

APOLLO

FBISE Chemistry Class 10

Topical workbook - Volume 2 of 2

112 questions arranged by official framework topic.

National Curriculum 2022-23; supported examinations from 2027.

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Basics of Organic Chemistry

Domain E: Organic Chemistry

Draw the structural formula: of the following:	1.5
a. Ethene b. Propane	+
درج شدہ کے سٹرکچرل فارمولے بنائیں: (الف) ایتھین (ب) پروپین	1.5

				مolecular formula اور structural formula میں فرق۔	
(xi)	If the hydroxide ion concentration of a solution is $1 \times 10^{-4} \text{ mol.dm}^{-3}$, identify whether the solution is acidic, basic, or neutral. Give a brief reason.	1+2	OR	Differentiate between a molecular formula and a structural formula of a straight-chain hydrocarbon with the help of an example.	1.5 +
	اگر کسی محلول میں ہائیڈروکسائیڈ آئن کی کثافت $1 \times 10^{-4} \text{ mol.dm}^{-3}$ ہے تو یہ محلول تیزاب، قلی، یا خنثی ہے۔ ایک مختصر وجہ دیں۔			ایک سٹریٹ چین ہائیڈروکاربن کے لیے مالیکیولر فارمولا اور سٹرکچرل فارمولا میں فرق۔	1.5

Write the structural formulas of the following:

- a. n-Heptane b. Methanal c. Methanoic acid

(1+1+1)

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Hydrocarbons

Domain E: Organic Chemistry

Q. 2	Attempt the following questions	(10x3 = 30)
(i)	Based on the given standard electrode potential (E°) values, arrange the following metals in order of increasing reactivity. Explain how electrode potential relates to metal reactivity. $\text{Mg}^{2+} + 2e^- \rightarrow \text{Mg} \quad E^\circ = -2.37$ $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu} \quad E^\circ = +0.34$ $\text{Ni}^{2+} + 2e^- \rightarrow \text{Ni} \quad E^\circ = -0.25$	1+2 OR A gas sample has a volume of 2 dm ³ at room temperature and pressure. How many moles of gas does it contain?
(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	1+1 +1 OR a. What is molarity? How do you convert molarity to g/dm ³ ? b. What is the molarity of a solution made by dissolving 98 g of H ₂ SO ₄ in 2 dm ³ of water? (Molar mass of H ₂ SO ₄ = 98 g/mol)
(iii)	A sample of calcium carbonate (CaCO ₃) contains 20 grams of calcium. What is the mass of carbon dioxide (CO ₂) produced when the calcium carbonate is heated?	03 OR Draw structural formula of a. Pent-2-ene b. But-1-ol c. Pentanoic acid
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers. c. Which polymer is commonly used to make plastic bottles?	1+1 +1 OR Draw the structure showing how a polypeptide molecule is formed, clearly showing the peptide linkages within the chain.
(v)	Write the chemical equations for the reactions of: a. Zinc with steam. b. Magnesium with hydrochloric acid. c. Sodium with cold water.	1+1 +1 OR a) What are the reactants in a hydrogen-oxygen fuel cell? b) Which electrode in a hydrogen-oxygen fuel cell undergoes oxidation? c) Write the overall reaction for a hydrogen-oxygen fuel cell.
(vi)	a. What is esterification? Provide a general reaction equation to illustrate the process. b. Why is esterification considered a condensation reaction?	2+1 OR How does the lattice structure of ionic compounds contribute to their physical properties?
(vii)	Complete the following reactions: a. $\text{CH}_3\text{-CH}_2\text{-Br} + \text{alcoholic KOH} \rightarrow \text{Y}$ b. $\text{Y} + \text{Br}_2 \rightarrow \text{Z}$	1.5 + 1.5 OR Why are SO ₂ and CO ₂ classified as acidic oxides and CuO and CaO as basic oxides?

(viii)	a. Why is petroleum considered a mixture? Give three examples of a hydrocarbon found in petroleum.	1.5 + 1.5	OR
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1.5 + 1.5	OR	Ethene and ethane are hydrocarbons which belong to different classes. How can they be distinguished? Write at least two tests in each case for the support of your answer.	1+2
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3.	Which gas is widely used for welding and cutting metals?	Methane	Ethane	Ethylene	Acetylene
		ميٿين	ايٿين	ايٿيلين	ايسيٽيلين

Halogenation of methane in diffused sunlight does NOT produce:	Carbon tetra-chloride, CCl_4	Chloroform, $CHCl_3$	Carbon Black, C	Chloro methane, CH_3Cl
	ڪاربن ٽٽراڪلوريڊ	ڪلورو فورم	ڪاربن بلاك	ڪلورو ميٿين

State Bronsted-Lowry concept of Acids and Bases. Discuss reactions of NH_3 and HCl with water in light of this concept. How does water behave in both reactions? برونسٹڈ-لوری کا ایسڈ اور بیسز کا نظریہ بیان کریں۔ نیز اس نظریہ کی روشنی میں NH_3 اور HCl کے پانی ساتھ ری ایکشنز بیان کریں۔ پانی دونوں ری ایکشنز میں کیسے کام کرتا	06	OR	What is the trend of reactivity of halogens with alkanes? How methane reacts with chlorine in diffused sunlight? الکین کے ساتھ ہیلوجنز کے ری ایکشن کا رجحان کیا ہے؟ میتھین کلورین کے ساتھ سورج کی ڈیفوزڈ روشنی میں کس طرح ری ایکٹ کرتی ہے؟	06
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OR

04

What are the main sources of organic compounds?
Describe any one source briefly.

