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## **Organic Chemistry Multiple Choice Questions**

 An organic compound, X, has the empirical formula C<sub>2</sub>H<sub>4</sub>O and a relative molecular mass of 88. It reacts with ethanol in the presence of concentrated sulphuric acid to produce a sweet smelling liquid. Which one of the following structures could X have?



- 2. The conversion of ethanol into ethene is an example of:
  - A Hydration. B Dehydrogenation.
  - **C** Dehydration. **D** Fermentation.

**3.** Which one of the following substances is formed when propan-1-ol (C<sub>3</sub>H<sub>7</sub>OH) is oxidised by acidified sodium dichromate(VI) (Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>)?

- **A** C<sub>3</sub>H<sub>8</sub> **B** C<sub>3</sub>H<sub>6</sub>
- **C** C<sub>3</sub>H<sub>7</sub>ONa **D** C<sub>2</sub>H<sub>5</sub>COOH

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4. The structure of butane maybe represented as:



Which one of the following is an isomer of butane?



- **6.** Which one of the following is the formula of a possible product when ethanol ( $C_2H_5OH$ ) is oxidised?
  - **A** C<sub>2</sub>H<sub>4</sub> **B** C<sub>2</sub>H<sub>6</sub>

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**C** C<sub>2</sub>H<sub>5</sub>COOH **D** CH<sub>3</sub>COOH

7. It can be predicted from their formulae that the compounds:



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12.	Which one of the following reagents is best suited to distinguishing between						
	samples of ethane and ethene? <b>A</b> A lighted splint. <b>B</b> Aqueous bromine.						
	Α	A lighted splint.	В	Aqueous bromine.			
	С	Aqueous barium nitrate.	D	Lime water.			
					(	)	
13.	What	is the number of isomers of formu	la C₅H	12?			
	Α	1	В	2			
	С	3	D	4			
					(	)	
14.	What	is the formula of the ester formed	when	propanoic acid reacts with ethanol?			
	Α	C <sub>2</sub> H <sub>5</sub> COOCH <sub>3</sub>	В	CH <sub>3</sub> COOCH <sub>3</sub>			
	С	$C_2H_5COOC_2H_5$	D	CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>			
					(	)	
15.	Octar	ne is a member of the alkane homo	ologou	s series. It has eight carbon atoms p	er		
	mole	cule. What is its molecular formula	?				
	Α	C <sub>8</sub> H <sub>8</sub>	В	C <sub>8</sub> H <sub>10</sub>			
	С	C <sub>8</sub> H <sub>14</sub>	D	C <sub>8</sub> H <sub>18</sub>			
					(	)	
16.	All m	embers of a homologous series:					
	Α	Have the same empirical formula	ì.				
	В	Have the same melting points an	d boili	ng points.			
	С	Have the same number of carbo	n atom	S.			
	D	Undergo similar chemical reactio	ns.				
					(	)	
17.	Whic	h one of the following does <b>not</b> ch	ange w	hen ethene is polymerised to form	·	,	
	poly(	ethene)?	Ū				
	Α	Melting point.	В	Density.			
	С	Boiling point.	D	Percentage composition.			
		01		0 1			

- 18. Which one of the following statements concerning alkanes is correct?
  - A They undergo addition reactions.
  - **B** They have the same empirical formula.
  - **C** They occur naturally in crude oil.
  - **D** They react with organic acids to form esters.
- **19.** What are the molecular formulae and empirical formulae of ethanoic acid?

	Molecular Formula	Empirical Formula
Α	CH <sub>2</sub> O	C <sub>2</sub> H <sub>4</sub> O
В	$C_2H_4O_2$	$C_2H_4O_2$
С	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	CH <sub>2</sub> O
D	C <sub>2</sub> H <sub>6</sub> O	C <sub>2</sub> H <sub>6</sub> O

20. Four full structural formulae are shown below:



Which of the above are possible structures for an alkene having the molecular formula  $C_4H_8$ ?

Α	1 and 4 only.	В	1, 2, 3 and 4.
С	1, 2 and 4 only.	D	2 and 3 only.

