

# Determination de la formule brute - masse molaire

\* Nombre de moles ou quantité de matières

$$(mol) \leftarrow n = \frac{m}{M} \quad \begin{matrix} \nearrow g \\ \searrow g/mol \end{matrix}$$

$$n = \frac{V}{V_m} \quad \begin{matrix} \nearrow l \\ \searrow l \end{matrix}$$

avec

$$V_m = 22,4 \text{ l/mol}$$

$$\Rightarrow m = n \times M$$

$$\Rightarrow V = n \times V_m$$

| dm <sup>3</sup> |  |       | cm <sup>3</sup> |  |  |
|-----------------|--|-------|-----------------|--|--|
|                 |  | L     |                 |  |  |
|                 |  | 0,002 |                 |  |  |

$$V = 2 \text{ cm}^3 = 0,002 \text{ l}$$

2 atomes de Carbone  
C2

## \* Masse molaire

• soit  $C_xH_yO_zN_t$  une formule brute

$$M(C_xH_yO_zN_t) = 12x + y + 16z + 14t$$

• si  $d$  est la densité.

$$M = 29 \times d$$

## \* Les lois de proportions

soit  $C_xH_yO_zN_t$  une formule brute

$$\frac{12x}{\%C} = \frac{y}{\%H} = \frac{16z}{\%O} = \frac{14t}{\%N} = \frac{M}{100}$$

$$\frac{12x}{m_C} = \frac{y}{m_H} = \frac{16z}{m_O} = \frac{14t}{m_N} = \frac{M}{m_s}$$

$$\frac{m_C}{\%C} = \frac{m_H}{\%H} = \frac{m_O}{\%O} = \frac{m_N}{\%N} = \frac{m_S}{100}$$

Rmq:

$$100 = \%C + \%H + \%O + \%N$$

$$m_S = m_C + m_H + m_O + m_N$$

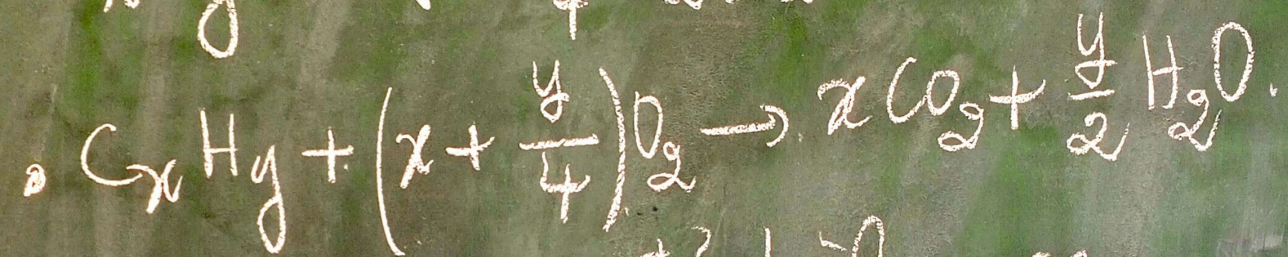
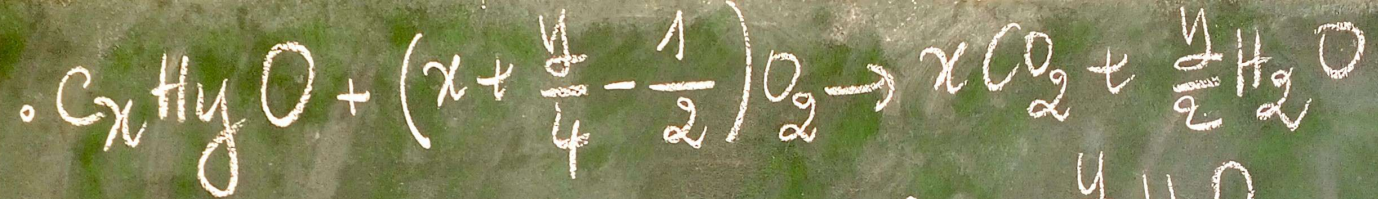
$$m_C = \frac{3m_{CO_2}}{11} ; m_H = \frac{m_{H_2O}}{9}$$

$$\%C = \frac{300m_{CO_2}}{11m_S} ; \%H = \frac{100m_{H_2O}}{9m_S}$$

NB:

Les lois de proportions servent à:

- déterminer la formule brute ( $x, y, \dots$ )
- déterminer la composition centésimale (%)



Rmq: avec l'éq<sup>te</sup> bilan, on utilise le rapport stœchiométrique.



$$\frac{n(A)}{a} = \frac{n(B)}{b} = \frac{n(C)}{c} = \frac{n(D)}{d}$$

Pour déterminer les nombres de moles  $n(A); n(B); n(C); n(D)$ , puis la formule brute.

$\Delta^{190}$

1) Alkyles:  $R = C_n H_{2n+1}$   
 $M(R) = 14n + 1$

$CH_3 -$  : méthyle

$CH_3-CH_2-$  ou  $C_2H_5-$  : éthyle

$CH_3-CH_2-CH_2-$  ou  $C_3H_7-$  : propyle

$\begin{matrix} & & 1 \\ & & CH \\ & & | \\ 2 & CH_3 - & CH - \end{matrix}$  : isopropyle ou  
1-méthyle éthyle  
 $\begin{matrix} & & CH_3 \end{matrix}$

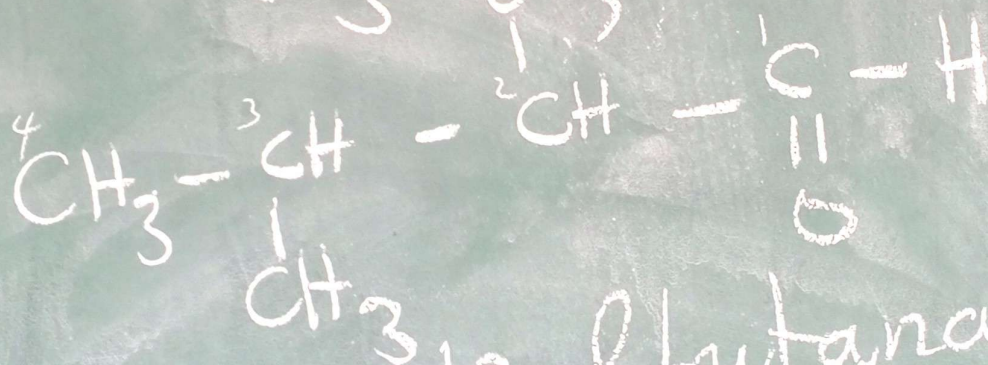
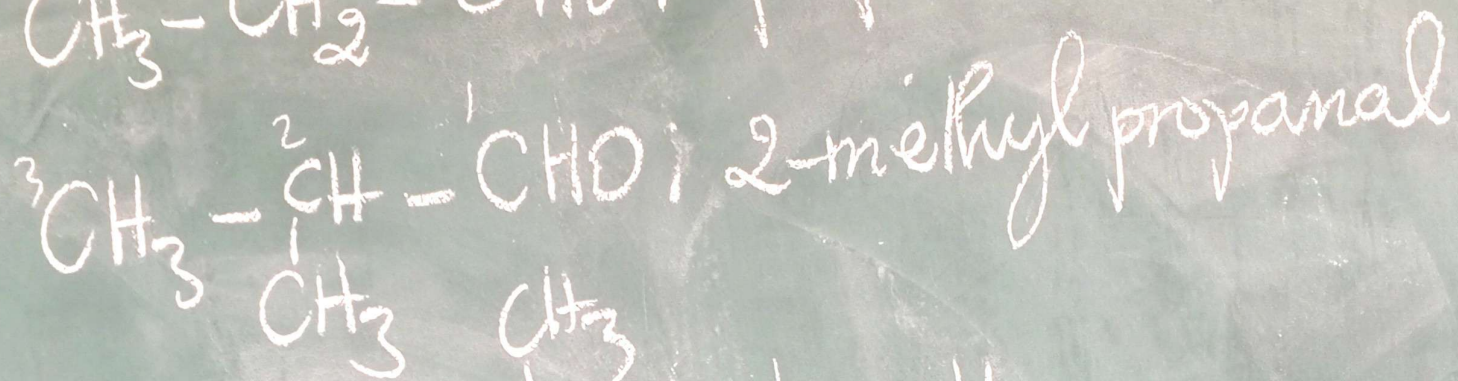
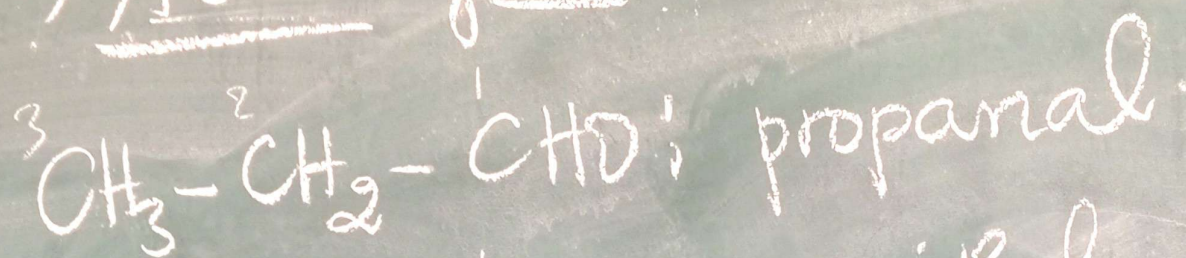
3) Alcohols:  $-OH$  "alcan-nº-ol"