What are the main sources of organic compounds?
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(xi)	How is oxalic acid prepared from ethyne? Write complete equation.	03
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OR	What is meant by Halogenation? How does methane undergo halogenation under diffused and direct sunlight?	06
	ہالوجینیشن سے کیا مراد ہے؟ میتھین کی ہالوجینیشن اور ڈیفوزڈ اور ڈیریکٹ سولائٹ میں	

Bromine water test is used to indicate the presence of all EXCEPT :				
1.	$H_2C=CH_2$	H_3C-CH_3	$HC\equiv CH$	$H_3C-CH=CH_2$

درجہ	پیشہ	نام	پتہ	تاریخ	
12.	Which compound will discharge pink color of $KMnO_4$ solution and will be oxidized?	Ethane	Ethene	Methane	Butane

Write the chemical equation for hydrogenation of ethene. Name the catalyst used.	2+1
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Draw the structural formulas of ethane and ethene. Which is more reactive?	03
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Discuss the preparation of ethene by following methods with chemical equations. آپتھین کی درج طریقوں سے تیاری بیان کریں۔ کیمیکل ری ایکشنز کی مساوات بھی لکھیں۔ a. Dehydration of alcohols الکوحل کی ڈی ہائیڈریشن b. Dehydrohalogenation of alkyl halides ہالو آئل کی ڈی ہائیڈرو ہالوجینیشن	3+3
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1.5 + 1.5	OR	State the observation when an unsaturated hydrocarbon reacts with aqueous bromine. Explain with equation. الان سیکور ٹنڈر کاربن کے ایکو کر، برومین سے رڈا ایکشن، رکسا آزر ویش، ہوگا، ہے؟ ایک	1+2
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How can ethene (C ₂ H ₄) be prepared from: ایتھین (C ₂ H ₄) کو درج شدہ سے کیسے بنایا جاسکتا ہے؟			03
a	Bromoethane	برومو ایٹھین	
b	Ethanol	ایٹھانول	

What is petroleum? Why does it need to be separated into fractions?

پٹرولیم کیا ہے؟ اسے مختلف حصوں میں تقسیم کیوں ضرورت ہوتی ہے؟

1+2

Write the complete balanced chemical equation for the addition of steam to ethene to form ethanol.

ایتھین میں بھاپ کے اضافے سے ایٹھانول بنانے کی مکمل متوازن کیمیائی مساوات لکھیں۔

03

Q.3	Enlist any four petroleum fractions. Also given their uses. پٹرولیم فریکشن کے کسی بھی چار حصوں کے نام لکھیں اور ان کے استعمالات بھی بیان کریں۔	1x4
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How can presence of double bond be identified in hydrocarbons? Give chemical reaction. کسی ہائیڈروکاربن میں ڈبل بانڈ کی موجودگی کیسے معلوم کی جاسکتی ہے؟ کیمیائی مساوات	2+1
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پروپین (C ₃ H ₆) کی درج شدہ سے تیاری لکھیں۔		
Write the preparation of C ₃ H ₆ (propene) from:		
a	Bromo-propane	بروموپروپین
b	Propane-1-ol	پروپین-1-اول
What is meant by fractional distillation? Enlist any		

03

پروپین-1-اول		
Propane-1-ol		
What is meant by fractional distillation? Enlist any two petroleum fractions.		
فرائیکشن ڈسٹیلیشن سے کیا مراد ہے؟ کوئی سی دو پٹرولیم فرائیکشنز کے نام لکھیں۔		

2+1

Describe the potassium manganate (VII) (KMnO_4) test for unsaturated hydrocarbons with balanced equation.

غیر شدہ ہائیڈروکاربن کے لئے پوٹاشیم مینگنٹ (VII) ٹیسٹ بیان کریں متوازن

03

درج شدہ پراسسز کے لیے متوازن کیمیائی مساوات تحریر کریں:

03

پ۔ راستے میں پیر پیٹھ پر رہا ہے، دسواں گریں۔

فریکشننگ کالم میں نیچے سے اوپر درج شدہ خصوصیات میں تبدیلی تفصیلاً بیان کریں۔

2+2

OR

(vii)	Complete the following reactions: a. $\text{CH}_3\text{-CH}_2\text{-Br} + \text{alcoholic KOH} \rightarrow \text{Y}$ b. $\text{Y} + \text{Br}_2 \rightarrow \text{Z}$	1.5 + 1.5	OR
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6. Which of the following is a hydrocarbon? درج شدہ میں سے کون سا ہائڈروکاربن ہے؟	H_2O	C_2H_6	N_2	CO_2
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Which of the following is a hydrocarbon? درج شدہ میں سے کون سا ہائڈروکاربن ہے؟	H_2O	C_2H_6	N_2	CO_2	☐
Which structural formula represents an alkyne?	$\text{CH}_3\text{-CH}_3$	$\text{CH}_2=\text{CH}_2$	$\text{CH}_3\text{-CH=CH}_2$	$\text{HC}\equiv\text{CH}$	☐