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21.	<b>1.</b> Ethanol vapour ( $M_r = 46$ ) was bubbled through concentrated sulphuric acid. A gas <b>X</b>					
	was p	roduced which decolourised brom	ine wa	ter. Which one of the following is th	е	
	molec	cular formula of gas X?				
	Α	CH <sub>4</sub>	В	C <sub>2</sub> H <sub>4</sub>		
	С	$C_2H_6$	D	C <sub>3</sub> H <sub>6</sub>		
					(	)
22.	Which	n one of the following correctly des	cribes	the properties of both ethane and		
	ethen	e?				
	Α	They are both unsaturated hydro	carbor	IS.		
	В	They both readily decolourise bro	omine	water.		
	С	They are both readily polymerise	d.			
	D	They can both burn to produce c	arbon	dioxide and water.		
					(	)
23.	One r	nole of ethanol and one mole of et	thene h	nave an equal:		
	Α	Mass.	В	Number of electrons.		
	С	Number of atoms.	D	Number of molecules.		
					(	)
24.	What	are the products of the fermentation	on of s	ugar?		
	Α	Ethanol and carbon dioxide.				
	В	Ethanol and water.				
	С	Ethanol and enzymes.				

**D** Carbon dioxide and enzymes.

25. Ethanol was oxidised to ethanoic acid using the apparatus shown below:



The purpose of the condenser was to prevent the:

- A Conversion of the ethanol to ethene.
- **B** Escape of any unreacted ethanol.
- **C** Reforming of ethanol from the ethanoic acid.
- **D** Reaction of the ethanoic acid with the ethanol.
- **26.** Which one of the following equations represents the complete combustion of  $C_3H_7OH$ ?
  - $\textbf{A} \qquad C_{3}H_{7}OH \ \textbf{+} \ O_{2} \ \rightarrow \ C_{2}H_{5}COOH \ \textbf{+} \ H_{2}O$
  - $\textbf{B} \qquad 2C_3H_7OH \ \textbf{+} \ \ \textbf{3O}_2 \ \rightarrow \ \textbf{6C} \ \textbf{+} \ \ \textbf{8H}_2O$
  - $\label{eq:constraint} \textbf{C} \qquad 2C_3H_7OH \ \textbf{+} \ 5O_2 \ \rightarrow \ 6CO_2 \ \textbf{+} \ H_2$
  - $\textbf{D} \qquad 2C_3H_7OH \ \textbf{+} \ 9O_2 \ \rightarrow \ 6CO_2 \ \textbf{+} \ 8H_2O$
- **27.** Which one of the following best describes the similarities and differences of compounds which are isomers?

The Same	Different
Chemical properties	Molecular formulae
Physical properties	Chemical properties
Molecular formulae	Structural formulae
Structural formulae	Molecular mass
	Chemical properties Physical properties Molecular formulae Structural formulae

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**28.** The diagram below represents the process of fractional distillation of crude oil. At which position, **A**, **B**, **C** or **D** is bitumen obtained?



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**32.** An organic compound **Z** reacts separately with sodium, sodium hydroxide and sodium carbonate. Which of the following can represent the structure of **Z**?



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**33.** The structural formula of butenedioic acid is given below:



Which one of the following statements about butanedioic acid is not correct?

- A It is an unsaturated compound.
- **B** Its empirical formula is the same as its molecular formula.
- **C** Its relative molecular mass is 116.
- **D** It decolourises bromine.
- **34.** By what process is ethanol converted into ethanoic acid?
  - A Distillation. B Fermentation.
  - **C** Neutralisation. **D** Oxidation.

35. What are the products when ethanol burns completely in air?

- A Carbon and steam.
- **B** Carbon dioxide and hydrogen.
- **C** Carbon dioxide and steam.
- **D** Carbon monoxide and steam.

- **36.** Yeast can be used to convert simple sugars to:
  - A Ethanoic acid and oxygen. B
    - Ethanol and oxygen.
  - **C** Ethanol and carbon dioxide.
- **D** Starch and carbon dioxide.

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**37.** Five structural formulae are shown below:



40. Which structural formula represents an unsaturated hydrocarbon?



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**41.** The diagram shows the structural formulae of three compounds:



Which statement is correct for all three compounds?

