

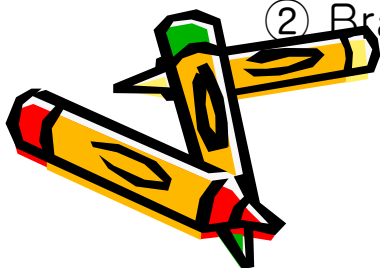
IUPAC Nomenclature of Alkanes



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1. IUPAC

- 계속된 과학의 발달로 인해 수많은 화합물이 알려지게 되고 그 동안 써오던 속명 혹은 관용명(common name)의 한계로 인해서 보다 체계적이고 수많은 화합물을 명명할 수 있는 방법이 필요해졌다.
- 국제 순수 및 화학 연합 IUPAC(International Union of and Pure Applied Chemistry)에 의해서 IUPAC 명명법이 고안됐다.



2. IUPAC 명명법의 구성

- 접두사(Prefix) + 모체(Parent) + 접미사(Suffix)

- 접두사 : 치환기의 위치
- 모 체 : 탄소 원자의 개수
- 접미사 : 작용기의 계열



IUPAC Nomenclature

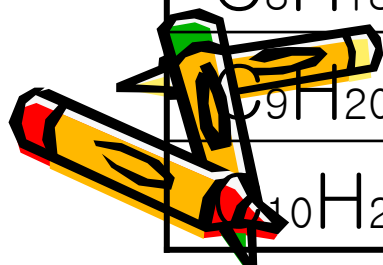
IUPAC nomenclature
of straight-chain
alkanes



Some Straight-Chain Alkanes and Alkyl Groups



분자식	이름	알킬기	알킬기의이름
CH ₄	methane	CH ₃ -	methyl
C ₂ H ₆	ethane	C ₂ H ₅ -	ethyl
C ₃ H ₈	propane	C ₃ H ₇ -	propyl
C ₄ H ₁₀	n-butane	C ₄ H ₉ -	n-butyl
C ₅ H ₁₂	n-pentane	C ₅ H ₁₁ -	n-pentyl
C ₆ H ₁₄	n-hexane	C ₆ H ₁₃ -	n-hexyl
C ₇ H ₁₆	n-heptane	C ₇ H ₁₅ -	n-heptyl
C ₈ H ₁₈	n-octane	C ₈ H ₁₇ -	n-octyl
C ₉ H ₂₀	n-nonane	C ₉ H ₁₉ -	n-nonyl
C ₁₀ H ₂₂	n-decane	C ₁₀ H ₂₁ -	n-decyl



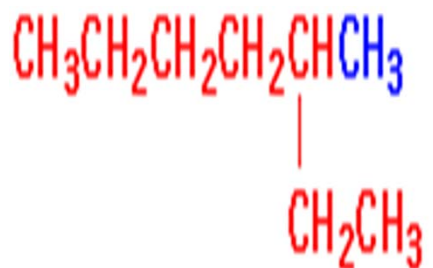
IUPAC Nomenclature

IUPAC nomenclature
of Branched-chain
alkanes



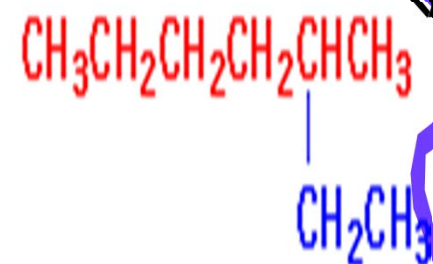
1. 1단계

- ① 분자내에 존재하는 탄소 원자의 가장 긴 연속된 사슬을 찾아서 모체의 이름으로 사용한다.