(ii)	Is NH_3 a base? Justify in light of Bronsted-Lowry concept.	1+2	OR	Write general formulas of alkanes, alkenes and alkynes.	1x3
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سیر شدہ ہائیڈروکاربنوں کو سیر شدہ ہائیڈروکاربنوں کے طور پر کہا جاتا ہے۔	
(iii)	Why are alkanes called saturated hydrocarbons while alkenes and alkynes are called unsaturated hydrocarbons?
	1.5
	+
	1.5
الکینز کو سیر شدہ ہائیڈروکاربن جبکہ الکینز اور الکائینز کو غیر سیر شدہ ہائیڈروکاربن کیوں کہا جاتا	

ہر میٹوڈیٹ اور انڈسٹریل ویسٹ کی تین تین مثالیں لکھیں۔		سیر شدہ ہائیڈروکاربنوں کو سیر شدہ ہائیڈروکاربنوں کے طور پر کہا جاتا ہے۔	
(viii)	Briefly explain the role of DNA in the storage and transmission of genetic information. (Three points)	Write a chemical equation showing the halogenation of an alkene using ethene and bromine.	1x3
	1x3	OR	1x3
جراثیم اور برومین استعمال کرتے ہوئے الکین کی ہیلوجنیشن کو ظاہر کرنے والا کیمیائی		ایٹھین اور برومین استعمال کرتے ہوئے الکین کی ہیلوجنیشن کو ظاہر کرنے والا کیمیائی	

Attempt an questions.

State law of mass action. Derive K_c expression for: $aA + bB \rightleftharpoons cC + dD$ لاو آف ماس ایکشن بیان کریں۔ نیز درج ری ایکشن کے لیے K_c ایکسپریژن اخذ کریں۔	2+4	OR	Write complete balanced chemical reactions of $KMnO_4$ with: a. $CH_2 = CH_2$ b. $CH \equiv CH$ $KMnO_4$ کے درج شدہ کے ساتھ مکمل۔یلنڈیکیمیکل ری ایکشنز لکھیں۔	2+4
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Q.1 Fill the relevant bubble for each part. Each part carries one mark.

- (1) Which one of the following compounds is formed by the reaction of Aluminium Hydroxide $\text{Al}(\text{OH})_3$ with Sulphuric Acid (H_2SO_4)?

A. $\text{Al}(\text{SO}_4)_3$	B. Al_2CO_3
C. $\text{Al}_2(\text{SO}_4)_3$	D. AlCl_3
- (2) Marble Buildings are disintegrated by acid rain because of the reaction of acid with:

A. Calcium Sulphate	B. Calcium Nitrate
C. Calcium Carbonate	D. Calcium Oxalate
- (3) Dipeptide is formed by joining of two molecules of:

A. Amino acids	B. Alcohols
C. Carboxylic acids	D. Amines
- (4) Two products obtained from the carbonating tower during the Solvay Process are

A. NH_4Cl and CO_2	B. NH_4HCO_2 and NH_4Cl
C. NaHCO_3 and NH_4Cl	D. NaHCO_3 and NH_3
- (5) The end product of the reaction of acetylene with concentrated alkaline KMnO_4 is

A. Reduction	B. Oxidation
C. Substitution	D. Rearrangement
- (6) One mole of an unsaturated hydrocarbon reacts with one mole of hydrogen to form a saturated compound. Predict the formula of unsaturated compound.

A. C_3H_4	B. C_6H_{12}
C. C_4H_{10}	D. C_7H_{16}

How will you differentiate between Ethane and Ethene using a chemical reaction?

(1+2)

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Q.6 Define fractional distillation. Enlist four fractions obtained by fractional distillation of petroleum. (1+1+1+1)

i. A given organic compound 'X' gives positive Bayer's test (Reaction with KMnO_4). Mention the change observed for this test. [01]

APOLLO

Hydroxy Compounds

Domain E: Organic Chemistry

Write equation of complete combustion of alcohols. Write names of products formed.	2+1
الکو حل کے مکمل احتراق (کمبوسجن) کی مساوات لکھیں۔ نیز پراڈکٹس کے نام لکھیں۔	

One major advantage of alcohol fuels over fossil fuels is that they:	Are non-flammable	Are renewable	Produce smoke	Have higher sulfur content
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Write balanced chemical equation of complete combustion of Methanol. Write names of products. میٹھانول کے مکمل احتراق (کمبوسچن) کی مساوات لکھیں۔ نیز پراڈکٹس کے نام بھی	2+1
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State one advantage and one disadvantage of fermentation compared to the catalytic hydration of ethene. آستھین کی کیٹلک ہائیڈریشن کے مقابلے میں خمیر سازی کا ایک فائدہ اور ایک نقصان بیان	1.5 +
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A disadvantage of alcohol fuels compared to petrol is:	High sulfur content	Lower energy content	Higher pollution	Non-renewable
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03

Through which process glucose is converted into ethanol? Write balance chemical equation. 1+2

1+2

Briefly state any two uses of alcohols in daily life.	1.5
روزمرہ زندگی میں الکحل کوئی سے دو استعمالات مختصر اُ بیان کریں۔	+ 1.5

1.5 + 1.5	OR	Explain the combustion process of alcohols and discuss why they are considered cleaner fuels compared to fossil fuels?	1.5 + 1.5
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APOLLO

