National
Qualifications
2017

X713/76/02

Chemistry
Section 1 — Questions

MONDAY, 8 MAY

9:00 AM – 11:30 AM

Instructions for the completion of Section 1 are given on *Page 02* of your question and answer booklet X713/76/01.

Record your answers on the answer grid on *Page 03* of your question and answer booklet.

You may refer to the Chemistry Data Booklet for Higher and Advanced Higher.

Before leaving the examination room you must give your question and answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SECTION 1 — 20 marks

Attempt ALL questions

1. Which of the following bonds is the **least** polar?

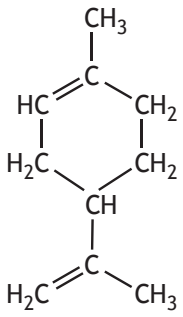
A C — I

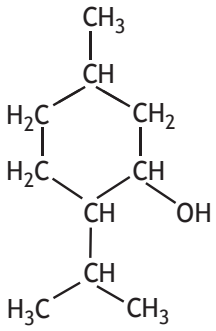
B C — F

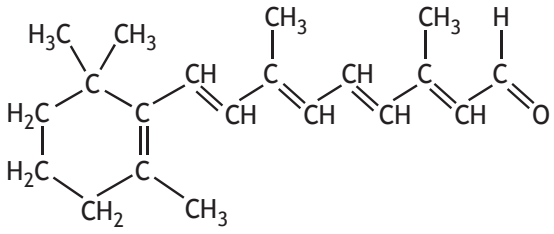
C C — Cl

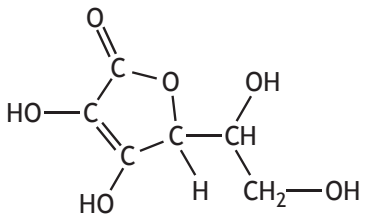
D C — Br

2. Which of the following compounds would be the **most water** soluble?

A 

B 

C 

D 

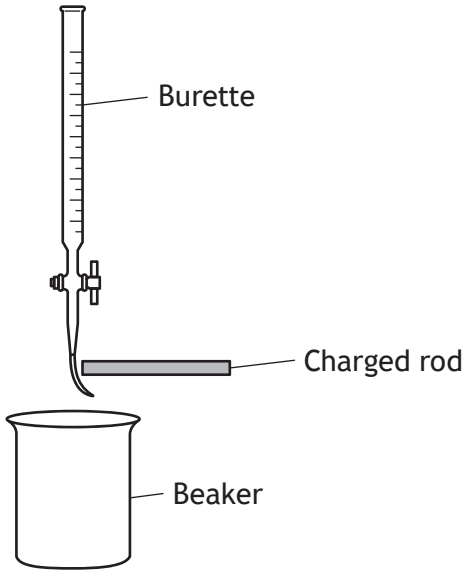
3. Which of the following atoms has the greatest attraction for bonding electrons?

A Sulfur
B Silicon
C Nitrogen
D Hydrogen

4. Which type of structure is found in phosphorus?

A Covalent network
B Covalent molecular
C Monatomic
D Metallic lattice

5. The polarity of molecules can be investigated using a charged rod. The charged rod will attract a stream of polar liquid flowing from a burette.



Which of the following liquids would **not** be attracted?

A Water
B Propanone
C Propanol
D Hexane

[Turn over

6. $x P_2H_4 + y O_2 \rightarrow P_4O_{10} + z H_2O$

The equation is balanced when

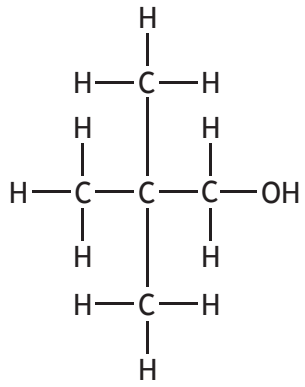
A $x = 1$, $y = 5$, $z = 4$

B $x = 4$, $y = 6$, $z = 2$

C $x = 2$, $y = 7$, $z = 4$

D $x = 2$, $y = 5$, $z = 2$

7. What is the systematic name for the compound below?



A 2,2,2-trimethylethanol

B 2,2-dimethylpropan-1-ol

C 2,2-dimethylpropan-3-ol

D 2,2-dimethylpentan-1-ol

8. Which of the following fatty acids is the most unsaturated?

A $C_{15}H_{29}COOH$

B $C_{15}H_{31}COOH$

C $C_{17}H_{31}COOH$

D $C_{17}H_{35}COOH$

9. Which of the following is **not** a step in a free radical chain reaction?

A Activation
B Initiation
C Propagation
D Termination

10. Which of the following is an isomer of ethyl propanoate ($CH_3CH_2COOCH_2CH_3$)?

A Methyl propanoate
B Pentan-2-one
C Pentanoic acid
D Pentane-1,2-diol

11. Essential oils are

A non-water soluble, non-volatile compounds
B non-water soluble, volatile compounds
C water soluble, non-volatile compounds
D water soluble, volatile compounds.

