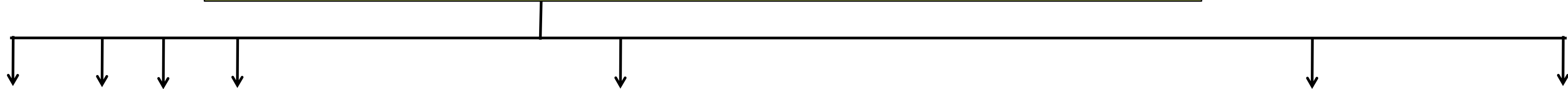


ALCOHOLS, PHENOLS AND ETHERS

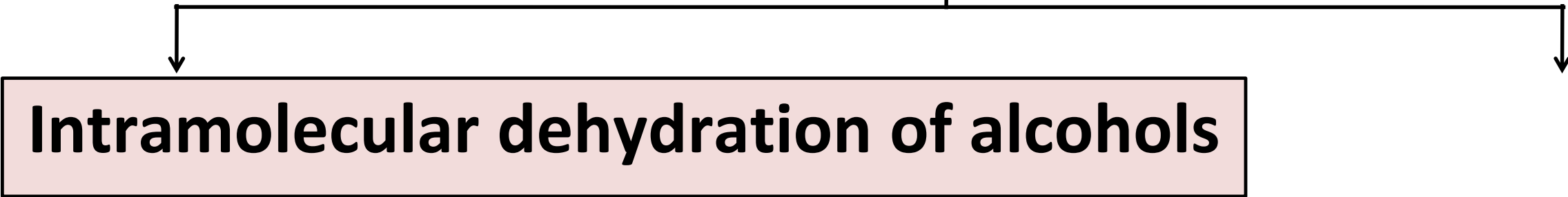


DEHYDRATION OF ALCOHOLS

Reactions involving breaking of C – O bond



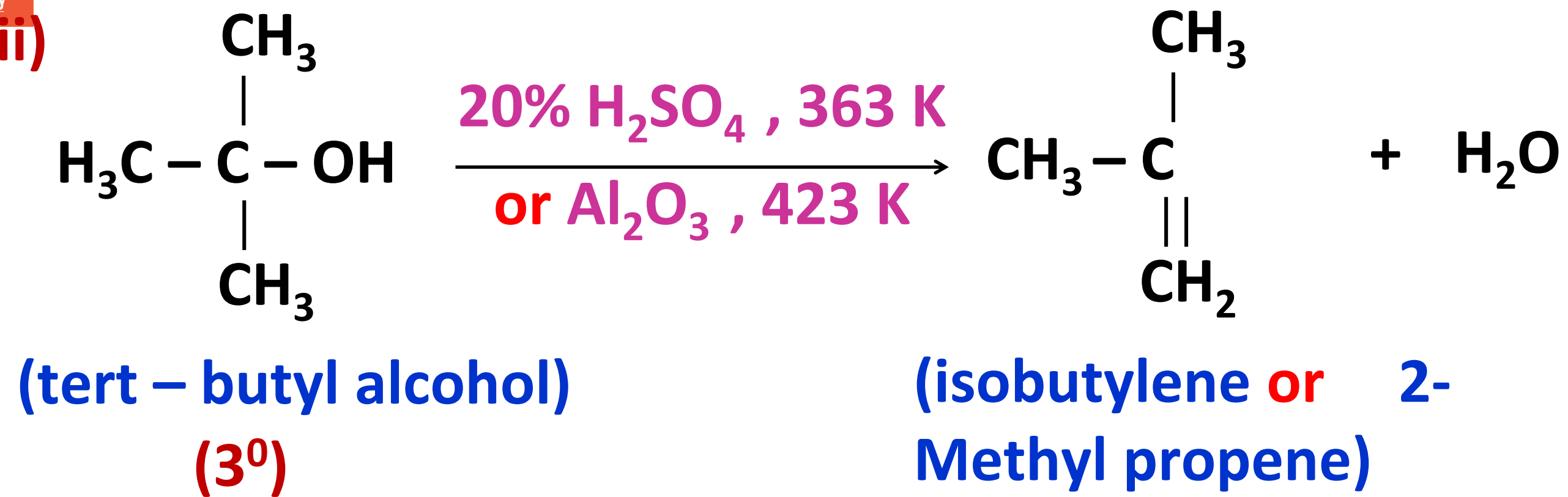
Dehydration of Alcohols



Intramolecular dehydration of alcohols

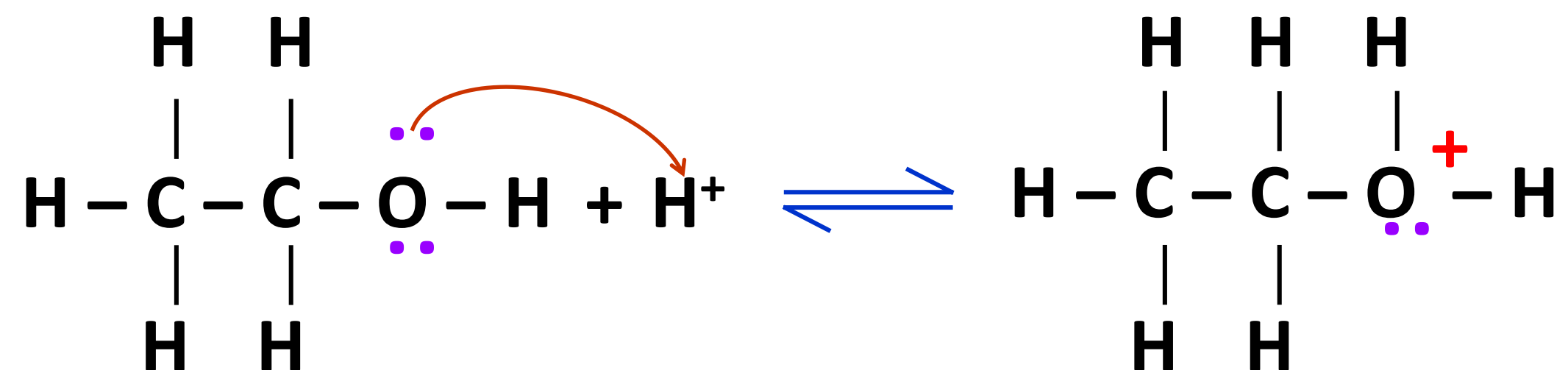