Carbonyl Compounds

Domain E: Organic Chemistry

Q. 2	Attempt the following questions	(10x3 = 30)
(i)	Based on the given standard electrode potential (E°) values, arrange the following metals in order of increasing reactivity. Explain how electrode potential relates to metal reactivity. $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg} \quad E^\circ = -2.37$ $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu} \quad E^\circ = +0.34$ $\text{Ni}^{2+} + 2\text{e}^- \rightarrow \text{Ni} \quad E^\circ = -0.25$	A gas sample has a volume of 2 dm ³ at room temperature and pressure. Calculate the number of moles of gas does it contain?
(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	a. What is molarity? How do you convert molarity to g/dm ³ ? b. What is the molarity of a solution made by dissolving 98 g of H ₂ SO ₄ in 1 dm ³ of water? (Molar mass of H ₂ SO ₄ = 98 g/mol)
(iii)	A sample of calcium carbonate (CaCO ₃) contains 20 grams of calcium. What is the mass of carbon dioxide (CO ₂) produced when the calcium carbonate is heated?	Draw structural formula of the following: a. Pent-2-ene b. But-1-ol c. Pentanoic acid
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers. c. Which polymer is commonly used to make plastic bottles?	Draw the structure showing how a polypeptide molecule is formed, clearly showing the peptide linkages within the chain.
(v)	Write the chemical equations for the reactions of: a. Zinc with steam. b. Magnesium with hydrochloric acid. c. Sodium with cold water.	a) What are the reactants in a hydrogen-oxygen fuel cell? b) Which electrode in a hydrogen-oxygen fuel cell undergoes oxidation? c) Write the overall reaction for a hydrogen-oxygen fuel cell.
(vi)	a. What is esterification? Provide a general reaction equation to illustrate the process. b. Why is esterification considered a condensation reaction?	How does the lattice structure of ionic compounds contribute to their physical properties?

میں دیں اور اس میں متوازن کیمیائی مساوات لکھیں۔

What is esterification? Give an example having balanced chemical equation.

ایسٹری فیکیشن کیا ہے؟ ایک مثال دیں اور متوازن کیمیائی مساوات لکھیں۔

1x3

Vinegar is produced by bacterial oxidation
11. of:

Ethanoic acid

Ethanol

Propanol

Methanol

Give balanced chemical reaction between ethanoic acid and methanol. Also write name of the products formed.

ایٹھانکک اسڈ اور میتھانول کے درمیان ایکشن کا متوازن مساوات لکھیں۔ نیز بننے والے

1+2

Which condition is necessary for bacterial oxidation of ethanol to ethanoic acid?

Strong acid

Absence of oxygen

High pressure

Presence of oxygen

Write the general word equation for the esterification reaction. Also give a specific example.	1+2
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APOLLO

Polymers

Domain E: Organic Chemistry

Q. 2	Attempt the following questions	(10x3 = 30)
(i)	Based on the given standard electrode potential (E°) values, arrange the following metals in order of increasing reactivity. Explain how electrode potential relates to metal reactivity. $\text{Mg}^{2+} + 2e^- \rightarrow \text{Mg} \quad E^\circ = -2.37$ $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu} \quad E^\circ = +0.34$ $\text{Ni}^{2+} + 2e^- \rightarrow \text{Ni} \quad E^\circ = -0.25$	A gas sample has a volume of 2 dm ³ at room temperature and pressure. Calculate the number of moles of gas does it contain?
(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	a. What is molarity? How do you convert molarity to g/dm ³ ? b. What is the molarity of a solution made by dissolving 98 g of H ₂ SO ₄ in 2 dm ³ of water? (Molar mass of H ₂ SO ₄ = 98 g/mol)
(iii)	A sample of calcium carbonate (CaCO ₃) contains 20 grams of calcium. What is the mass of carbon dioxide (CO ₂) produced when the calcium carbonate is heated?	Draw structural formula of the following: a. Pent-2-ene b. But-1-ol c. Pentanoic acid
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers. c. Which polymer is commonly used to make plastic bottles?	Draw the structure showing how a polypeptide molecule is formed, clearly labeling the peptide linkages within the chain.

A polymer is formed by the reaction between a dicarboxylic acid and a diamine. - What type of polymerization occurs in this reaction? - Determine the structure of the repeating unit in the resulting polymer. - Identify the functional group that forms during the polymerization process. - Name a well-known synthetic polyamide and mention one of its applications.	$1+2+1+2$
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What is a polymer? Give two examples as well.

پولیمر کیا ہے؟ دو مثالیں بھی دیں۔

03

Q.6

What happens during the electrolysis of dilute copper sulphate using copper electrodes? Also give the equations of chemical reactions occurring at both electrodes.

ڈائلوٹ کاپر سلفیٹ کے محلول کی الیکٹرولیس جب کاپر کے الیکٹروڈز کے ذریعے کی

2+2

OR

Describe the formation of a polyamide from a dicarboxylic acid and a diamine. Include a general equation and the type of linkage formed.

ڈائیکاربوکسیٹک ایسڈ اور ڈائی امین سے پولی امائیڈ کی تشکیل بیان کریں۔ عمومی مساوات

2+2

Describe the environmental challenges. Caused by plastic, limited to:

درج نکات کی روشنی میں پلاسٹک کی وجہ سے پیدا ہونے والے ماحولیاتی مسائل کی وضاحت کریں۔

a	Disposal in landfill sites	لیژنڈ فل سائٹس میں تخلیق
b	Accumulation in oceans	سمندر دوں میں جمع ہونا

A polymer is formed by the reaction between a dicarboxylic acid and a diamine.

- a) What type of polymerization occurs in this reaction? Explain.
- b) Determine the structure of the repeating unit in the resulting polymer.
- c) Identify the functional group that forms during the polymerization process.

04

Name a well-known synthetic polyamide and mention one of its applications.