- **A** They decolourise aqueous bromine.
- **B** They are carbohydrates.
- **C** They belong to the same homologous series.
- **D** They are isomers of one another.
- **42.** Ethanol is used in some perfumes and deodorants. Which pair of properties makes it suitable for these uses?
  - A It is flammable and mixes easily with water.
  - **B** It is flammable and vaporises easily.
  - **C** It is colourless and has a low freezing point.
  - **D** It is a good solvent and vaporises easily.
- **43.** When glasses of wine or beer are left are left standing in the air for some time they become acidic. Which equation represents this change?
  - $\textbf{A} \qquad CH_3CH_2OH + CO \rightarrow CH_3CH_2COOH$
  - $\textbf{B} \qquad \text{CH}_3\text{CH}_2\text{OH} \ + \ \text{O}_2 \ \rightarrow \ \text{CH}_3\text{COOH} \ + \ \text{H}_2\text{O}$
  - $\textbf{C} \qquad \text{CH}_3\text{CH}_2\text{OH} \ \textbf{+} \ \ \textbf{3O}_2 \ \rightarrow \ \textbf{2CO}_2 \ \textbf{+} \ \ \textbf{3H}_2\text{O}$
  - $D \qquad 2CH_3CH_2OH + O_2 \rightarrow 2CH_3COOH + 2H_2 \qquad ()$

44.	. Which substance, present in car exhaust fumes, is <b>not</b> produced by the combustion of					on o	of
	hydro	carbons?					
	Α	Carbon.	В	Carbo	on dioxide.		
	С	Carbon monoxide.	D	Oxide	s of nitrogen.		
						(	)
45.	Which	statement about the members of	a hom	ologou	s series is correct?		
	Α	They have the same empirical for	rmula.				
	В	They have the same melting poin	nt.				
	С	They have the same number of c	arbon	atoms	per molecule.		
	D	They undergo similar reactions.					
						(	)
46.	Ethen	e reacts with steam at 300°C in th	e pres	ence of	f phosphoric acid as a		
	cataly	st. What is formed?	-				
	Α	Ethane.	В	Ethan	ioic acid.		
	С	Ethanol.	D	Ethyl	ethanoate.		
				,		(	)
47.	One n	nole of a hydrocarbon X reacted c	omplet	ely with	n one mole of hydrogen gas i	n th	, ne
	prese	nce of a heated catalyst. What cou	uld the	formula	a of <b>X</b> be?		
	Å	C <sub>2</sub> H <sub>6</sub>	в	C <sub>3</sub> H <sub>8</sub>			
	С	C5H10	D	C7H16	i i i i i i i i i i i i i i i i i i i		
	-		_			(	)
48.	The d	iagrams show the structures of for	ır orda	nic mo	lecules:	(	,
		P Q	in orga	R	S		
	I	μ, μμ		Ч.	н нң		
	H—(	с — О— Н         Н — С — С — Н	Н—	└_O_	-с–н н–с–с–о–н		
	I	H H		H	H H H		
	Which	n two are members of the same ho	molog	ous sei	ries?		
	Α	P and Q		В	P and R		
	С	P and S		D	<b>Q</b> and <b>R</b>		
						(	)

- **49.** The taste of wine changes after contact with air because some of the alcohol in the wine:
  - A Evaporates. B Ferments.
  - **C** Reacts with carbon dioxide. **D** Reacts with oxygen.

**50.** The formula of butanol may be written as C<sub>4</sub>H<sub>9</sub>OH. The next higher member of the homologous series of alcohols is pentanol. How may the formula of pentanol be written?

- **A** C<sub>4</sub>H<sub>8</sub>(OH)<sub>2</sub> **B** C<sub>4</sub>H<sub>9</sub>(OH)<sub>2</sub>
- **C** C<sub>5</sub>H<sub>9</sub>OH **D** C<sub>5</sub>H<sub>11</sub>OH

51. Which of the following statements about the homologous series of alcohols is not true?

- **A** They can be prepared by similar methods.
- **B** They can be represented by a general formula.
- **C** They exhibit a gradual change of physical properties.
- **D** They all contain oxygen.

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- 52. What is the product formed when hydrogen reacts with an alkene?
  - A An alcohol. B An alkane.
  - **C** A carbohydrate. **D** An organic acid.
- **53.** An organic acid **X** decolourises aqueous bromine. Which formula could represent **X**?





**54.** An organic compound **Z** reacts both with sodium hydroxide and with sodium carbonate. What could the structure of **Z** be?



**55.** The graph shows the proportion of methane in a coal mine during a working day:



What is most likely to have caused the sudden fall in the percentage methane shown on the graph?