Formation of Alkene





Mechanism : Dehydration of Ethanol :

Step I : Formation of Protonated alcohol



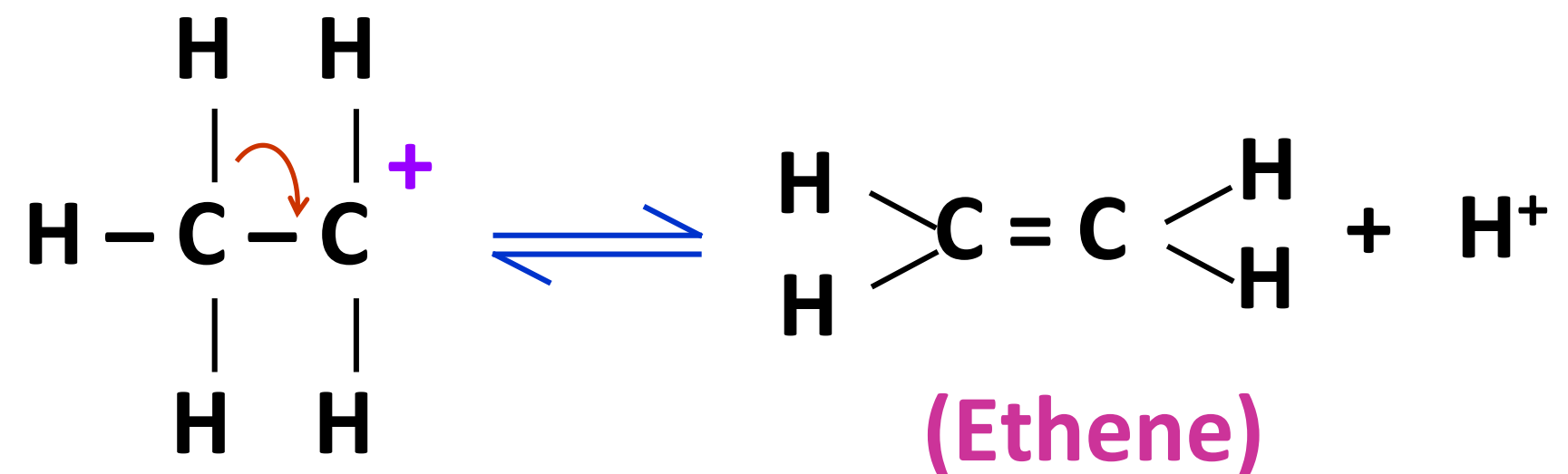
Step II : Formation of Carbocation



Carbocation

R.D.S = Rate Determining Step.

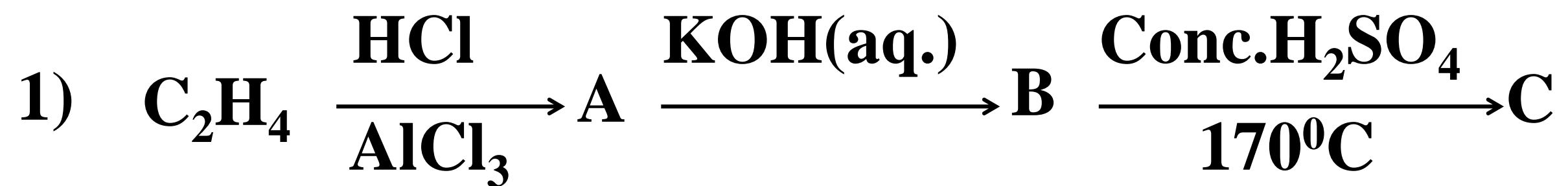
Step III : Formation of Ethene by deprotonation