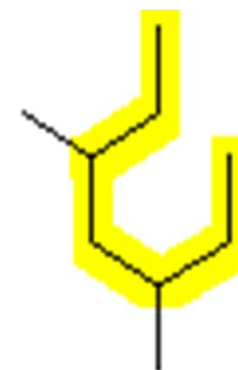
a Methylheptane

heptane



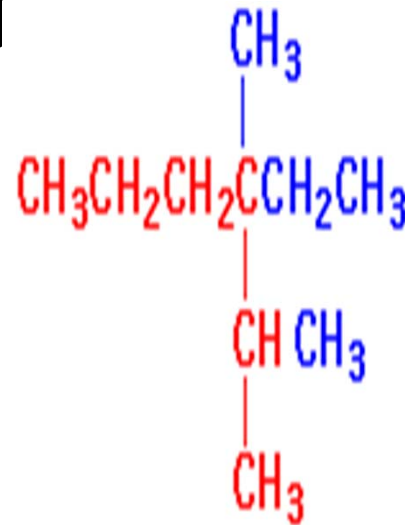
not an Ethylhexane

hexane

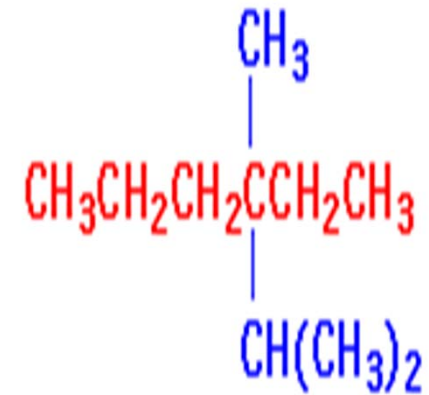


1. 1단계

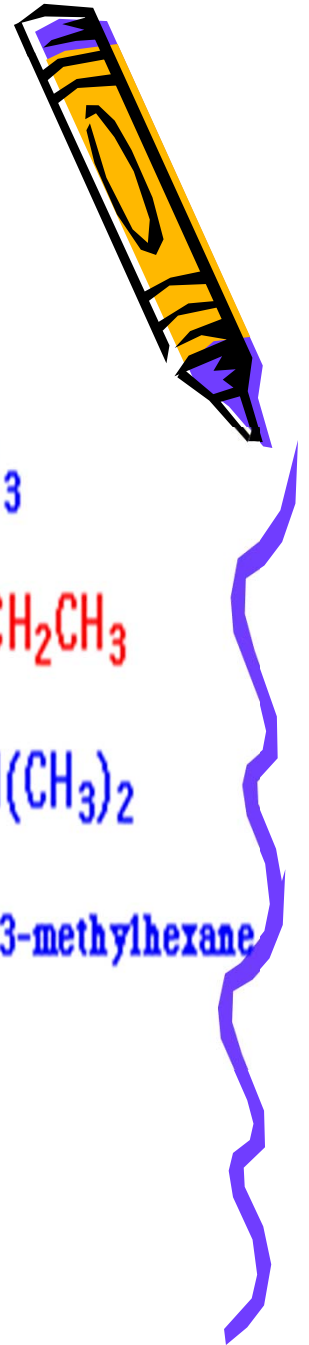
② 길이가 동일한 두개의 서로 다른 사슬이 존재하면 결가지 수가 많은 가지 쪽을 모체 사슬로 선택한다.



3-Ethyl-2,3-dimethylhexane

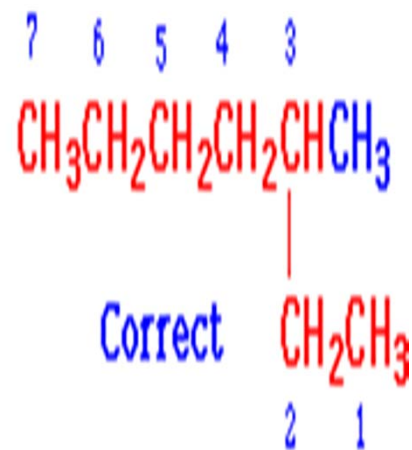
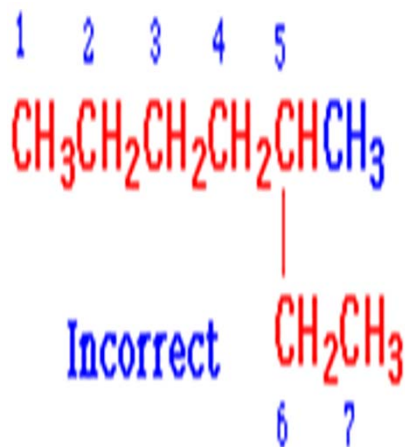


Not 3-Isopropyl-3-methylhexane



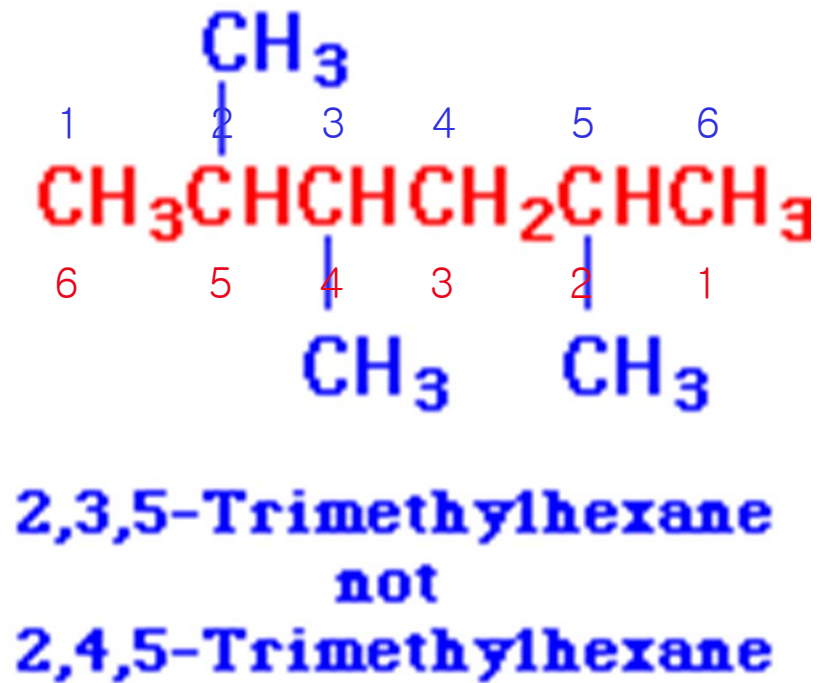
II. 단계

- ① 첫 번째 곁가지가 붙어있는 점에서 더 가까운 쪽 끝에서부터 시작하여 모체 사슬 각 탄소 원자마다 번호를 붙인다.



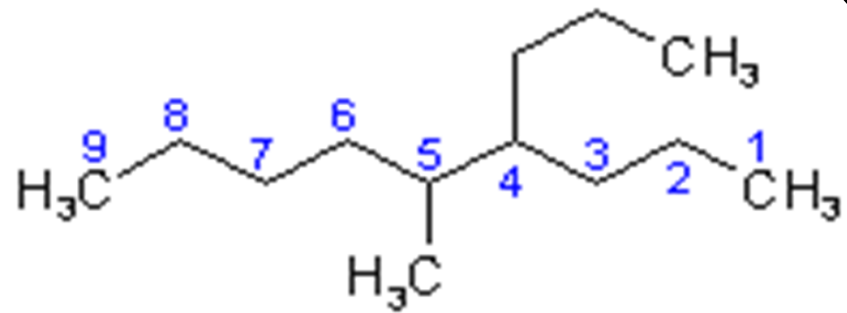
II. 단계

- ② 모체 사슬의 양끝에서 **동일한 거리** 만큼씩 곁가지가 위치가 떨어져 있으면 **두 번째 곁가지가** 점에서 더 가까운 쪽 끝에서부터 번호를 붙인다.