12. The enthalpy of combustion of a hydrocarbon is the enthalpy change when

A one mole of a hydrocarbon burns to give one mole of water
B one mole of a hydrocarbon burns to give one mole of carbon dioxide
C one mole of a hydrocarbon burns completely in oxygen
D one mole of a hydrocarbon burns in one mole of oxygen.

13. Which of the following is the strongest reducing agent?

A Fluorine
B Lithium
C Calcium
D Iodine

[Turn over

14.

$TiCl_4$	+	$2Mg$	→	$2MgCl_2$	+	Ti
mass of one mole = 189·9 g		mass of one mole = 24·3 g		mass of one mole = 95·3 g		mass of one mole = 47·9 g

The atom economy for the production of titanium in the above equation is equal to

A $\dfrac{47{\cdot}9}{189{\cdot}9+24{\cdot}3}\times 100$

B $\dfrac{47{\cdot}9}{189{\cdot}9+(2\times 24{\cdot}3)}\times 100$

C $\dfrac{95{\cdot}3+47{\cdot}9}{189{\cdot}9+24{\cdot}3}\times 100$

D $\dfrac{(2\times 47{\cdot}9)}{189{\cdot}9+24{\cdot}3}\times 100$

15. The vitamin C content of a carton of orange juice was determined by four students. Each student carried out the experiment three times.

	Experiment 1 (mg/100 cm^3)	*Experiment 2* (mg/100 cm^3)	*Experiment 3* (mg/100 cm^3)
Student A	30·0	29·0	28·0
Student B	26·4	26·6	26·8
Student C	26·9	27·0	26·9
Student D	26·9	26·5	26·9

The most reproducible results were obtained by

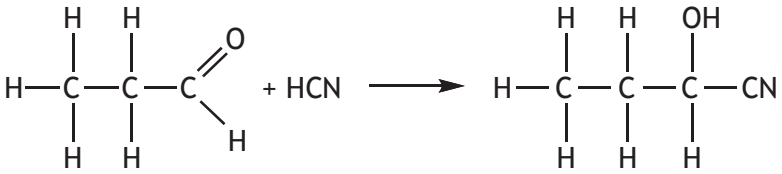
A Student A

B Student B

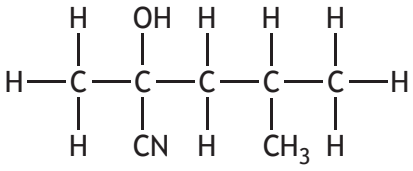
C Student C

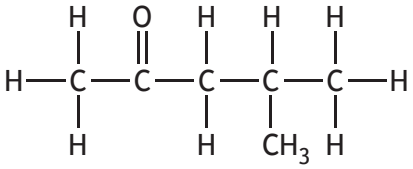
D Student D.

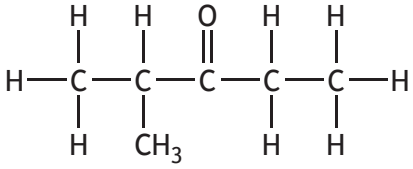
16. Cyanohydrin compounds can be made from carbonyl compounds by reacting the carbonyl compound with hydrogen cyanide (HCN).

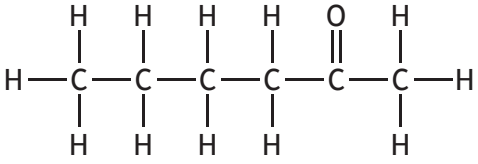


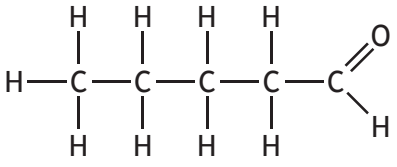
Which carbonyl compound would react with hydrogen cyanide (HCN) to form the following compound?



A 

B 

C 

D 

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17. Chemical reactions are in a state of dynamic equilibrium only when

A the reaction involves no enthalpy change
B the concentrations of reactants and products are equal
C the activation energies of the forward and backward reactions are equal
D the rate of the forward reaction equals that of the backward reaction.

18. Bromine and hydrogen react together to form hydrogen bromide.

$$H_2(g) + Br_2(g) \rightarrow 2HBr(g)$$

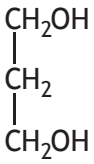
Bonds broken	Bonds made
H—H	2 × H—Br
Br—Br	

Bond	Bond enthalpy (kJ mol^{-1})
H—H	436
Br—Br	194
H—Br	366

The enthalpy change for this reaction, in kJ mol^{-1}, is

A −102
B +102
C −264
D +264.

19. Which of the following is a structural formula for glycerol?

A


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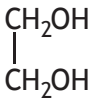

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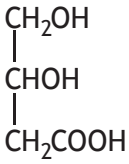

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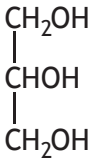

20. Which line in the table best describes the effect of adding a catalyst to the following reaction?

$4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(g) \qquad \Delta H = -ve$

	Position of equilibrium	*Rate of forward reaction*
A	unchanged	unchanged
B	unchanged	increased
C	moves to right	unchanged
D	moves to right	increased

[END OF SECTION 1. NOW ATTEMPT THE QUESTIONS IN SECTION 2 OF YOUR QUESTION AND ANSWER BOOKLET.]

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