ol



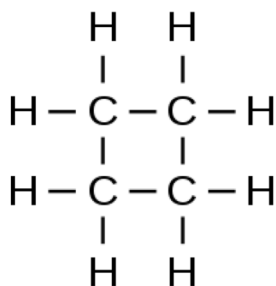
3-methylbutaan-2-ol



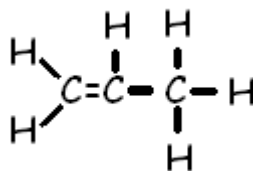
2,2,3-trimethylbutaan



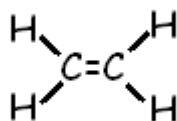
2,2,4-trimethylpentaan



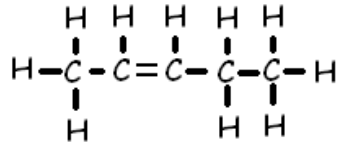
ethyl-2-methylpentaan



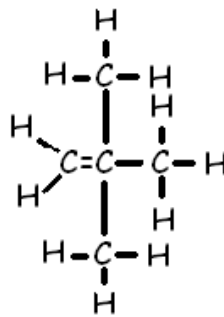
2-methyl-4-ethylhexaan



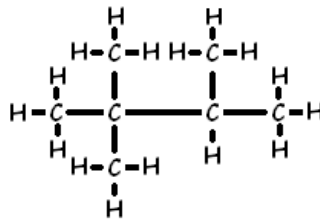
etheen



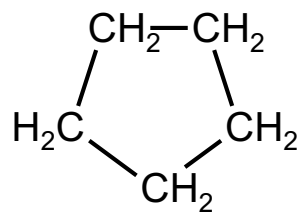
propeen



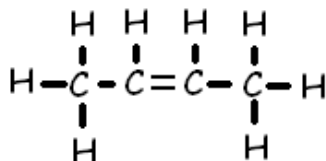
but-1-een



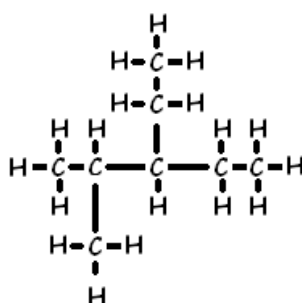
but-2-een



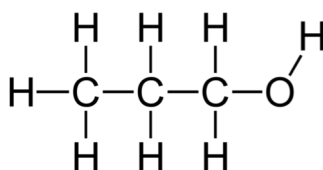
pent-2-een



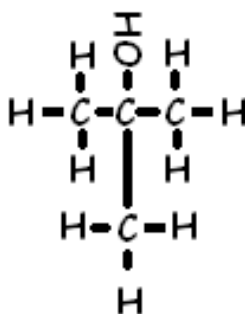
2-methylbut-1-een



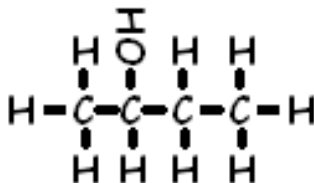
2,2-dimethylpropeen



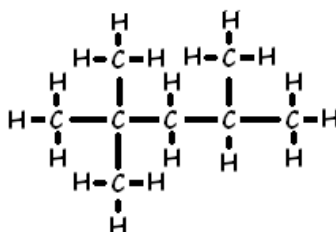
3,4-dimethyl-
pent-2-een



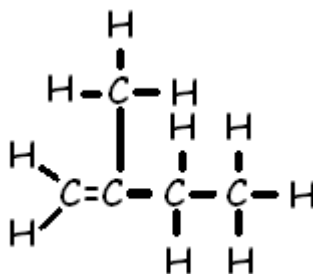
cyclobutaan



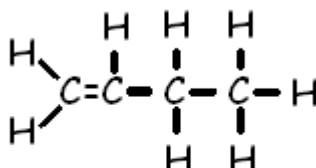
cyclopentaan



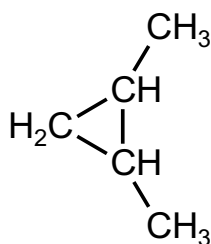
methylcyclobutaan



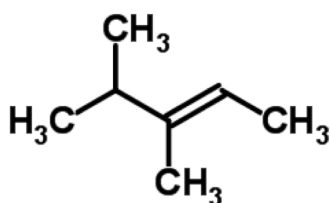
1,2-dimethyl-
cyclopropan



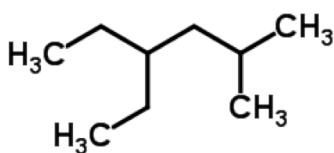
butaan-2-ol



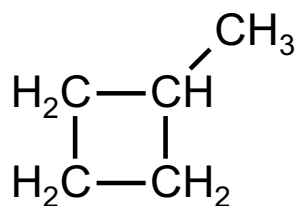
propaan-1-ol



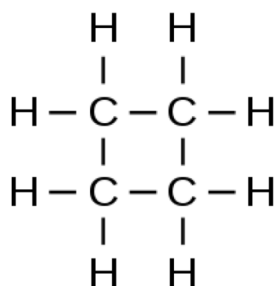
