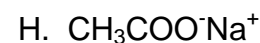
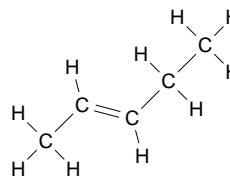
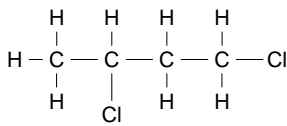
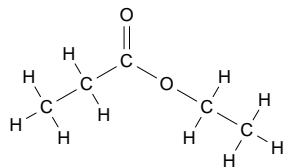
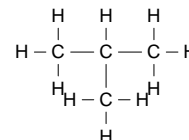
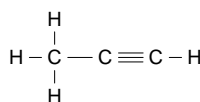
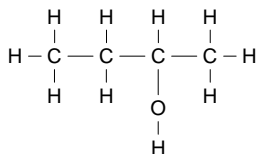
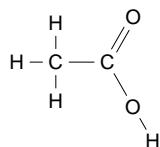


ORGANIC REVISION QUESTIONS – TEST YOURSELF

Match A-H with their organic family & name each molecule



alkane - D <i>methyl propane</i>	alkene (<i>and is it cis- or trans-?</i>)	alkyne
haloalkane	alcohol	carboxylic acid
ester	Sodium salt of carboxylic acid	

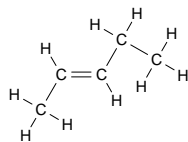
What does each of these reagents do?

- | | |
|---|---|
| A. Br_2 | G. Conc. H_2SO_4 , heat |
| B. Br_2 with uv light and/or heat | H. $\text{H}^+/\text{H}_2\text{O}$, heat |
| C. $\text{H}^+/\text{MnO}_4^-$ | I. $\text{H}^+/\text{H}_2\text{O}$, heat (<i>yes – it is meant to be here twice</i>) |
| D. $\text{H}^+/\text{Cr}_2\text{O}_7^{2-}$, heat (or $\text{H}^+/\text{MnO}_4^-$, heat) | J. $\text{NaOH}(\text{aq})$, heat |
| E. Conc. H_2SO_4 , alcohol, heat | |
| F. Conc. H_2SO_4 , carboxylic acid, heat | |

<input type="checkbox"/> When added to an alkene or alkyne it will be rapidly decolourised; solution turns from orange to colourless	<input type="checkbox"/> Will hydrolyse an ester to form an alcohol and the sodium salt of the carboxylic acid	<input type="checkbox"/> When added to an alkene a diol is formed and the solution turns from purple to colourless	<input type="checkbox"/> Will hydrolyse an ester to form an alcohol and carboxylic acid	<input type="checkbox"/> Turns a carboxylic acid into an ester
<input type="checkbox"/> Used to convert a primary alcohol to a carboxylic acid; solution turns from orange to green	<input type="checkbox"/> Turns an alcohol into an ester	<input type="checkbox"/> Will convert an alkene into an alcohol (addition reaction)	<input type="checkbox"/> When added to an alkane it will be slowly decolourised; solution turns from orange to colourless	<input type="checkbox"/> Will convert an alcohol into an alkene (elimination reaction)

Cis and trans isomerism


Requires a C=C bond because this does NOT allow free rotation. Requires each C of the C=C to have 2 different atoms or groups.

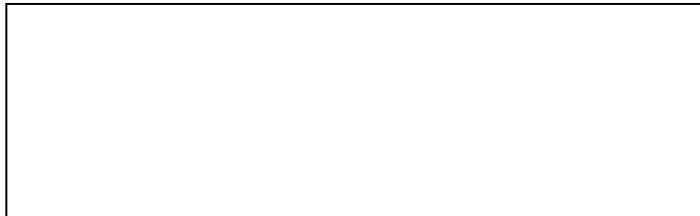


Draw the cis form of



Draw the cis and trans forms of but-2-ene.

You should use this  format to show the cis/trans



Identifying stuff!

You are given four liquids which you know to be the solutions listed below.

Using only 1) blue litmus paper, 2) acidified potassium dichromate solution, and 3) bromine water, discuss how you would systematically identify the four unknown solutions. Give equations where appropriate.

octene

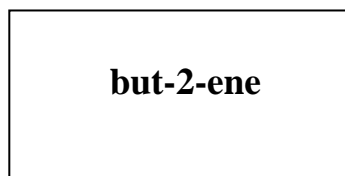
propanoic acid

butan-1-ol

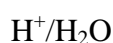
octane



Addition reactions of alkenes Alkenes such as but-2-ene are used by the petrochemical industry to produce many useful materials. Draw structures to represent possible compounds A-D in the reactions of but-2-ene shown below. Give the names of the compounds formed.