$$\text{CH}_3 - \text{CH}_2\text{OH}; \text{ethan-1-ol or ethanol.}$$

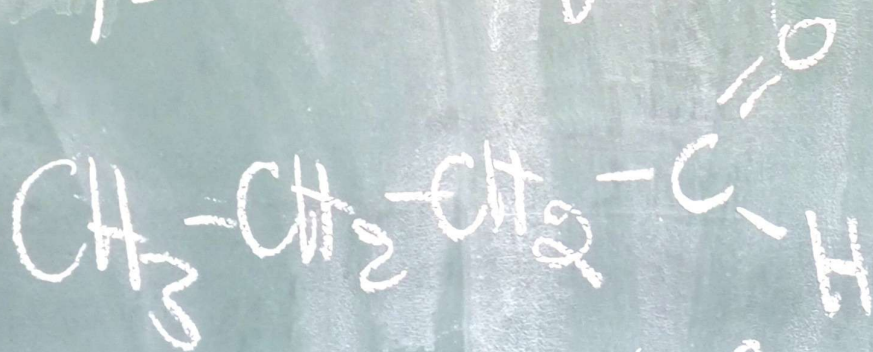
$\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{OH}$ ; propan-1-ol

$$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2\text{OH}; \text{butan-1-ol}$$
$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array} \quad \begin{array}{l} \text{2-methyl} \\ \text{propan-1-ol} \end{array}$$

4) Aldehydes - CHO 'alcanal'