III. 단계

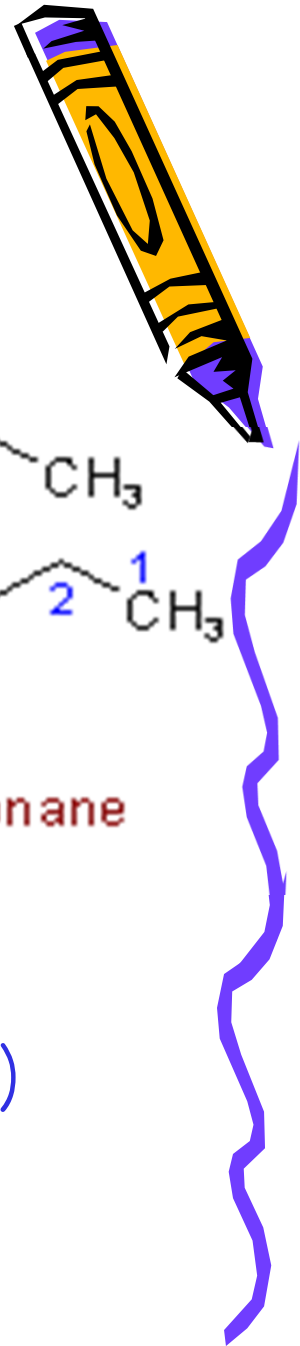
- ① 각 사슬에 붙어있는
각 점에 따라 각 **치환기**의 위치 번호를
부여한다.



5-Methyl-4-propylnonane

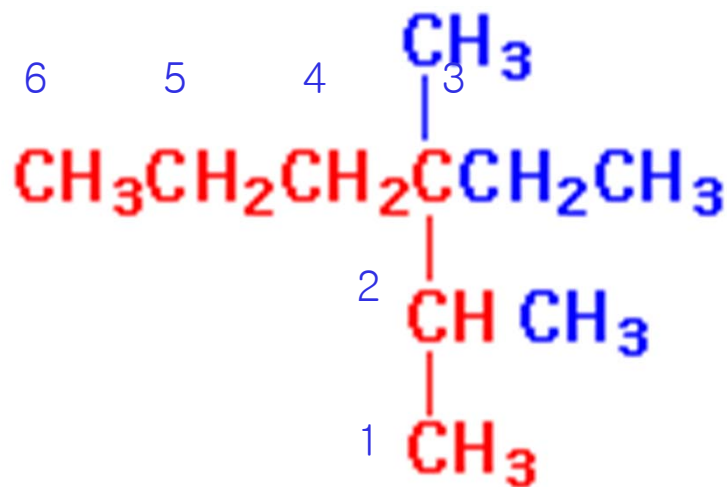
On C4, $\text{CH}_2\text{CH}_2\text{CH}_3$ (4-propyl)

On C5, CH_3 (5-methyl)



III. 단계

- ② 동일 탄소에 두개의 치환기가 붙어 있으면, 동일 번호를 두 번 걸쳐 부여한다. 항상 치환기 수 만큼에 해당되는 번호의 수를 가진다.



3-Ethyl-2,3-dimethylhexane

On C2, CH₃ (2-methyl)

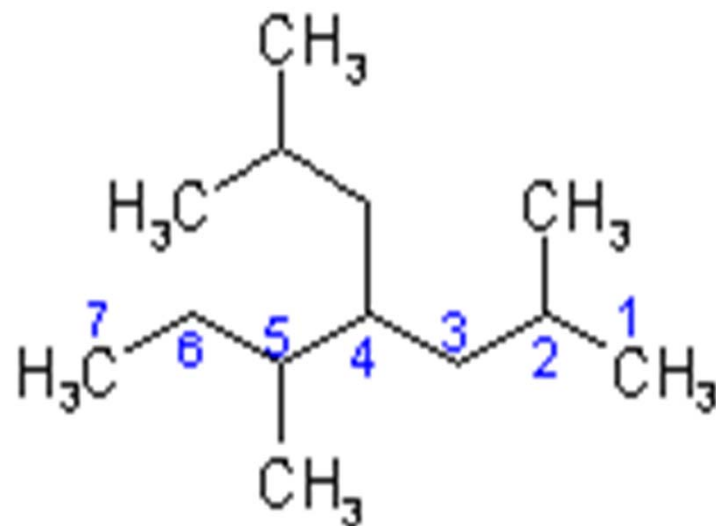
On C3, CH₂CH₃ (3-ethyl)

On C3, CH₃ (3-methyl)



IV. 단계

- ① 서로 다른 접두사는 하이픈(-)을 사용하여 분리한다. 번호는 쉼표(,)를 이용하여 분리하여 화합물 이름을 한 단어로 써라.