Order of ease of dehydration of alcohols

- Tertiary > Secondary > Primary

MCQs





a) Conc. H_2SO_4

b) CaCl_2

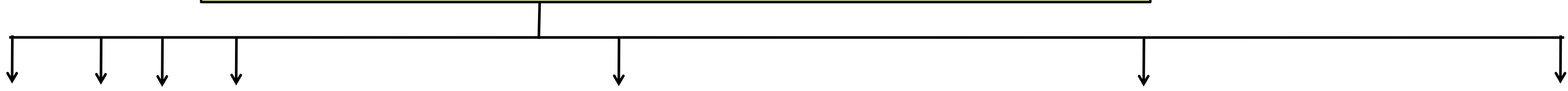
c) CaO

d) Al_2O_3

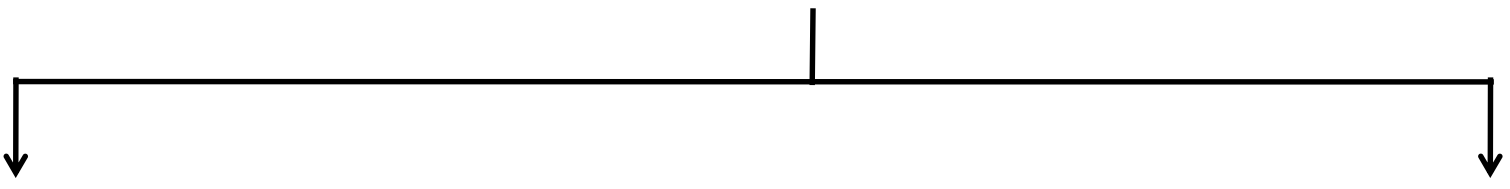


DEHYDRATION OF ALCOHOLS FORMATION OF ETHER.