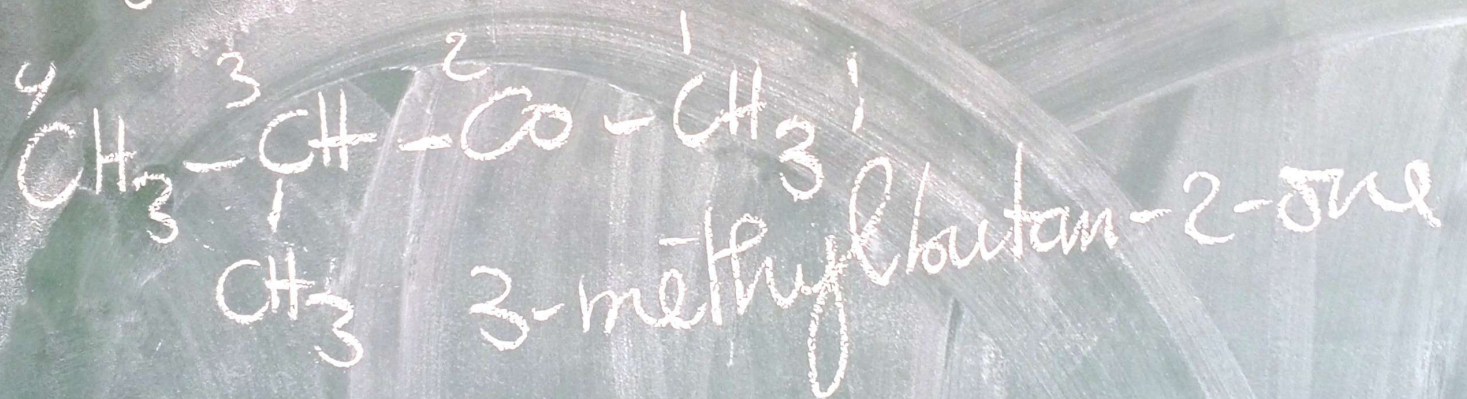
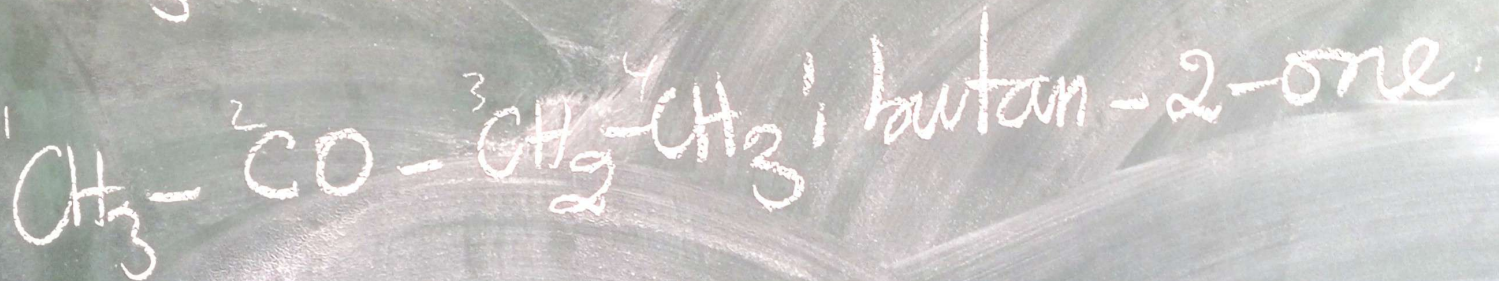
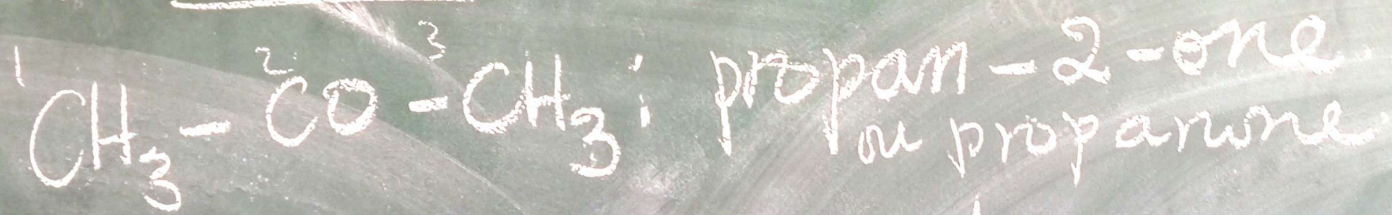