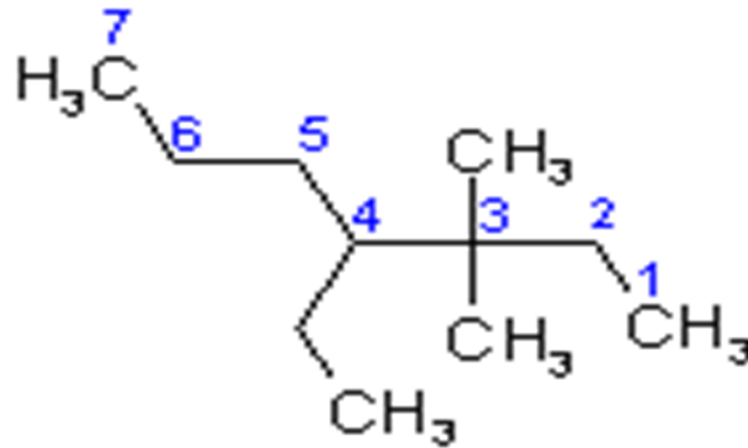


4-Isobutyl-2,5-dimethylheptane

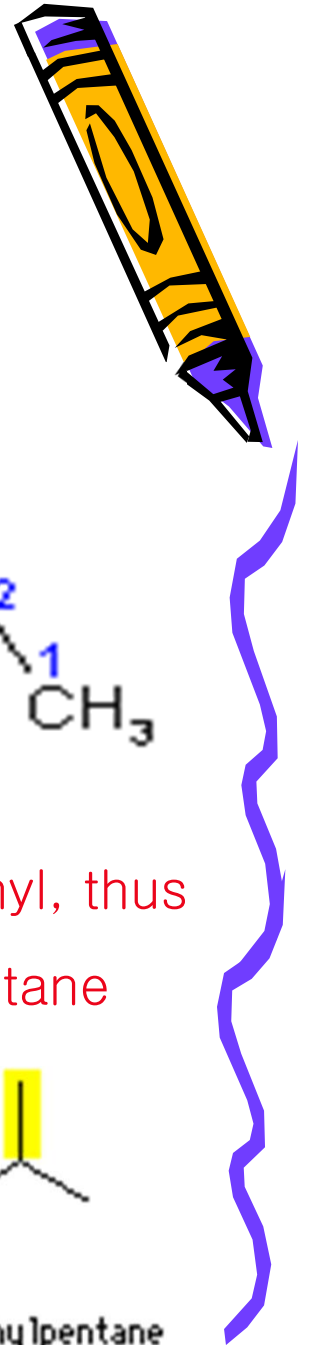
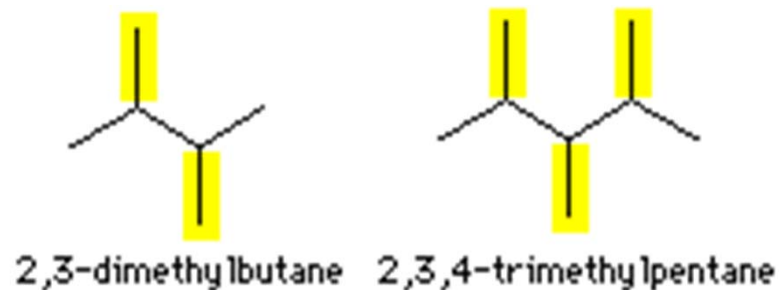


IV. 단계

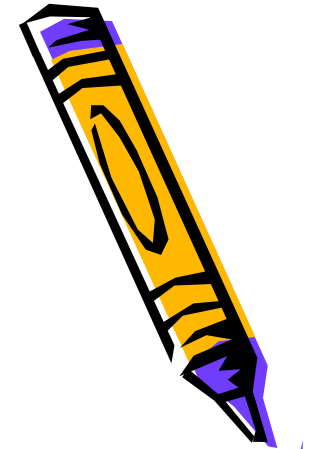
- ② 만일 둘 또는 그 이상의 치환기가 존재하면, 각 치환기 이름 앞에 접두사 di-, tri-, tetra-등을 이용하여 나타낸다. 그러나 이 접두사는 알파벳 순서를 결정할 때 포함되지 않는다.



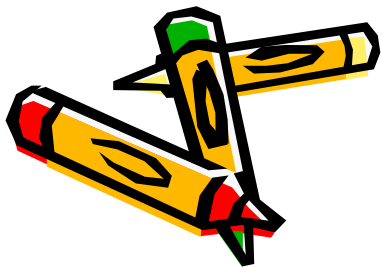
ethyl is cited before methyl, thus
4-Ethyl-3,3-dimethylheptane



(참고)숫자 및 탄소 수 세는 법 그리스어의 셈씨(수사) 이용

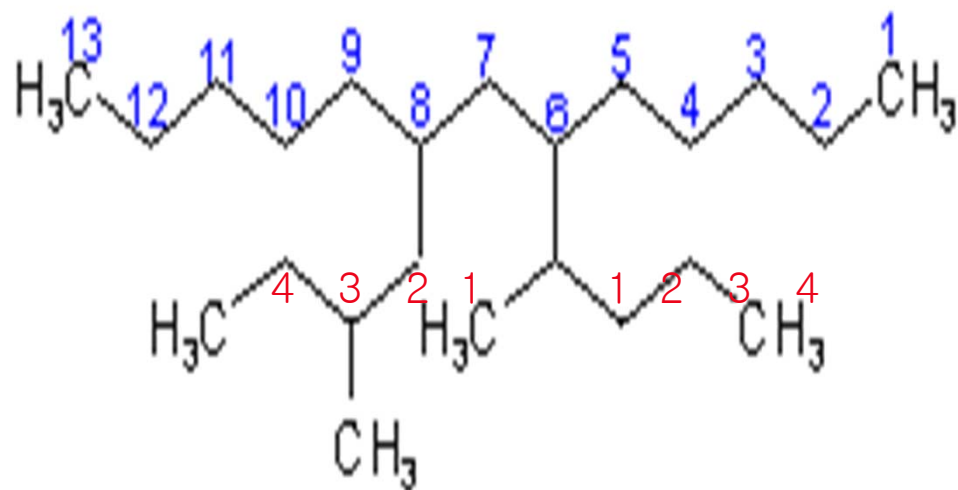


수	1	2	3	4	5	6	7	8	9	10
수를 셀때	mono	di(bi)	tri	tetra	penta	hexa	hepta	octa	nona	deca
물질 이름	metha	etha	propa	buta	penta	hexa	hepta	octa	nona	deca



