Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

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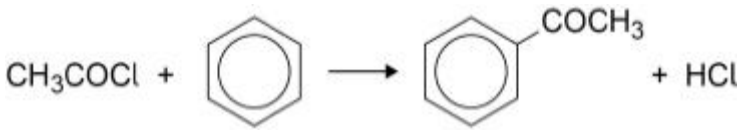
Name of the Student:_____
Max. Marks : 16 Marks **Time : 16 Minutes**

Q1.

Phenylethanone can be prepared by the reaction between ethanoyl chloride and benzene.



In a preparation, with an excess of benzene, the mass of ethanoyl chloride (M_r = 78.5) used was 5.7 × 10^{-2} kg.

The percentage yield of phenylethanone was 62%.

What mass, in grams, of phenylethanone was produced?

A 35 g ⬭

B 54 g ⬭

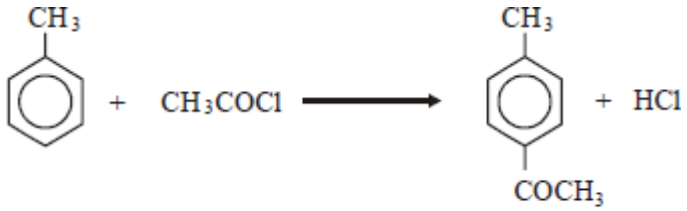
C 87 g ⬭

D 102 g ⬭

(Total 1 mark)

Q2.

Ethanoyl chloride reacts with methylbenzene forming compound **X** according to the equation below.



X

If the experimental yield is 40.0%, the mass in grams of **X** (M_r = 134.0) formed from 18.4 g of methylbenzene (M_r = 92.0) is

A 26.8

B 16.1

C 10.7

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D 7.4

(Total 1 mark)

Q3.

In a reaction which gave a 27.0% yield, 5.00 g of methylbenzene were converted into the explosive 2,4,6-trinitromethylbenzene (TNT) (M_r = 227.0). The mass of TNT formed was

A 1.35 g

B 3.33 g

C 3.65 g

D 12.34 g

(Total 1 mark)

Q4.

A 0.0720 g sample of reducing agent **R** was dissolved in water and acidified with an excess of dilute H_2SO_4. The resulting solution was found to react with exactly 18.0 cm^3 of a 0.0200 mol dm^{-3} solution of $KMnO_4$.

In this reaction, 5 mol of **R** react with 3 mol of $KMnO_4$. The M_r of **R** is

A 120

B 167

C 240

D 333

(Total 1 mark)

Q5.

Propanoic acid reacts with methanol in the presence of a small amount of concentrated sulphuric acid. The empirical formula of the ester formed is

A CH_2O

B $C_2H_6O_2$

C $C_2H_4O_2$

D C_2H_4O

(Total 1 mark)

Q6.

This question is about the following reaction scheme which shows the preparation of polymer **P**.

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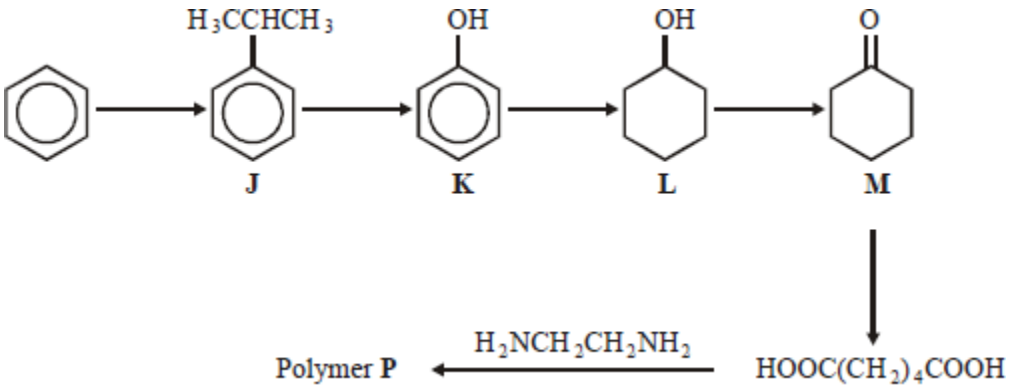

If 1.0 kg of benzene gave 0.98 kg of **J**, the percentage yield of **J** was

A 64

B 66

C 68

D 70

(Total 1 mark)

Q7.

