CHEMISTRY ONLINE
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CHEMISTRY

ORGANIC CHEMISTRY

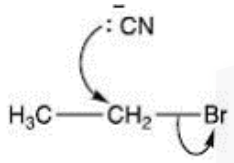
Level & Board	AQA (A-LEVEL)
TOPIC:	HALOGENOALKANES
PAPER TYPE:	SOLUTION - 3
TOTAL QUESTIONS	10
TOTAL MARKS	34

Halogenoalkanes - 3

1.

(a)

Mechanism for compound D



$\longrightarrow CH_3CH_2CN + Br^-$

(2)

(b)

IUPAC name of compound D

Propanenitrile (propane-1-nitrile)

(1)

(c)

$$\text{Atom Economy} = \frac{\text{Molecular mass of desired product}}{\text{Sum of molecular masses of all reactants}} \times 100$$

$C_2H_5Br + KCN \rightarrow C_2H_5CN + KBr$

The molecular masses are as follows:

- Molecular mass of C_2H_5Br (ethyl bromide): 108 g/mol
- Molecular mass of KCN (potassium cyanide): 65 g/mol
- Molecular mass of C_2H_5CN (propanenitrile): 55 g/mol
- Molecular mass of KBr(potassium bromide): 119 g/mol

$$\text{Atom Economy} = \frac{55}{108+65} \times 100$$

$$\text{Atom Economy} = \frac{55}{173} \times 100$$

Atom Economy=31.6%

(2)

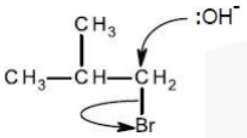
2. D

(1)

3.

(a)

Name : nucleophilic substitution



$\rightarrow (CH_3)_2CHCH_2OH + Br^-$

(3)

(b)

Calculate the moles of 1-bromo-2-methylpropane (1-bromo-2-methylpropane):

moles=volume×density/molar mass

moles=2.0 cm^3×1.26 g/cm^3/136.9 g/mol

moles=2.52 g/136.9 g/mol

moles=0.0184 mol

Determine the theoretical yield of 2-methylpropan-1-ol:

theoretical yield=moles×molar mass

mass of 2-methylpropan-1-ol expected = 0.0184 × 74.0 = 1.36 g

Calculate the percentage yield:

Percentage yield= Actual yield/Theoretical yield×100

Percentage yield=895mg/1.36g ×100

Percentage yield=0.895g/1.36g ×100

Percentage yield=65.8%

(3)

(c)

Name of organic product: Methylpropene

Name the mechanism: Elimination

(2)

4. D

(1)

I am Sorry !!!!!

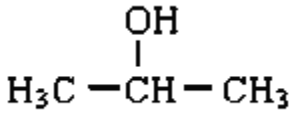
5. A

(1)

6.

(a)

Structure:



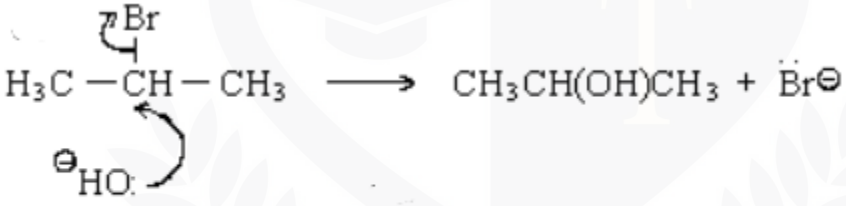
Name: propan-2-ol

(2)

(b)

Name of mechanism: nucleophilic substitution

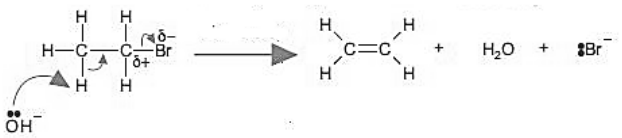
Mechanism:



(3)

7.

Name: Elimination
Mechanism for reaction:



(4)

8. A

(1)

9.

(a)

Condition: UV light causes a bond in CCl_4 to break.
Equation: $CCl_4 \rightarrow CCl_3\cdot + \cdot C$

(2)

(b)

Equation showing Cl· as catalyst
$Cl\cdot + O_3 \rightarrow ClO\cdot + O_2$
$ClO\cdot + O_3 \rightarrow Cl\cdot + 2O_2$

(2)

(c)

Calculate moles of freon:

Moles of freon=$1.78\times10^{-4} \times10^{3}/104.5$ g/mol
$=1.70\times10^{-3}$ mol

Calculate the number of molecules:

Number of molecules=1.70×10^{-3} mol$\times6.02\times10^{23}$ mol^{-1}
$=1.02\times10^{21}$

Calculate molecules in 500 cm^3:

Molecules in 500 cm^3=$1.02\times10^{21}\times500\times10^{-6}/100$
$=5.10\times10^{15}$

10. D

(3)

(1)

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