Reactions involving breaking of C – O bond



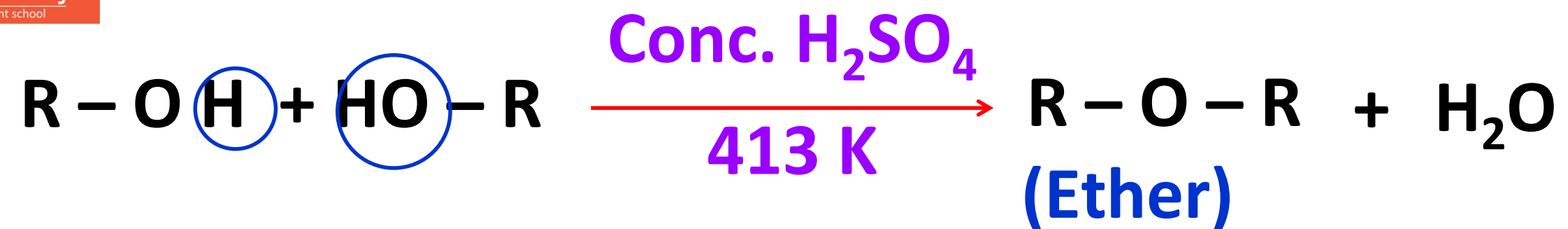
Dehydration of Alcohols



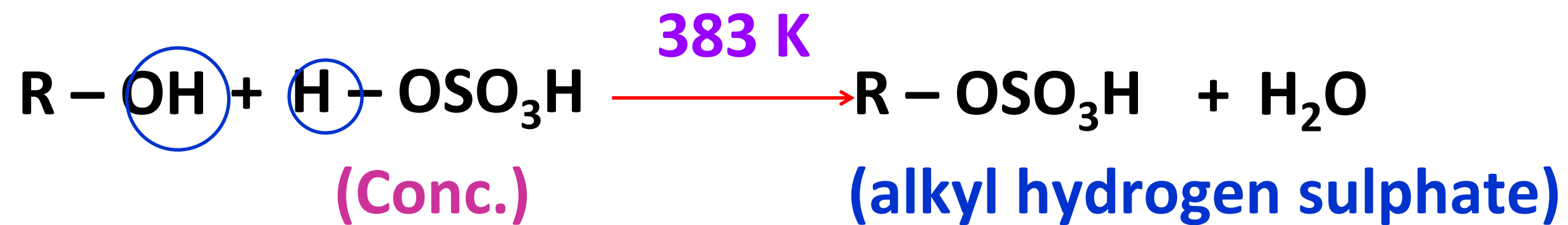
Intermolecular dehydration of Alcohols

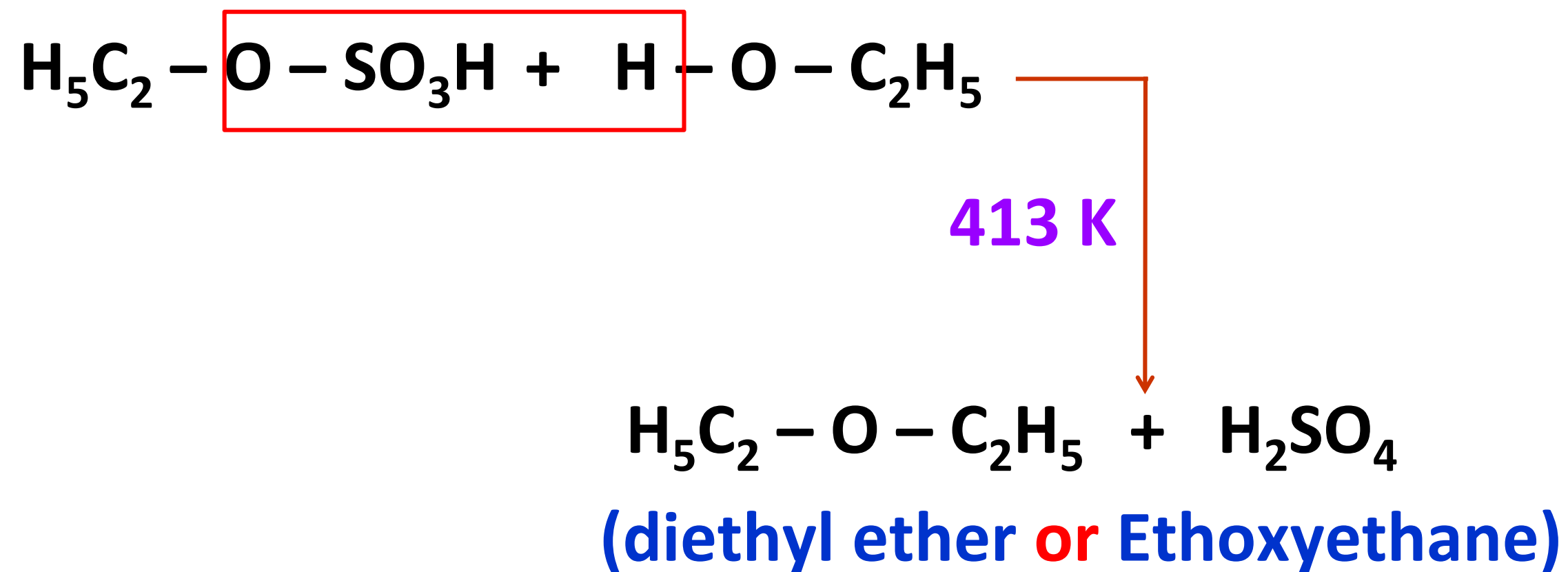
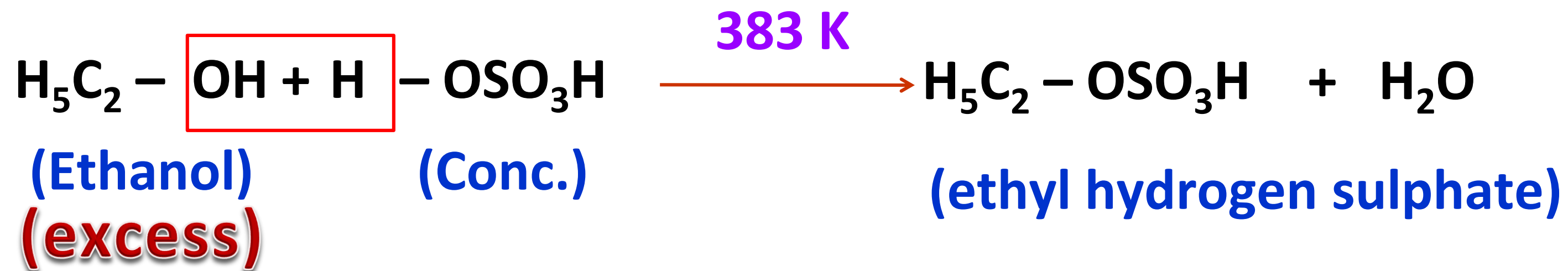
Formation of Ether

Continuous etherification process

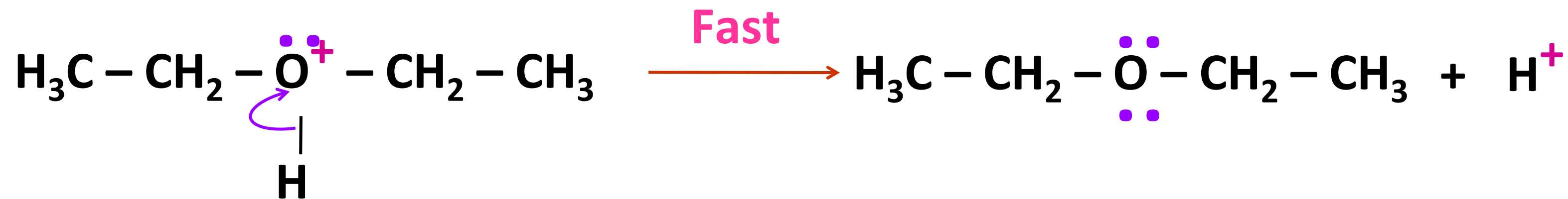


Note :