APOLLO

Biochemistry

Domain E: Organic Chemistry

Q. 2	Attempt the following questions			(10x3 = 30)
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(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	1+1 +1	OR	a. What is molarity? How can you convert molarity to g/dm ³ ? b. What is the molarity of a solution made by dissolving 98 g of H ₂ SO ₄ in 1 dm ³ of water? (Molar mass of H ₂ SO ₄ = 98 g/mol) 1.5+ 1.5
(iii)	A sample of calcium carbonate (CaCO ₃) contains 20 grams of calcium. What is the mass of carbon dioxide (CO ₂) produced when the calcium carbonate is heated?	03	OR	Draw structural formula of following a. Pent-2-ene b. But-1-ol c. Pentanoic acid 1+1+ 1
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers.	1+1 +1	OR	Draw the structure showing how protein molecule is formed, clearly highlighting the peptide linkages within the structure. 2+1

6. Proteins are essential for the formation of:	Protoplasm	Cholesterol	Dextrin	Cellulose
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03

Q.4	Differentiate between Monosaccharides and disaccharides with examples.	06
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06

Discuss any four uses of proteins.

04

پروٹیز کے کوئی سے چار استعمالات تحریر کریں۔

— 22 —

Enlist any three sources of lipids.

03

لہذا کے ذرائع مختصر تحریر کریں۔ (کوئی سے تین)

پروٹیز کے سورسز اور کوئی سے چار استعمالات بیان کریں۔

06

Q.6	Describe the importance of vitamins. (Any four points)	04
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5.	Which bonds are responsible for holding amino acids together in proteins?	Hydrogen bonds	Ionic bonds	Peptide bonds	Glycosidic bonds
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مونو سیکرائڈز اور ڈائی سیکرائڈز کی فزیکل خصوصیات کا موازنہ کریں۔ اور ان کی دودو

3+3

Name two sources of vitamin A and state one of its functions.

وٹامن A کے دو ذرائع بتائیں اور اس کا ایک فعل بیان کریں۔

1x3

Draw the general structure of an amino acid and label its main functional groups.

امینو ایسڈ کی عمومی ساخت بنائیں اور اس کے اہم فنکشنل گروپس کی نشاندہی کریں۔

1+2

Give two sources of vitamin C and mention one deficiency disease caused by its lack.

وٹامن سی کے دو ذرائع لکھیں اور اس کی کمی سے پیدا ہونے والی ایک بیماری نام لکھیں۔

1x3

Draw the general structure of a dipeptide formed from two amino acids.

دو امینو ایسڈز سے بننے والے ڈیپٹائیڈ کی عمومی ساخت بنائیں۔

03

(x)	Vitamins are important for our health. Summarize their sources and importance in health.	1.5 + 1.5
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8. Which of the following is a disaccharide?	Glucose	Fructose	Sucrose	Ribose
	گلوکوز	فکٹوز	سکروز	ریبوز

(vi)	Why is RNA important for protein synthesis in cells? Write three reasons.	1x3	OR	Enlist any three major gases present in the atmosphere along with their approximate percentages.	1x3
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Q.4	How peptide bonds are formed between amino acids? Explain. Draw a labeled diagram showing peptide bond formation.	3+3	OR	a) b)
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- Apollo | original FBISE source crops | 55

Q.2 Attempt all parts from the following. All parts carry equal marks. (11 × 3 = 33)

i. Classify the following substances as Lewis acids or Lewis bases. (1+1+1)

a. AlBr_3 b. $\text{CH}_3\text{-CH}_2\text{-OH}$ c. CN^{-1}

OR

Write down balanced chemical equations showing the formation of salt: (1.5+1.5)

a. Reaction of HCl acid with Al metal

b. Reaction of HCl acid with calcium carbonate

ii. Write the name and formulas of the three Nitrogen containing fertilizers. (1+1+1)

OR

What are the products formed as a result of combustion of methane in the presence of limited and excess supply of oxygen? (1.5+1.5)

iii. What is slaked lime? How is it produced during Solvay process? (1+2)

OR

Define the following with examples:

a. Lipids

b. Fats

c. Oils

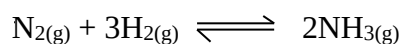
iv. Describe ion exchange method for removal of hardness of water. (3)

OR

Derive alkyl radicals from the following alkanes?

a.) Butane b) isopropane c) propane (1+1+1)

v. For the given reversible reaction equilibrium concentration is: (1.5+1.5)



$$N_2 = 0.602 \text{ mol dm}^{-3}$$

$$\text{H}_2 = 0.420 \text{ mol dm}^{-3} \text{ and}$$

$$\text{NH}_3 = 0.113 \text{ mol dm}^{-3}.$$

Calculate the value of K_c and determine K_c unit.

OR

What are essential and non-essential amino acids? Draw a peptide linkage between two amino acids? (1+1+1)

How vitamins can be classified on the basis of their solubility? State their importance? (1.5+1.5)

What is nucleic Acid? Describe structure and function of DNA. (1+2.5+2.5)

APOLLO

Energy

Domain F: Empirical Data Collection & Analysis

your answer.		
OR	a. What are the primary fossil fuels used for energy production?	1+1 +1
	b. Identify the fossil fuel that is mainly composed of methane. Among coal, petroleum, and natural gas, which is considered the cleanest-burning fuel	

What is meant by global warming? Enlist any two harmful effects.	03
--	----

Q.5 Explain briefly petroleum and its formation.