Hint! These are all addition reactions!!
Extra Question! Which results would be different for but-1-ene? Draw them, identify any major/minor products and name them.



ANSWERS

Match A-G with their organic family & name each molecule

alkane D methyl propane	alkene G trans pent-2-ene	Alkyne C propyne
Haloalkane F 1,3-dichlorobutane	Alcohol B butan-2-ol / 2-butanol	carboxylic acid A ethanoic acid
Ester E ethyl propanoate	Sodium salt of carboxylic acid H sodium ethanoate	

What does each of these reagents do?

A - When added to an alkene or alkyne it will be rapidly decolourised; solution turns from orange to colourless

J - Will hydrolyse an ester to form an alcohol and the sodium salt of the carboxylic acid

C - When added to an alkene a diol is formed and the solution turns from purple to colourless

H/I - Will hydrolyse an ester to form an alcohol and carboxylic acid

E - Turns a carboxylic acid into an ester

D - Used to convert a primary alcohol to a carboxylic acid; solution turns from orange to green (or purple to colourless if $\text{H}^+/\text{MnO}_4^-$, heat)

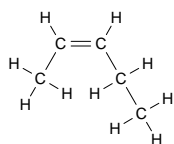
F - Turns an alcohol into an ester

H/I - Will convert an alkene into an alcohol (addition reaction)

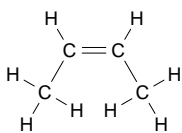
B - When added to an alkane it will be slowly decolourised; solution turns from orange to colourless

G - Will convert an alcohol into an alkene (elimination reaction)

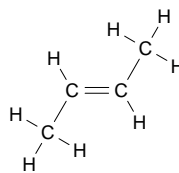
Cis and trans isomerism



cis pent-2-ene



cis but-2-ene

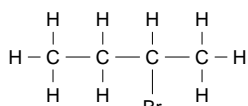


trans but-2-ene

Identifying stuff! (Order may vary – this is one possible sequence).

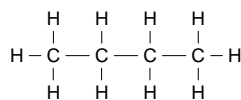
- Test each liquid with blue litmus; only the propanoic acid will turn it red as it is a weak acid. $\text{CH}_3\text{CH}_2\text{COOH} + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{CH}_2\text{COO}^- + \text{H}_3\text{O}^+$
- Warm the remaining 3 with $\text{H}^+/\text{Cr}_2\text{O}_7^{2-}$; only the butan-1-ol will be oxidised to butanoic acid, and the orange dichromate will change from orange to the green Cr^{3+} ion. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- Add Br_2 water to the remaining 2; the alkene (octane) will decolourise it rapidly (orange to colourless) but the alkane (octane) will only decolourise it slowly (in the presence of uv light and/or heat). $\text{C}_8\text{H}_{16} + \text{Br}_2 \rightarrow \text{C}_8\text{H}_{16}\text{Br}_2$ (this is an addition reaction, shown by the alkene). $\text{C}_8\text{H}_{18} + \text{Br}_2 \rightarrow \text{C}_8\text{H}_{17}\text{Br} + \text{HBr}$ (this is a substitution reaction, shown by the alkane).

Addition reactions of alkenes



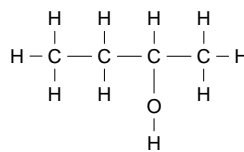
A

2-bromobutane



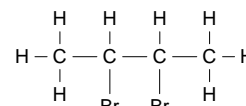
B

butane



C.

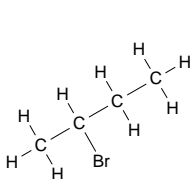
butan-2-ol



D.

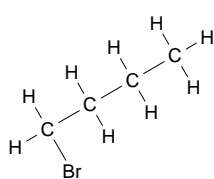
2,3-dibromobutane

Extra question: B would be butane again but D would be 1,2-dibromobutane this time. A & C have 2 products since but-1-ene is unsymmetrical & HBr and H_2O (H-OH) are both unsymmetrical reagents. Remember "the rich get richer... the H adds to the C of the $\text{C}=\text{C}$ that already has most H's".

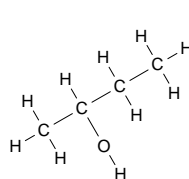


A.

2-bromobutane
major

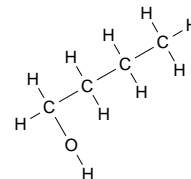


1-bromobutane
minor



C.

2-butanol
major



1-butanol
minor