The relative molecular mass (M_r) of benzene-1,4-dicarboxylic acid is

A 164

B 166

C 168

D 170

(Total 1 mark)

Q8.

Butan-1-ol was converted into butyl propanoate by reaction with an excess of propanoic acid. In the reaction, 6.0 g of the alcohol gave 7.4 g of the ester. The percentage yield of ester was

A 57

B 70

C 75

D 81

(Total 1 mark)

Q9.

This question relates to the equilibrium gas-phase synthesis of sulphur trioxide:

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

Thermodynamic data for the components of this equilibrium are:

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Substance	$\Delta H_f^{\ominus}$ / kJ mol^{-1}	$S^{\ominus}$ / J K^{-1} mol^{-1}
$SO_3(g)$	−396	+257
$SO_2(g)$	–297	+248
$O_2(g)$	0	+204

This equilibrium, at a temperature of 585 K and a total pressure of 540 kPa, occurs in a vessel of volume 1.80 dm^3. At equilibrium, the vessel contains 0.0500 mol of $SO_2(g)$, 0.0800 mol of $O_2(g)$ and 0.0700 mol of $SO_3(g)$.

At equilibrium in the same vessel of volume 1.80 dm^3 under altered conditions, the reaction mixture contains 0.0700 mol of $SO_3(g)$, 0.0500 mol of $SO_2(g)$ and 0.0900 mol of $O_2(g)$ at a total pressure of 623 kPa. The temperature in the equilibrium vessel is

A 307 °C

B 596 K

C 337 °C

D 642 K

(Total 1 mark)

Q10.

1,3-dinitrobenzene can be prepared by heating nitrobenzene with a mixture of fuming nitric acid and concentrated sulphuric acid. The reaction can be represented by the following equation.

If the yield of the reaction is 55%, the mass of 1,3-dinitrobenzene produced from 12.30 g of nitrobenzene is

A 16.90 g

B 16.80 g

C 9.30 g

D 9.24 g

(Total 1 mark)

Q11.

Aqueous $C_2O_4^{2-}$ ions react with MnO_4^- ions in acidic solution according to the equation

$$5\ C_2O_4^{2-} + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

Under the same conditions Fe^{2+} ions also react with MnO_4^- ions. How many moles of MnO_4^- ions are

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required to react exactly with one mole of $Fe(C_2O_4).2H_2O$?

A 0.4

B 0.6

C 2.5

D 7.5

(Total 1 mark)

Q12.

An excess of methanol was mixed with 12 g of ethanoic acid and an acid catalyst. At equilibrium the mixture contained 8 g of methyl ethanoate. The percentage yield of ester present was

A 11

B 20

C 54

D 67

(Total 1 mark)

Q13.

When vanadium reacts with chlorine at 400°C, a brown compound is obtained. When an aqueous solution containing 0.193 g of this compound was treated with aqueous silver nitrate all the chlorine in the compound was precipitated as silver chloride. The mass of silver chloride (AgCl) produced was 0.574 g. Which one of the following could be the formula of the brown compound?

A VCl

B VCl_2

C VCl_3

D VCl_4

(Total 1 mark)

Q14.

Hydrolysis of the ester, $CH_3COOCH_2CH_2CH_3$, produces ethanoic acid. In an experiment, 2.04 g of the ester was used and 0.90 g of ethanoic acid was produced. The percentage yield of ethanoic acid was:

A 44

B 59

C 75

D 90

(Total 1 mark)

Q15.

The oxidation of ethanedioate (*oxalate*) ions by manganate(VII) ions can be represented by the half

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equations:

$$C_2O_4^{2-}(aq) \rightarrow 2CO_2(g) + 2e^-$$

$$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l)$$

What volume (in cm^3) of 0.02 M $KMnO_4$ is required to oxidise completely a solution containing 0.02 mol of ethanedioate ions?

A 25

B 40

C 250

D 400

(Total 1 mark)

Q16.

CH_2O is the empirical formula of

A methanol

B methyl methanoate

C ethane-1,2-diol

D butanal

(Total 1 mark)

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