پیٹرولیم اور اس کی تشکیل کی مختصر وضاحت کریں۔

04

First Annual 2026 | Section B Q2(iii) | 3 marks

What are fossil fuels? Name any three fossil fuels.

فوسل فیوز کیا ہیں؟ کوئی سے تین فوسل فیوز کے نام لکھیں۔

1.5

+

1.5

What is fossil fuel? Name any three fossil fuels.	1.5
فوسل فیل کیا ہے؟ کوئی سے تین فوسل فیلز کے نام لکھیں۔	+
	1.5

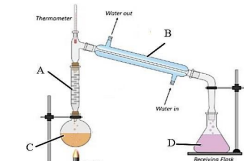
APOLLO

Lab and Practical Skills

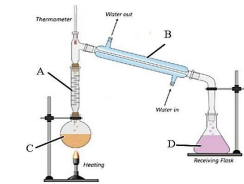
Domain G: Lab and Practical Skills

FBISE PBA model | Section A Q2 | 6 marks

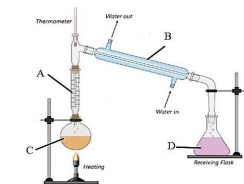
Q No.2 In the school laboratory, students are tasked with separating a mixture of water and alcohol using fractional distillation. The arrangement of the apparatus is shown in the figure below.



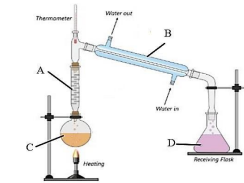
- a. Label the components A, B, C and D. [1]



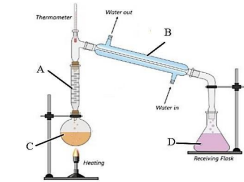
- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as 'A' in this setup, and how does it improve the separation process? [1]



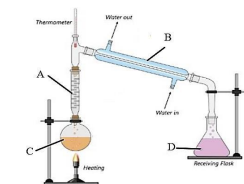
- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as 'A' in this setup, and how does it improve the separation process? [1]
- c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]



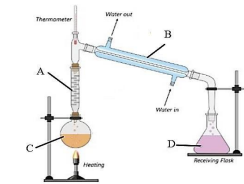
- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as 'A' in this setup, and how does it improve the separation process? [1]
- c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]
- d. During the experiment, the thermometer stabilizes at around 78°C. What does this indicate, and which liquid is being collected at this temperature? [1]



- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as 'A' in this setup, and how does it improve the separation process? [1]
- c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]
- d. During the experiment, the thermometer stabilizes at around 78°C. What does this indicate, and which liquid is being collected at this temperature? [1]
- e. How can you confirm that the distillate collected at 78°C is alcohol and not water? [1]

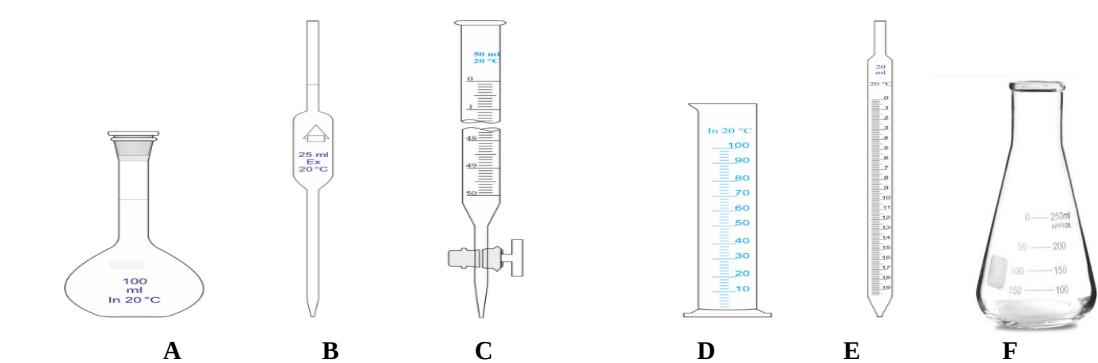


- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as 'A' in this setup, and how does it improve the separation process? [1]
- c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]
- d. During the experiment, the thermometer stabilizes at around 78°C. What does this indicate, and which liquid is being collected at this temperature? [1]
- e. How can you confirm that the distillate collected at 78°C is alcohol and not water? [1]
- f. How would you adjust the heat source to ensure a steady and controlled distillation process? [1]



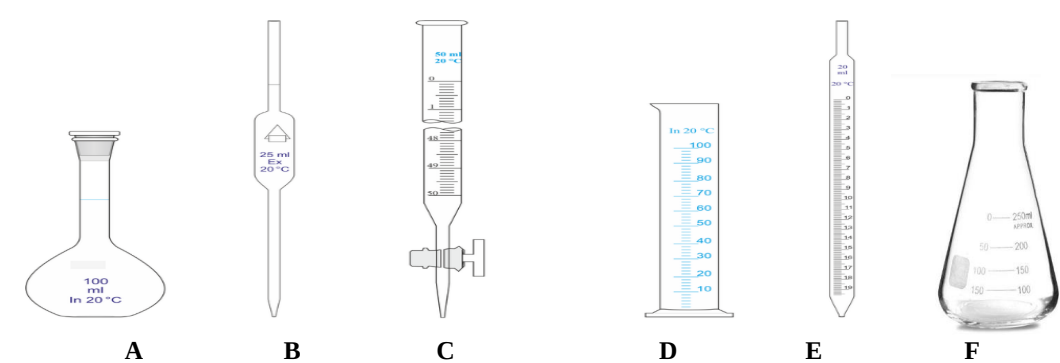
Q No.3 Purpose of this experiment is to determine the exact molarity of NaOH volumetrically. 0.1 M HCl is given.
In this experiment NaOH is taken in the conical flask and HCl in the burette.