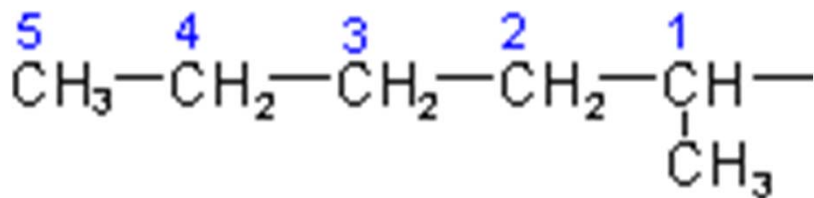
V. 단계

- ① 복잡한 치환기 (주사슬에 결합되어 있는 어떤 치환기에 또 다른 곁가지를 가지는 경우 등)의 명명은 치환기 자체를 하나의 화합물로 보고 명명한다.

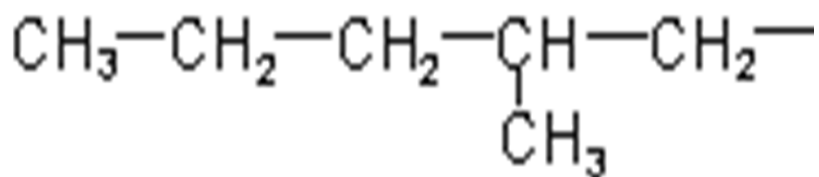


6-(1-Methylbutyl)-8-(2-methylbutyl)tridecane

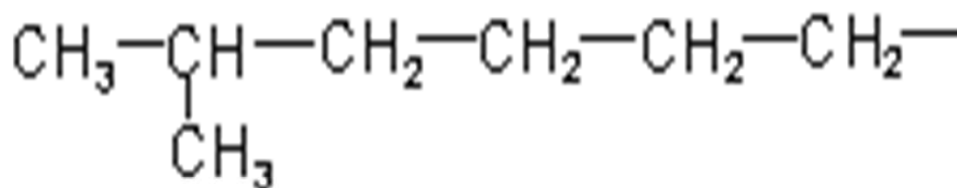




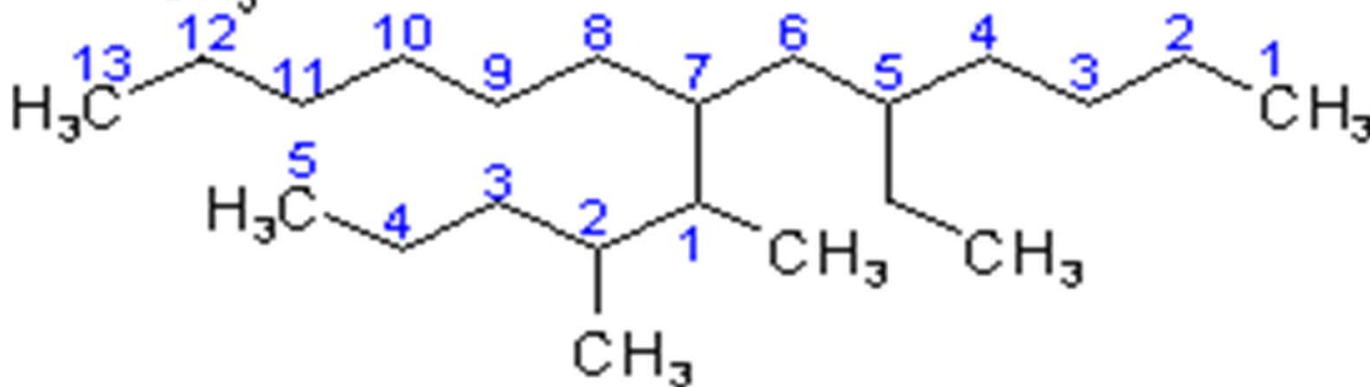
1-Methylpentyl



2-Methylpentyl



5-Methylhexyl



5-ethyl-7-(1,2-dimethylpentyl)tridecane



V. 단계

- ② 역사적 이유로 몇 가지 가지달린-사슬 알킬기들은 속명 혹은 관용명(common name)을 가지고 있다. 그리고 IUPAC 규칙에서도 이들의 사용을 허용하고 있다.