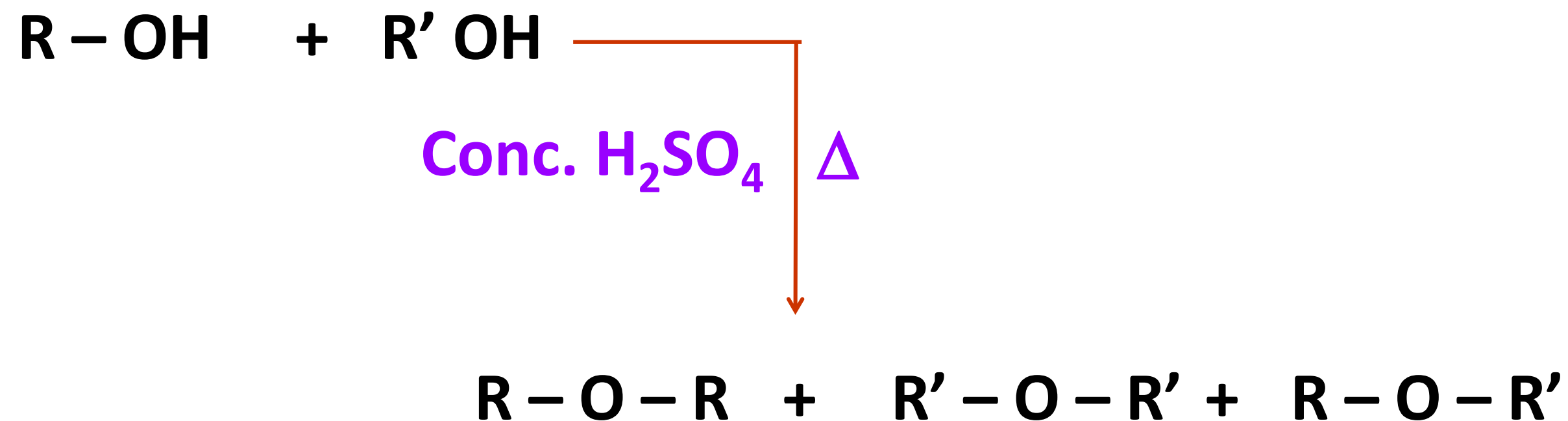


iii) Deprotonation to give ether



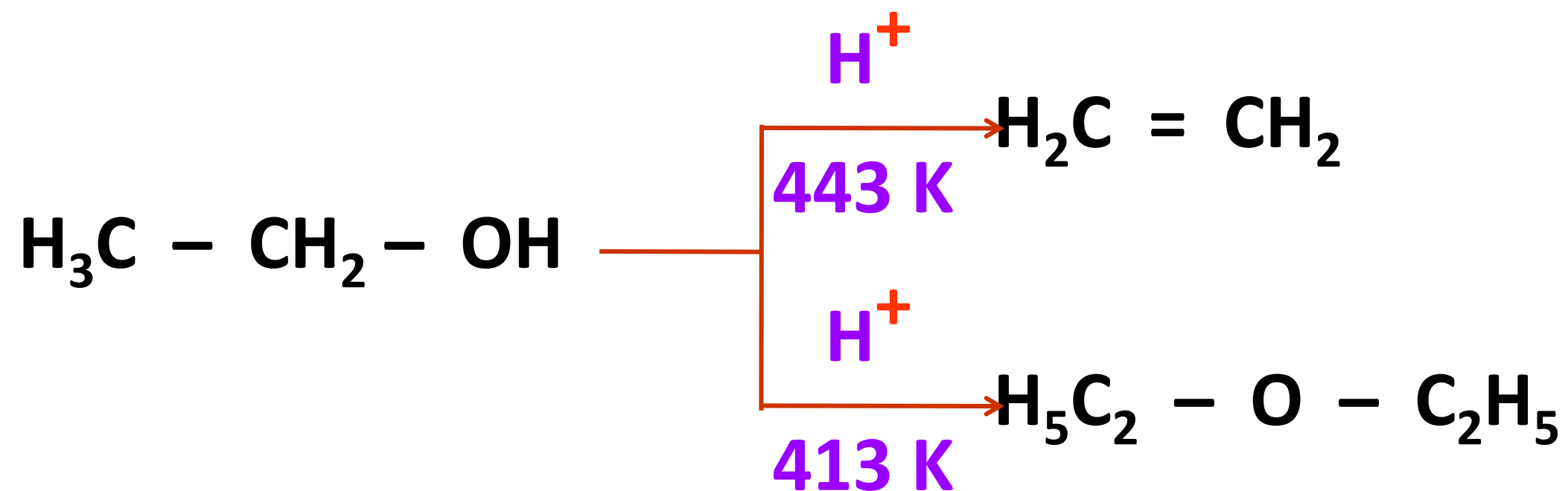
Limitations

- i) **Only simple ethers are prepared by this method, if a mixture of two different alcohols is used then a mixture of three different ethers is obtained which is difficult to separate.**



ii) Ethers prepared from this method is from only 1^o alcohol because 2^o & 3^o alcohols gives alkene by elimination.

iii) If temp rises above 413 K then alcohol gives formation of an alkene.



MCQs

1). Removal of water molecule from an alcohol is called...of alcohols.

a) hydration

b)  dehydration

c) hydrogenation

d) dehydrogenation

2). Dehydrating agent used for dehydration of alcohols is...

a) Conc. HCl

b)  Conc. H₂SO₄

c) Conc. HNO₃

d) None of these

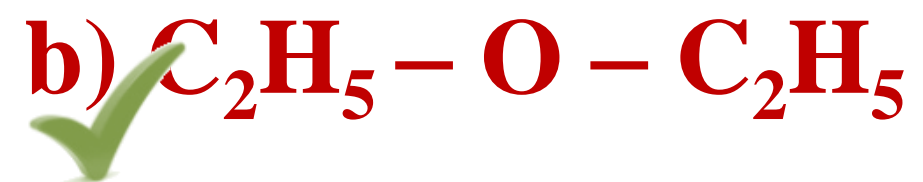
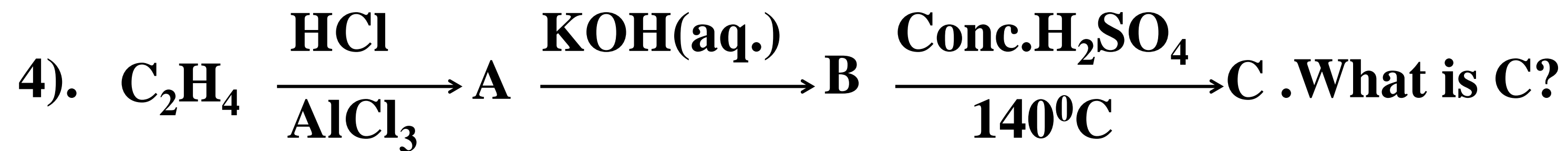
3). Ethyl alcohol when treated with concentrated sulphuric acid at 413K gives...