2,3-dimethyl butanal



butanal

5) Ketones:  $-\text{CO}-$  "alkan- $n^{\circ}$ -one"



Acide Carb  $-COOH$  Acide  
alcanoïque

$CH_3-COOH$ : Acide éthanique

$HCOOH$ : Acide méthanoïque

$CH_3-\overset{\overset{1}{CH}}{\underset{\underset{CH_3}{|}}{2}}-COOH$ : Acide  
2-méthylpropanique

$CH_3-CH_2-COOH$ : Acide  
propanique

# Composés à plusieurs fonctions:

$=$  ène |  $-CO : OXO$

$\equiv$  yne

$-OH$ : hydroxy

$-Cl$ : chloro

$-Br$ : bromo

$-NH_2$ : amino

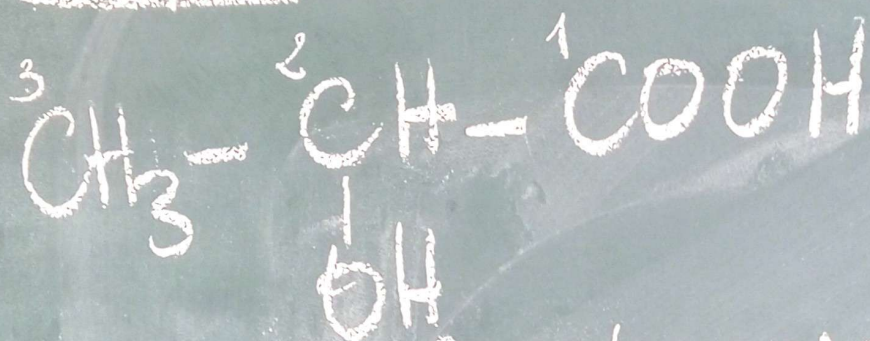
$x$  - substituents chaîne principale -  $y$  -  $ene$  -  $z$  - suffixe de la fonct<sup>n</sup> prioritaire

alkyles<sup>n</sup> ou  
fct<sup>n</sup> non prioritaire

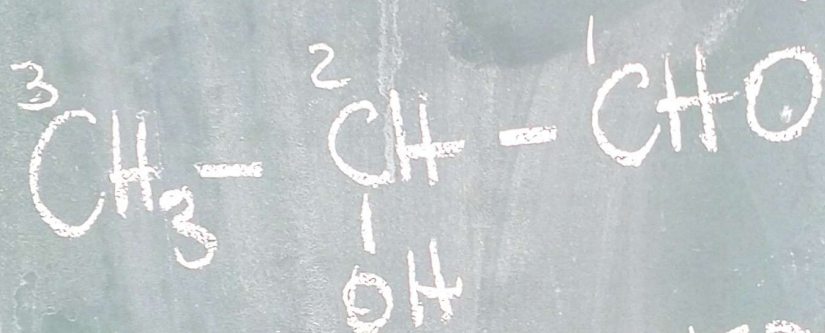
formule générale

Exple:

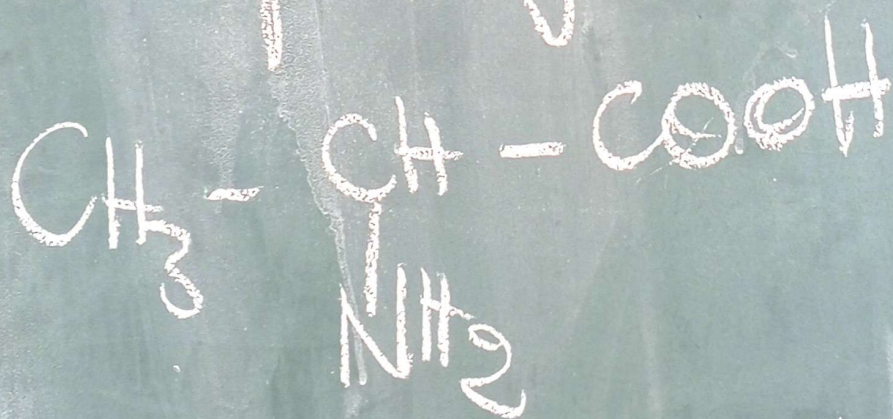
2-ene-1-olique



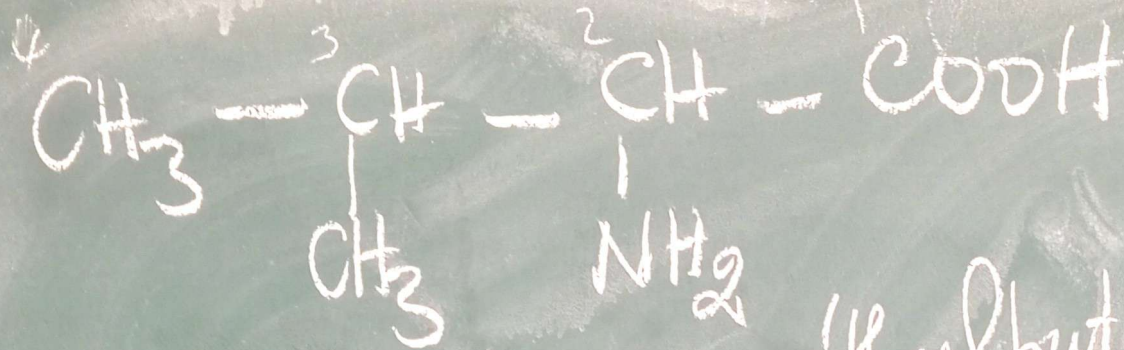
Acide 2-hydroxy propanoïque.



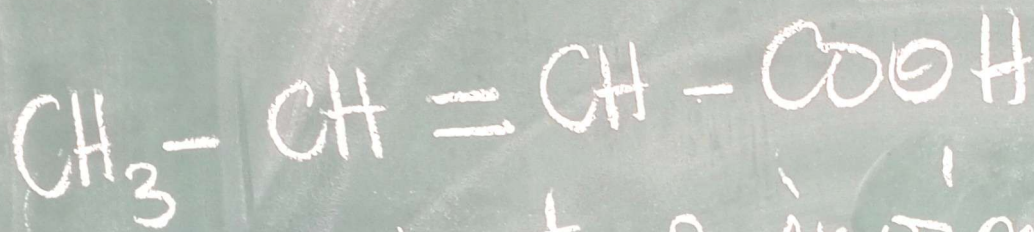
2-hydroxy propanal



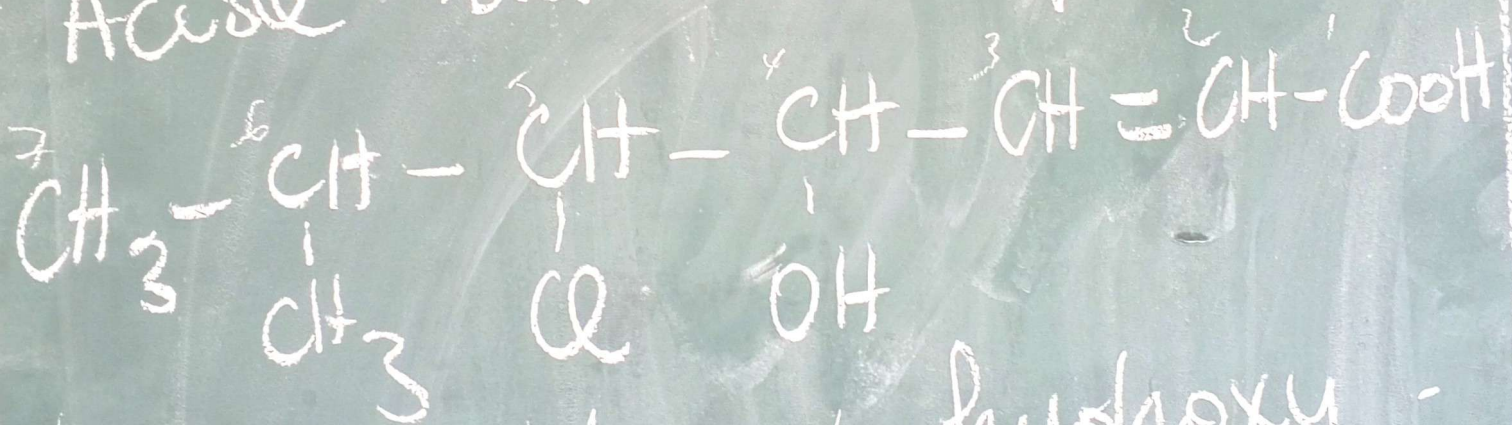
Acide 2-amino propanoïque.