methylpropan-2-ol



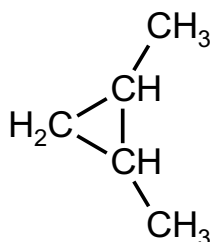
3-methylbutaan-2-ol



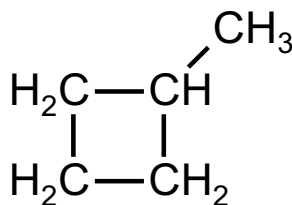
2,2,3-trimethylbutaan



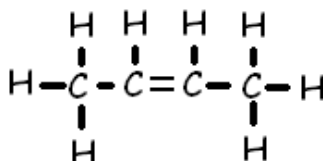
2,2,4-trimethylpentaan



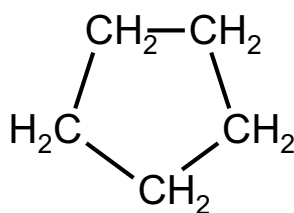
ethyl-2-methylpentaan



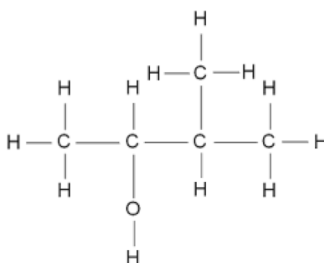
2-methyl-4-ethylhexaan



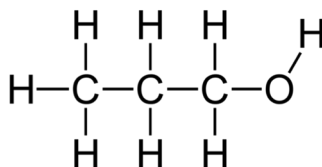
etheen



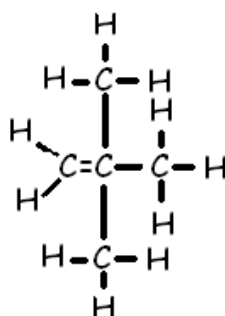
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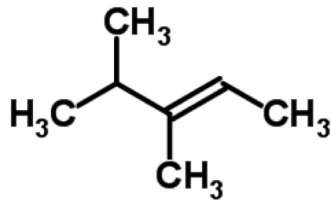
but-1-ene



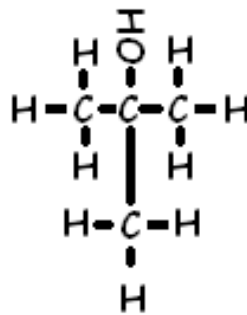
but-2-ene



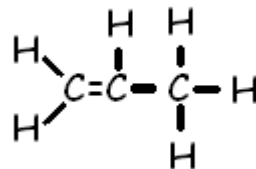
pent-2-een



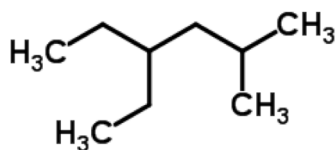
2-methylbut-1-een



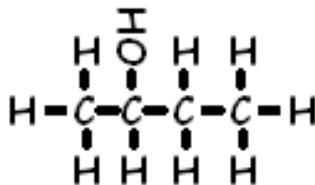
2,2-dimethylpropeen



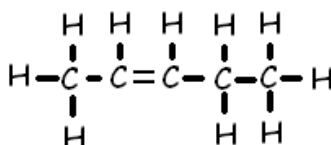
3,4-dimethyl-
pent-2-een



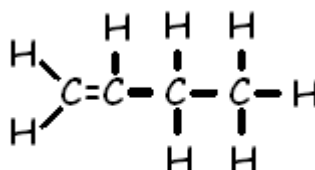
cyclobutaan



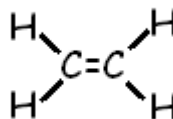
cyclopentaan



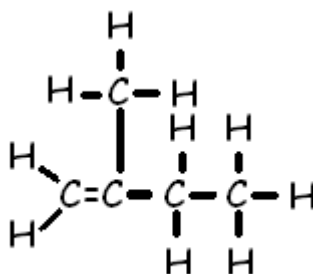
methylcyclobutaan



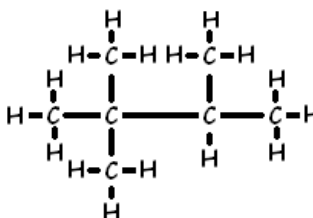
1,2-dimethyl-
cyclopropan



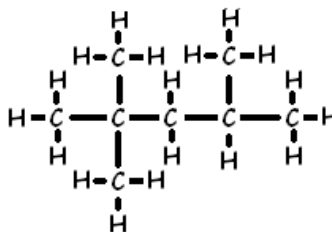
butaan-2-ol



propaan-1-ol



methylpropan-2-ol



3-methylbutaan-2-ol