Isopropyl(*i*-Pr)

sec-Butyl(*sec*-Bu)

Isobutyl

tert-Butyl(*t*-Butyl or *t*-Bu)

Isopentyl(Isoamyl or *I*-amyl)

Neopentyl

tert-Pentyl(*tert*-amyl

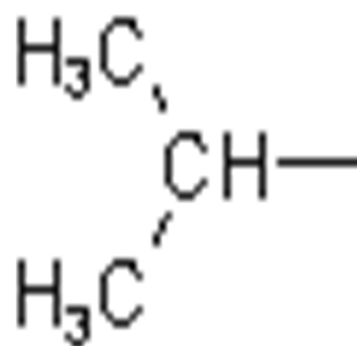
or *t*-amyl)



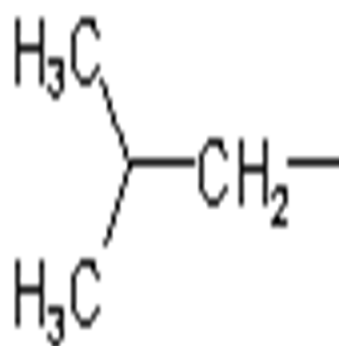
✓ C₃H₇-

✓ C₄H₉-

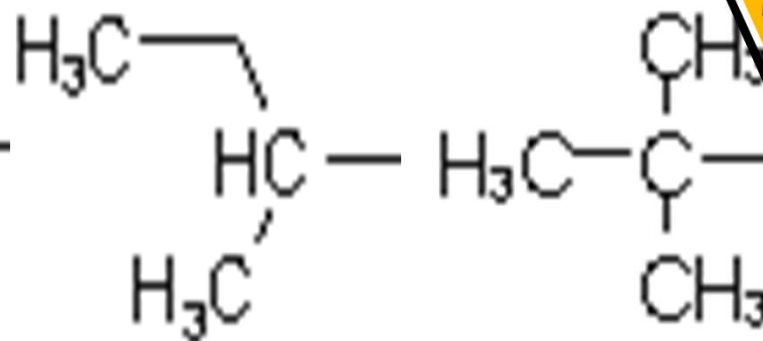
✓ C₅H₁₁-



Isopropyl

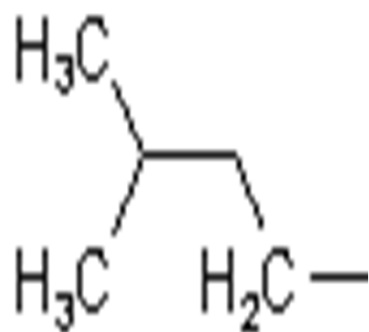


Isobutyl

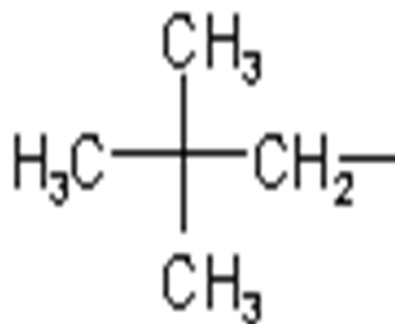


sec-Butyl

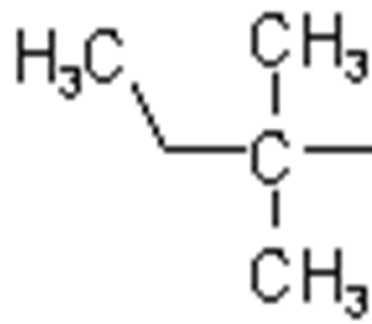
tert-Butyl



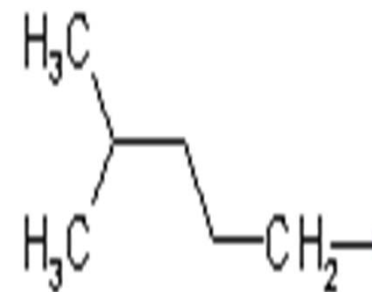