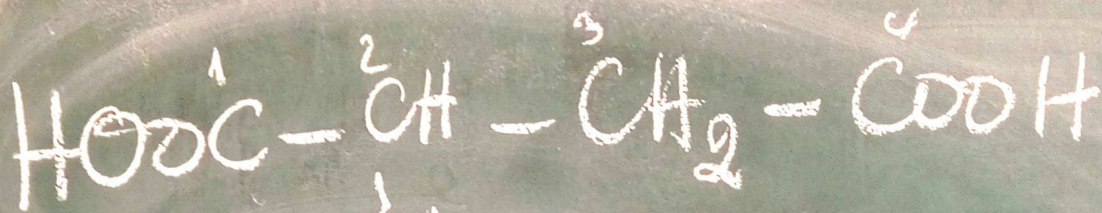
Acide 2-amino, 3-méthylbutanoïque



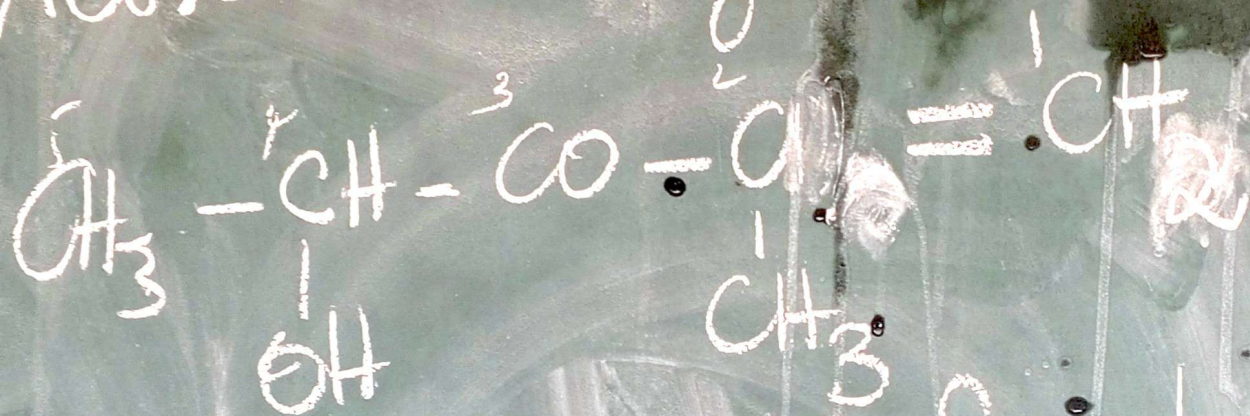
Acide but-2-énoïque



Acide 5-chloro; 4-hydroxy;  
6-méthylhept-2-énoïque



Acide 2-méthylbutan-1,4-dioïque



4-hydroxy, 2-méthylpent-1-ène  
-3-one