a) Ethene

b) Ethyl ether

c)  Diethyl ether

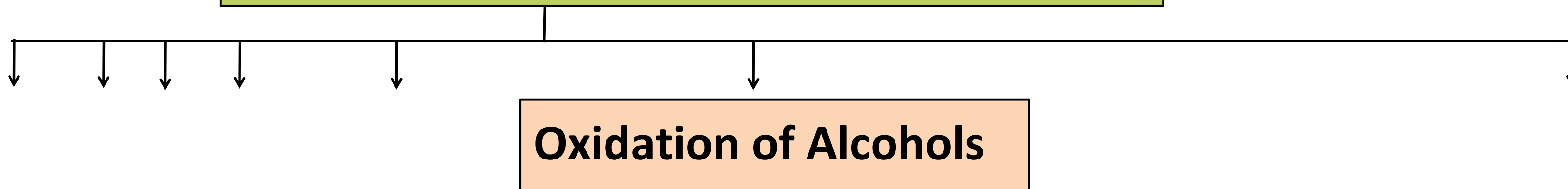
d) None of these





OXIDATION OF ALCOHOLS

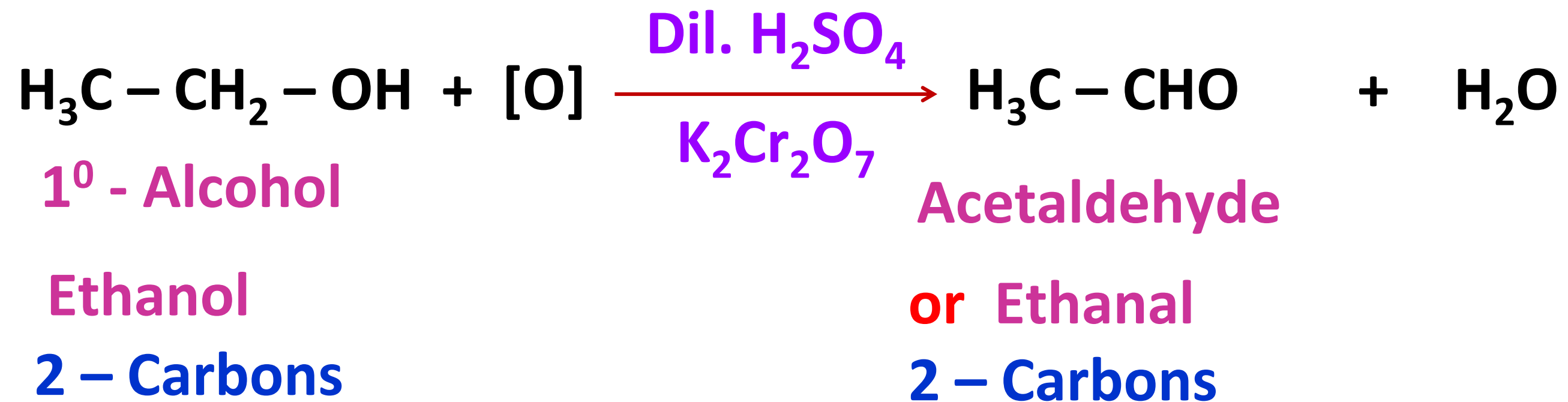
Reactions involving breaking of C – O bond



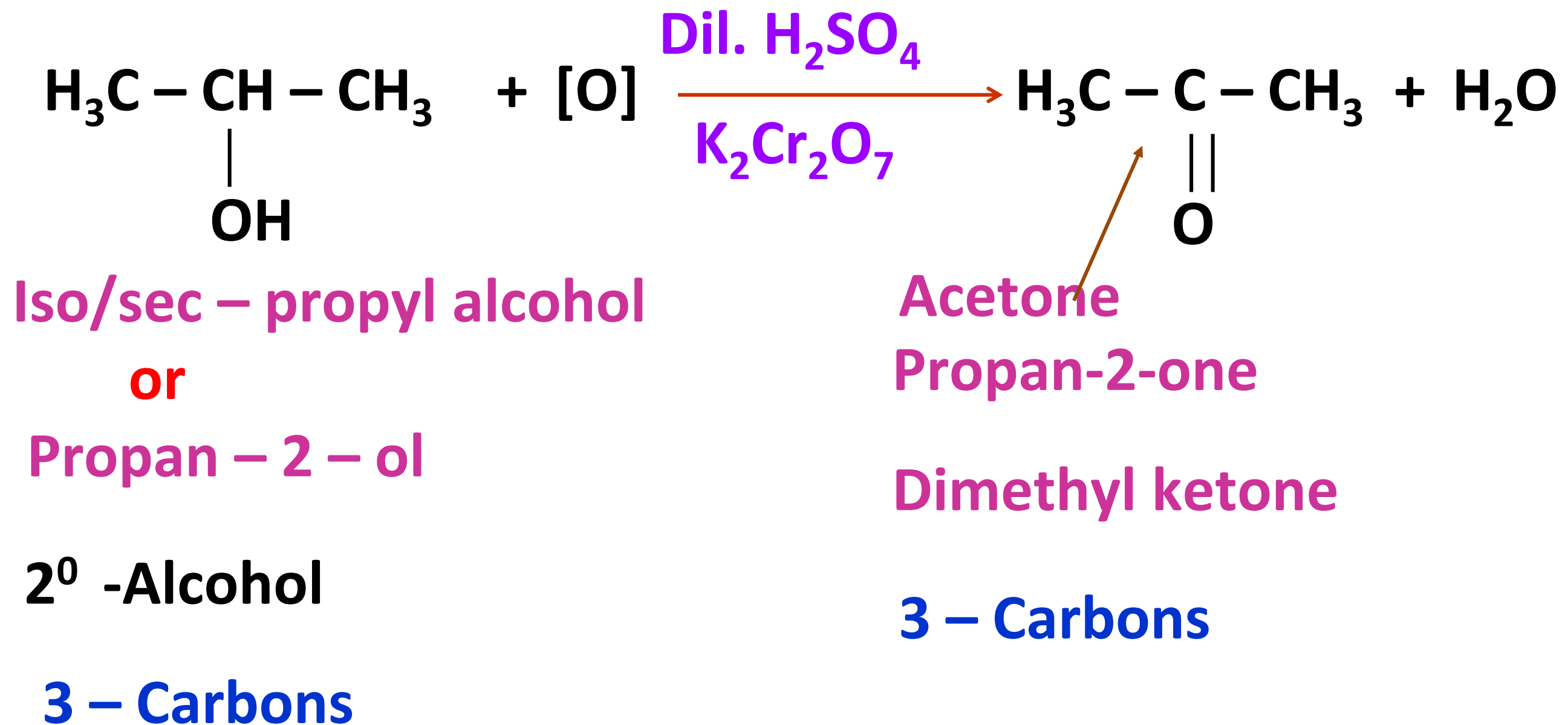
Distinguishable reaction Between 1^o, 2^o and 3^o alcohols