Isopentyl



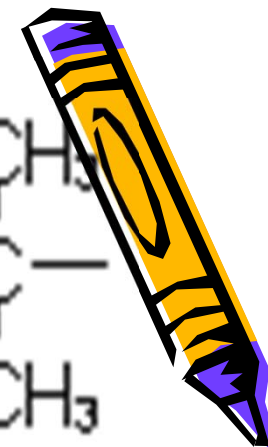
Neopentyl

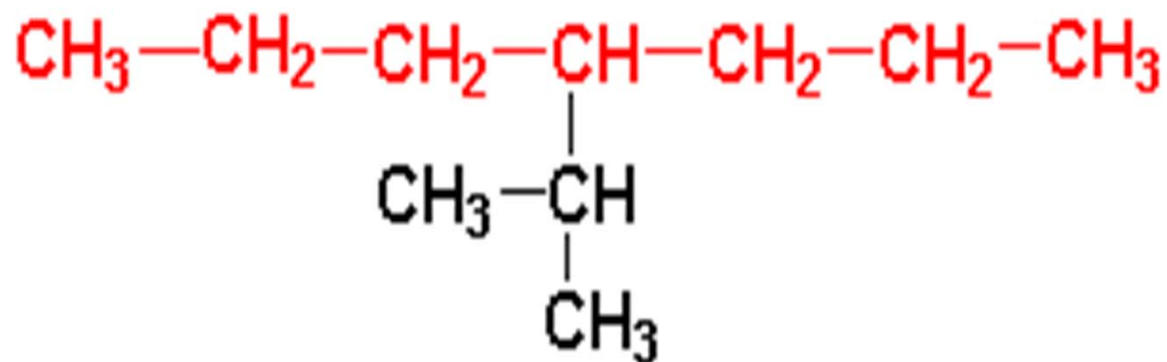
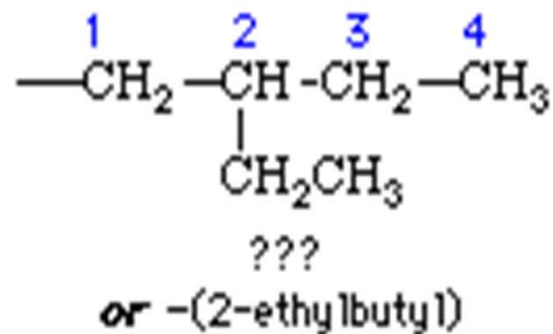
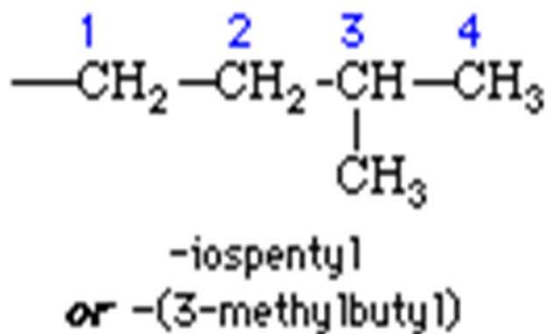
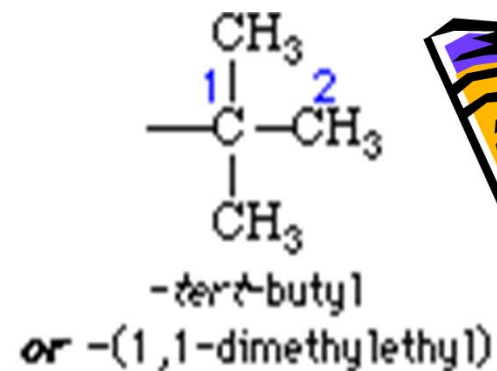
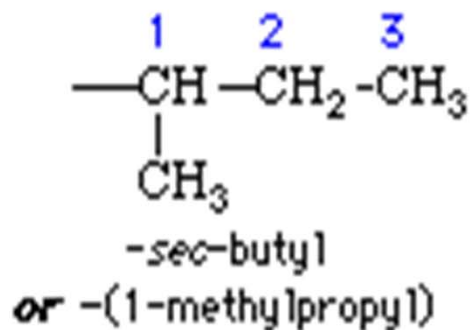
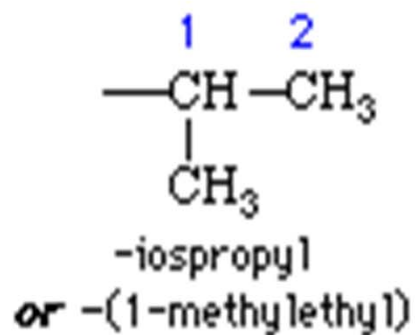


tert-Pentyl

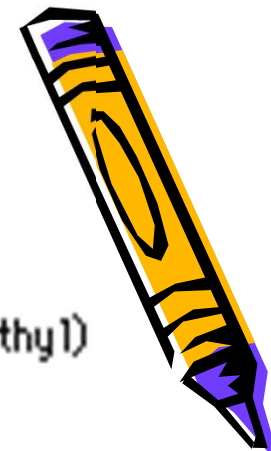


Isohexyl

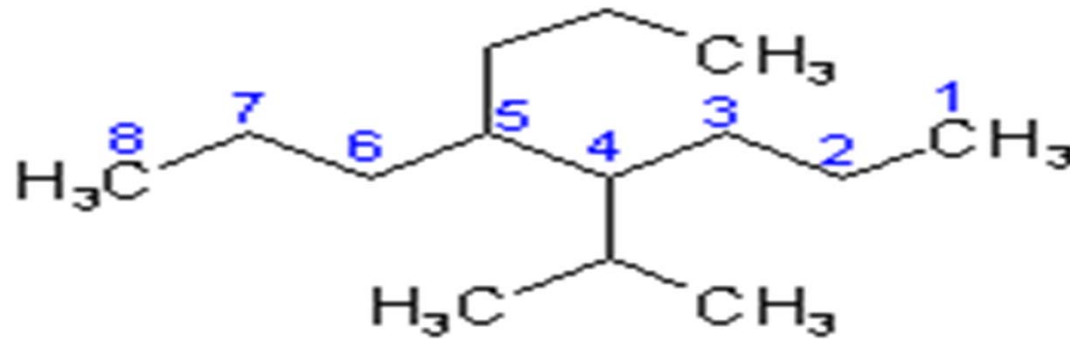




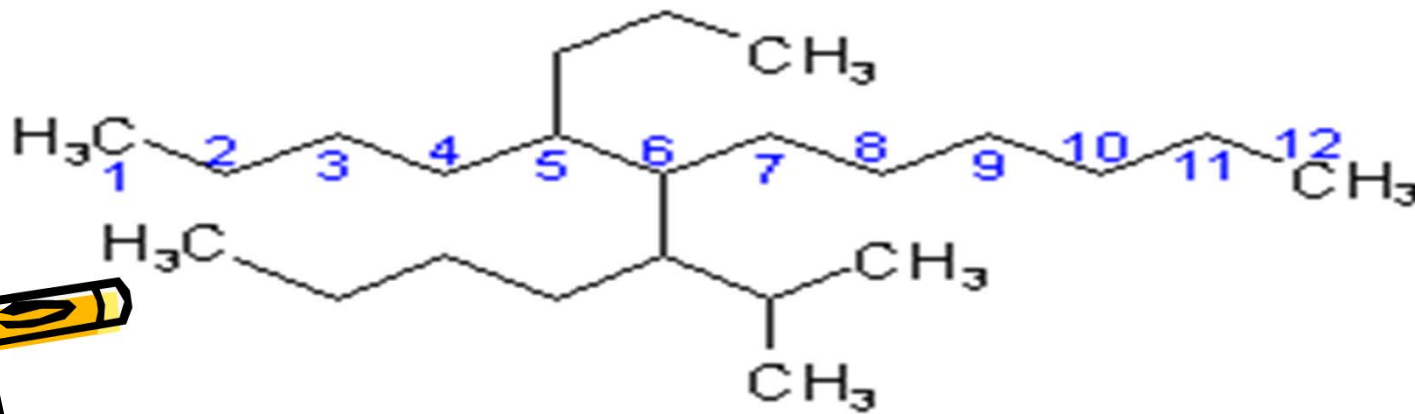
4-isopropylheptane or 4-(1-methylethyl)heptane