- a. Which of the following apparatus is used to transfer 10cm³ of NaOH into the conical flask? [1]



Chemicals used:
Phenolphthalein
Distilled water
0.1M HCl

- In this experiment NaOH is taken in the conical flask and HCl in the burette.
a. Which of the following apparatus is used to transfer 10cm³ of NaOH into the conical flask? [1]



- b. See the figure given below and record the observations in table. [2]

Titration 1		Titration 2		Titration 3	
Initial Reading	Final Reading	Initial Reading	Final Reading	Initial Reading	Final Reading

Observation Table:

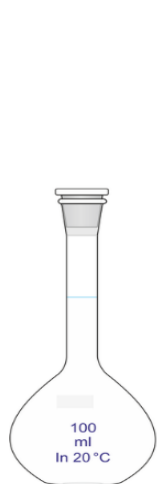
Sr. No	Initial Reading	Final Reading	Volume of HCl used
1	3.2cm ³		
2			
3			

Mean volume of HCl used= cm³

- c. By using the data given in the part “b” and volume of NaOH used. Calculate the molarity of NaOH. [1]
d. Why is it important to perform multiple titrations and take an average of the results? [1]
e. If a student accidentally adds too much indicator to the solution, how might this affect the titration results? [1]

Question no 1: Purpose of this experiment is to determine the exact molarity of Na_2CO_3 volumetrically. 0.1 M HCl is given.

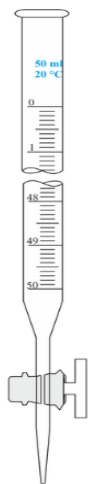
- i. Which of the following apparatus are used in this experiment: Encircle the correct option. [01]



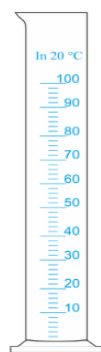
A



B



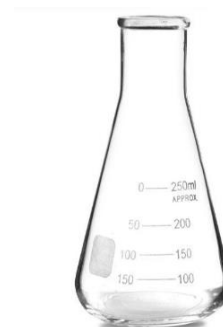
C



D



E



F

Chemicals used:

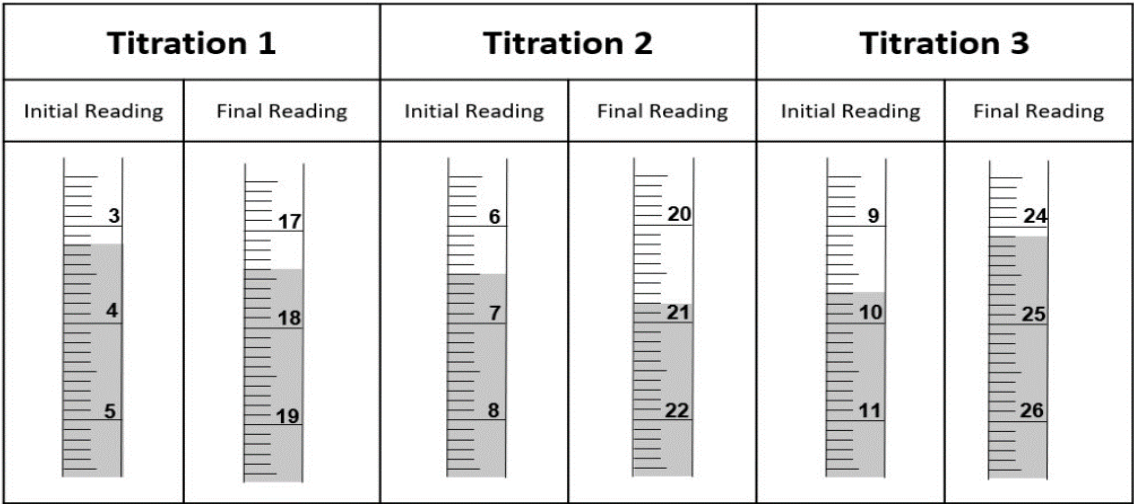
Methyl orange

Distilled water

0.1M HCl

$V_1 = 10\text{cm}^3$ (Na_2CO_3 solution)

ii. Refer to the figure given below and complete the observation table.



Observation Table:

Sr. No	Initial Reading	Final Reading	Volume of HCl used
1			
2			
3			

[01]
[01]
[01]

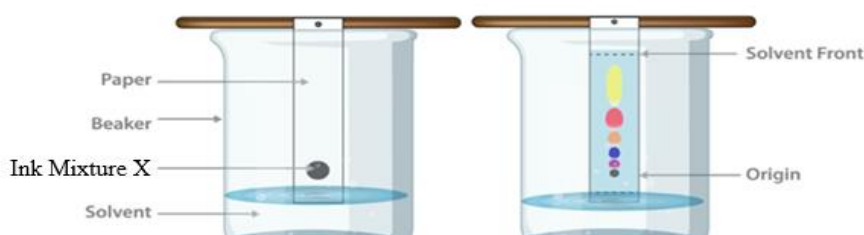
Mean volume of HCl used = cm³

ii. When an unknown salt is subjected to a flame test, a crimson red flame is obtained. Give procedure of the test and indicate the cation which gave red flame. **[01]**