Oxidation of alcohols is used to differentiate between 1^o, 2^o and 3^o alcohols using pyridiniumchlorochromate (PCC).

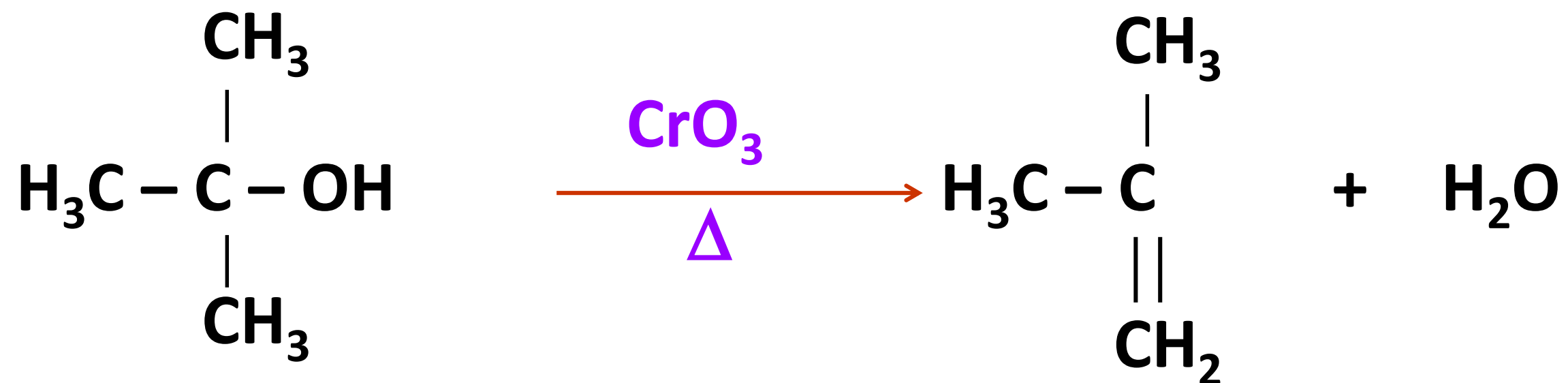
(i) Oxidation of 1^o alcohol



(ii) Oxidation of 2^o alcohol



iii) Oxidation of 3^o alcohol



tert – butyl alcohol (3^o)
(4 – C)


isobutylene
(4 – C)

Note :

1° , 2° and 3° alcohol on vigorous oxidation gives carboxylic acid but 1° alcohol gives carboxylic acid with same no. of 'C' atom, 2° alcohol gives carboxylic acid with one 'C' atom less and 3° alcohol gives carboxylic acid with two 'C' atoms less.

MCQs

1. Oxidation of alcohols is carried out by using...

- a) dilute H_2SO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$**
- b) pyridinium chlorochromate**
- c) pyridinium dichromate**
- d)  All of these**

2. Primary alcohol on oxidation gives...

a)  aldehyde

b) ketone

c) Both a & b

d) None of these

3. Secondary alcohol on oxidation gives...

a) aldehyde

b)  ketone

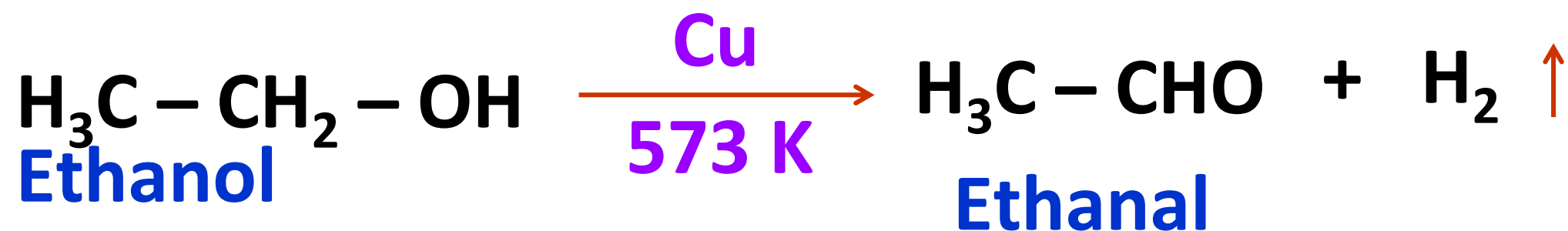
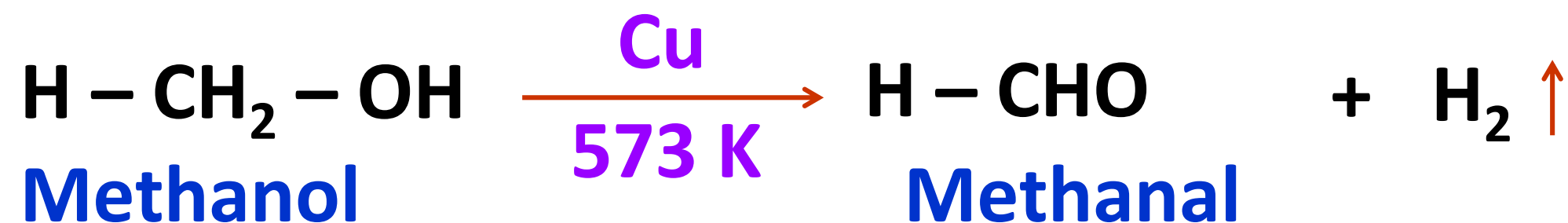
c) Both a & b