여러가지 복잡한 Alkanes IUPAC 명명법 연습

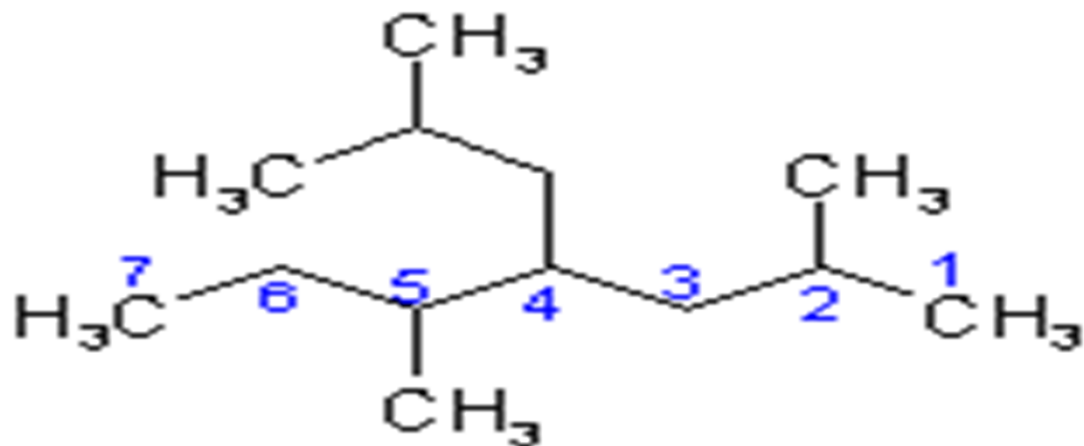


4-Isopropyl-5-propyloctane

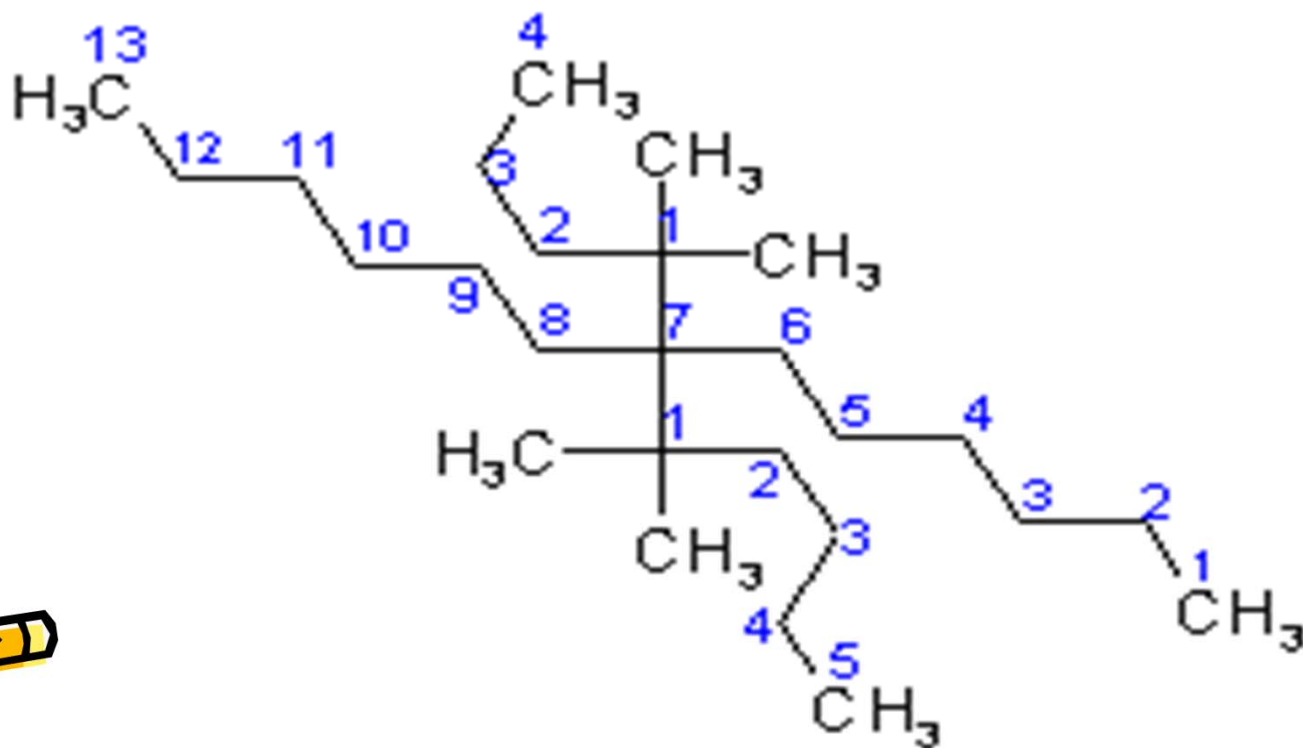


6-(1-Isopropylpentyl)-5-propyldodecane






4-Isobutyl-2,5-dimethylheptane



7-(1,1-Dimethylbutyl)-7-(1,1-dimethylpentyl)tridecane





능숙하고 정확하게 표기할 수 있어야 한다.

많은 연습을 통해 복잡한 Alkane을 체계적으로 침착하게 명명할 수 있다.