- **A** The temperature in the mine was lowered.
- **B** An explosive mixture of methane and air ignited.
- **C** The ventilator fans were switched on.
- **D** Methane stopped seeping into the mine.
- **56.** Ethane gas was cracked to produce hydrogen gas and another gas **Y** which decolourised aqueous bromine. What is the structural formula of **Y**?



**57.** The table shows how many moles of products are formed by the complete combustion of four hydrocarbons. Which hydrocarbon requires 11 moles of oxygen gas (O<sub>2</sub>) for this combustion?

	Hydrocarbon	Moles of CO <sub>2</sub>	Moles of H <sub>2</sub> O
Α	C <sub>3</sub> H <sub>8</sub>	3	4
В	C <sub>5</sub> H <sub>12</sub>	5	6
С	C <sub>6</sub> H <sub>12</sub>	6	6
D	C7H16	7	8

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58. Which of the following is an ester?

Α	Nylon.	В	PVC.
С	Soap.	D	Terylene.

**59.** Which one of the following does **not** occur in the complete combustion of ethane in a plentiful supply of air?

- A Breaking of carbon-to-carbon bonds.
- **B** Breaking of carbon-to-hydrogen bonds.
- **C** Breaking of carbon-to-oxygen bonds.
- **D** Forming of carbon-to-oxygen bonds.
- **60.** The diagram shows four stages in a reaction scheme:

Stage A	ç	Stage <b>B</b>	:	Stage <b>C</b>		Stage D	
Petroleum	Octane	—— <u> </u>	Ethene	——[	Ethanol	]{	Ethanoic acid

At which stage does catalytic cracking take place?

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**61.** In the alkane series of hydrocarbons ( $C_nH_{2n+2}$ ) the boiling point (b.p.) of the compound increases as *n* increases. Which graph correctly represents this effect?



62. Which set contains the correct process for converting substance **S** to the product(s)?

	Substance S	Process	Products
Α	Ester	Addition polymerisation	Terylene
В	Starch	Condensation polymerisation	Glucose
С	Protein	Hydrolysis	Amino acids
D	Ethanol	Reduction	Ethanoic acid
<u>[]</u>		I	(

**63.** In the fractional distillation of crude oil, which product has the highest boiling point?

- ABitumen.BParaffin (kerosene).
- **C** Lubricating oil.
- **D** Petrol (gasoline).

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**64.** An aqueous solution of a compound of molecular formula C<sub>2</sub>H<sub>4</sub>O<sub>2</sub> reacts with sodium carbonate liberating carbon dioxide. What is the structural formula of the compound?



**65.** A 10 cm<sup>3</sup> sample of gaseous hydrocarbon was completely burnt in oxygen. The total volume of the product was 70 cm<sup>3</sup>. Which equation represents the combustion of the hydrocarbon?

**A** 
$$CH_{4(g)}$$
 +  $2O_{2(g)} \rightarrow CO_{2(g)}$  +  $2H_2O_{(g)}$ 

$$\textbf{B} \qquad C_2H_{4(g)} \ \textbf{+} \ 3O_{2(g)} \ \rightarrow \ 2CO_{2(g)} \ \textbf{+} \ 2H_2O_{(g)}$$

- $\label{eq:constraint} \textbf{C} \qquad C_{3}H_{8(g)} \ + \ 5O_{2(g)} \ \rightarrow \ 3CO_{2(g)} \ + \ 4H_{2}O_{(g)}$
- $\textbf{D} \qquad 2C_2H_{6(g)} \ + \ 7O_{2(g)} \ \rightarrow \ 4CO_{2(g)} \ + \ 6H_2O_{(g)}$

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66. Which structural formula represents an unsaturated hydrocarbon?



**67.** What is the formula of the ester formed when propanoic acid (CH<sub>3</sub>CH<sub>2</sub>COOH) reacts with ethanol?

<b>A</b> CH <sub>3</sub> CH <sub>2</sub> COOCH <sub>3</sub> <b>B</b> CH <sub>3</sub> C	COOCH₃
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## 68. Which statement about ethanol is correct?

- **A** It is formed by the catalytic addition of steam to ethene.
- **B** It is an unsaturated compound.
- **C** It is formed by the oxidation of ethanoic acid.
- **D** It reacts with ethyl ethanoate to form an acid.

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## **69.** Ethanol is manufactured by the reaction between:

- A Ethane and oxygen. B Ethane and steam.
- **C** Ethene and oxygen **D** Ethene and steam.