d) None of these

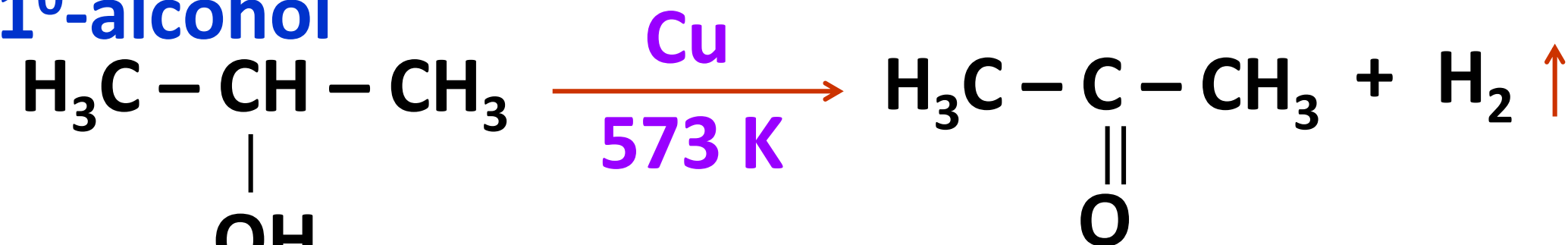
DEHYDROGENATION OF ALCOHOLS WITH 'Cu' AT 573 K

Reactions involving breaking of C – O bond

Dehydration of alcohols with Cu at 573 K (300°C)



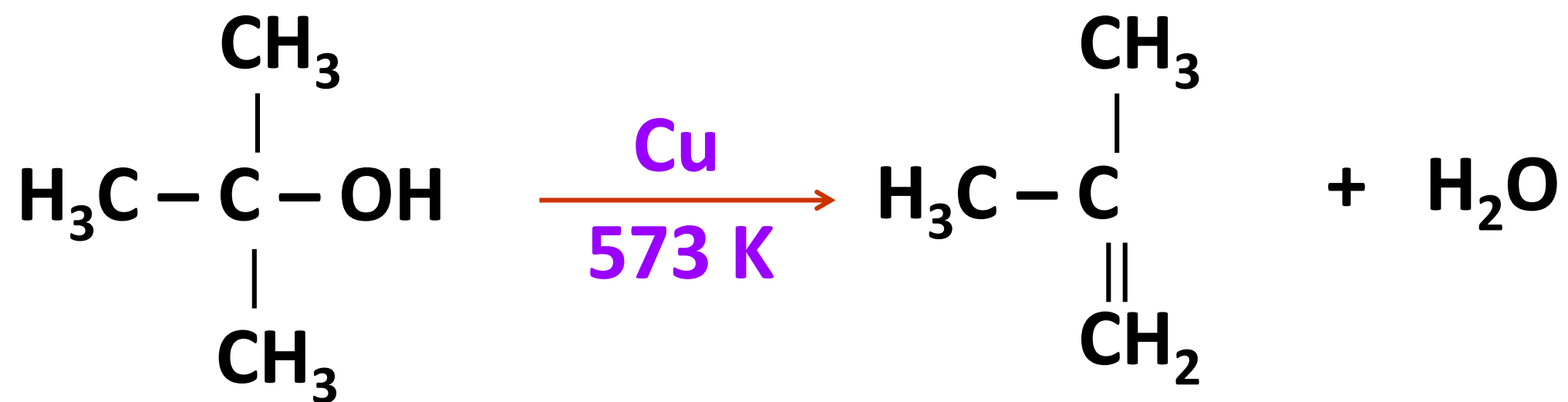
1^o-alcohol



Propan – 2 – ol

2^o-alcohol

Acetone



Tert-butyl alcohol

3⁰-Alcohol

Isobutylene

What will be the product ?

Catalytic dehydrogenation is also useful to distinguish 1⁰, 2⁰ and 3⁰ alcohols

MCQs

1. Primary alcohols on dehydrogenation with Cu at 573 K gives

a) ketone

b)  aldehyde

c) acid

d) None of these

2. Ethanol on dehydrogenation gives...

a) Methanol

b) Ethanal

c) Both a & b

d) Ethyl chloride

3. Propan – 2– ol on dehydrogenation gives --

a) acetaldehyde

b) Formaldehyde

c)  acetone

d) All of these