Q No.1 Ali, a Grade 10 student, is tasked with separating the components of a mixture of inks using paper chromatography in the school laboratory. He has been provided with the following materials:

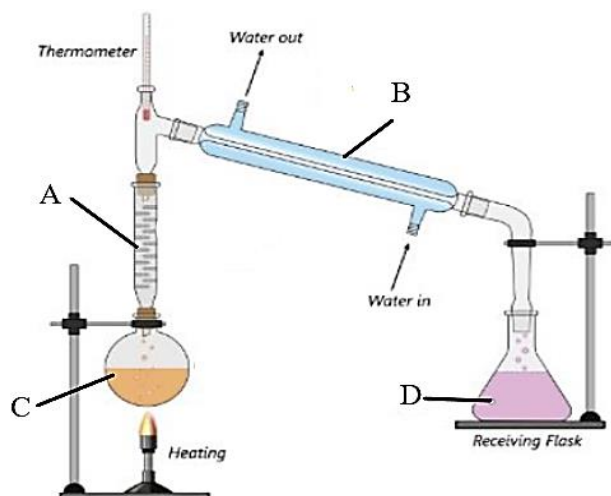
- Chromatography paper
- A pencil
- A capillary tube
- Beakers
- A solvent (water/alcohol mixture)
- Ink samples (Mixture X)

Ali is instructed to follow the standard procedure for paper chromatography and analyze his results to identify the composition of mixture X.



- a. Ali begins by drawing a baseline on the chromatography paper. Where should Ali draw the line, and why should he use a pencil instead of a pen? [1]
 Ali should draw the line at the bottom of the paper, just above the solvent level. He should use a pencil because it is not soluble in the solvent and will not be carried away by the solvent front. [1]
- b. Ali used a capillary tube to apply small spots of X (mixture of inks). How can he ensure that the spots are properly placed for effective separation? [1]
 He should ensure that the spots are small and concentrated, and that they are applied to the baseline. [1]
- c. After applying the ink spots, Ali placed the chromatography paper into a beaker with the solvent. What must Ali check to ensure the setup is correct before starting the experiment? [1]
 He should check that the solvent level is below the baseline and that the paper is not touching the sides of the beaker. [1]
- d. How can Ali determine when the experiment is complete, and what should he do immediately after removing the paper from the beaker? [1]
 He should determine when the solvent front is near the top of the paper. Immediately after removing the paper, he should mark the solvent front and the positions of the spots. [1]
- e. Ali observed that X separates into two distinct spots. What conclusion can Ali draw about the composition of X? [1]
 He can conclude that mixture X contains two different substances. [1]
- f. Perform the necessary calculations to Calculate the R_f values for substance A and B. [1]

Q No.2 In the school laboratory, students are tasked with separating a mixture of water and alcohol using fractional distillation. The arrangement of the apparatus is shown in the figure below.

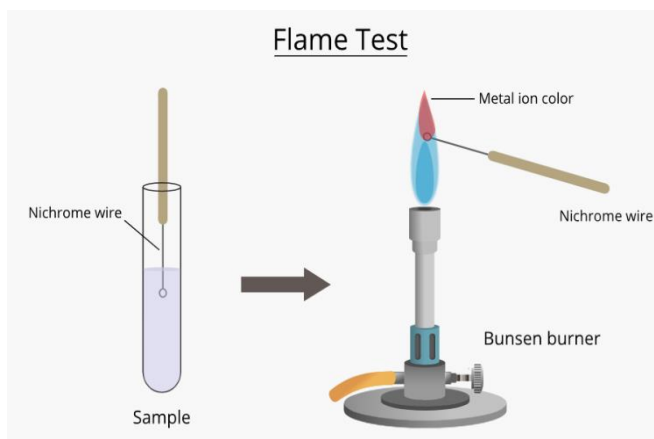


- a. Label the components A, B, C and D. [1]
- b. What is the purpose of the component labelled as `A` in this setup, and how does it improve the separation process? [1]
- c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]
- d. During the experiment, the thermometer stabilizes at around 78°C. What does this indicate, and which liquid is being collected at this temperature? [1]
- e. How can you confirm that the distillate collected at 78°C is alcohol and not water? [1]
- f. How would you adjust the heat source to ensure a steady and controlled distillation process? [1]

Q No.3 A student **Y** is working in the school laboratory to identify metal ions using the flame test. He is provided with:

- Solid samples of salts containing Na^+ , K^+ , Ca^{2+} , Cu^{2+} , and Ba^{2+} ions.
- A clean platinum/nichrome wire.
- Concentrated hydrochloric acid (for cleaning the wire).
- A Bunsen burner.
- Safety equipment (goggles, gloves).

Y must perform the flame test for each sample and record the flame color to identify the metal ion.



- What is the purpose of cleaning the nichrome/platinum wire before testing a new sample. Why is this step important. [1]
- Describe how **Y** should hold the wire in the Bunsen burner flame to observe the colour effectively. If **Y** observes a yellow flame while testing, which metal ion is likely present in the sample? [1]
- A student, **Z** is setting up an experiment to measure the boiling point of ethanol. He repeats the experiment 3 times to calculate the average. His determined boiling points are 70°C , 71°C , 70.5°C . The true boiling point of ethanol is 78°C . How would you describe his work in terms of accuracy and precision? [1]
 Accuracy: [1]
 Precision: [1]
- Design an experiment to separate a mixture of substances using sublimation. [1]