70.	In ho	In how many of the following can paraffin (kerosene) be used as the energy source?								
	Aircraft			Air Conditioning Units			Cars	Cars		
	۵	Domestic Cooking		Heavy Lorries			Power Stations			
	Α	1	В	2	С	3	<b>D</b> 4	1	`	
71.	Whic	h stater	nents are true	e about alk	anes?			(	)	
		1 Their general formula is $C_n H_{2n}$ .								
		2 They are flammable.								
		3	They react v	with chlorin	e.					
	Α	1 and	2 only.		В	2 and	3 only.			
	С	1 and	3 only.		D	1, 2 ar	nd 3.			
								(	)	
72.	The r	eaction	between a c	arboxylic a	cid, C <sub>x</sub> H <sub>y</sub> C	CO <sub>2</sub> H, a	nd an alcohol, C <sub>n</sub> H <sub>2n+1</sub> (	ЭH,		
	produ	uces an	ester. How n	nany hydro	gen atom	s does c	one molecule of the est	er		
	conta	in?								
	Α	y + 2r	1		В	y + 2n	+ 1			
	С	y + 2r	n + 2		D	y + 2n	+ 3			
								(	)	
73.	Whic	Which compound will react with steam, in the presence of a catalyst, to produce the								
	alcoh	alcohol CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> OH?								
	Α	CH₃C	H <sub>2</sub> CH <sub>2</sub> COOH	l						
	В	CH <sub>3</sub> CH <sub>2</sub> CO <sub>2</sub> CH <sub>3</sub>								
	С	$CH_3CH=CH_2$								
	D	CH₃C	H <sub>2</sub> CH=CH <sub>2</sub>							
								(	)	
74.	In which reaction does the product have more carbon atoms than the underlined									
	react	reactant?								
	Α	A carboxylic acid produced from an <u>alcohol</u> and an oxidising agent.								
	В	An ester produced from a carboxylic acid and an alcohol.								
	С	A salt produced from a carboxylic acid and sodium carbonate.								
	D	Carbon dioxide produced from the complete combustion of propane in oxygen.								

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**75.** Compound **X** can be oxidised to compound **Y**.



What are compound X and compound Y?

	X	Y	
Α	Butanol	Propanoic Acid	
В	Ethanol	Ethanoic Acid	
С	Propanol	Ethanoic Acid	
D	Propanol	Propanoic Acid	

76. One mole of a hydrocarbon X reacted completely with one mole of hydrogen gas in the presence of a heated catalyst. What could be the formula of X?

A	$C_2H_6$	В	C <sub>3</sub> H <sub>8</sub>	C	C5H10	D	C7H16

**77.** An ester of molecular formula C<sub>4</sub>H<sub>8</sub>O<sub>2</sub> was produced by the reaction of an alcohol with a carboxylic acid.

	Alcohol	Acid
1	Methanol	Propanoic Acid
2	Ethanol	Ethanoic Acid
3	Propanol	Methanoic Acid

Which of the following could be the alcohol and the acid?

- **A** 1, 2 and 3
- **B** 1 and 2 only.
- C 1 and 3 only.
- D 2 only.

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78. Pentanoic acid has the formula CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H.Which formula represents butyl pentanoate?



**79.** There are two isomers of butene,  $C_4H_8$ , their structures are given below:

CH<sub>2</sub>=CHCH<sub>2</sub>CH<sub>3</sub> and CH<sub>3</sub>CH=CHCH<sub>3</sub>

How many statements about these two isomers are correct?

- Combustion of 1 mole of each produces equal numbers of moles of  $CO_2$  and  $H_2O$ .
- Both decolourise bromine water.
- Both produce the same molecule when reacted with bromine.
- Both produce the same molecule when reacted with hydrogen.
- When polymerised, the same polymer is produced.

**A** 2 **B** 3 **C** 4 **D** 5

**80.** If one mole of each alcohol is burnt in excess oxygen, which alcohol will provide CO<sub>2</sub> and H<sub>2</sub>O in a mole ratio of 3:4?

Α	CH₃OH	В	$C_2H_5OH$
С	C <sub>3</sub> H <sub>7</sub> OH	D	C4H9OH

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• Scan the QR code given below to view the answers to this assignment.



http://www.chemist.sg/organic\_chem/assignments/multi\_choice\_ans.pdf