



National  
Qualifications  
2015

**X713/76/02**

**Chemistry  
Section 1 — Questions**

THURSDAY, 28 MAY

1:00 PM – 3:30 PM

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

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

Reference may be made to the Chemistry Higher and Advanced Higher Data Booklet.

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.



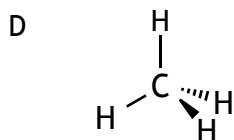
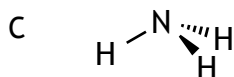
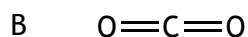
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SECTION 1 — 20 marks

Attempt ALL questions

- The elements nitrogen, oxygen, fluorine and neon
  - can form negative ions
  - are made up of diatomic molecules
  - have single bonds between the atoms
  - are gases at room temperature.
  
- Which of the following equations represents the first ionisation energy of fluorine?
  - $F^-(g) \rightarrow F(g) + e^-$
  - $F^-(g) \rightarrow \frac{1}{2}F_2(g) + e^-$
  - $F(g) \rightarrow F^+(g) + e^-$
  - $\frac{1}{2}F_2(g) \rightarrow F^+(g) + e^-$
  
- Which of the following atoms has least attraction for bonding electrons?
  - Carbon
  - Nitrogen
  - Phosphorus
  - Silicon
  
- Which of the following is **not** an example of a van der Waals' force?
  - Covalent bond
  - Hydrogen bond
  - London dispersion force
  - Permanent dipole - permanent dipole attraction

5. Which of the following has more than one type of van der Waals' force operating between its molecules in the liquid state?



6. Oil molecules are more likely to react with oxygen in the air than fat molecules. During the reaction the oil molecules

- A are reduced
- B become rancid
- C are hydrolysed
- D become unsaturated.

7. Which of the following mixtures will form when  $\text{NaOH}(\text{aq})$  is added to a mixture of propanol and ethanoic acid?

- A Propanol and sodium ethanoate
- B Ethanoic acid and sodium propanoate
- C Sodium hydroxide and propyl ethanoate
- D Sodium hydroxide and ethyl propanoate

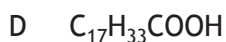
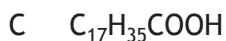
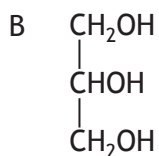
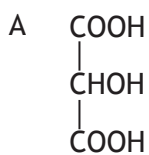
8. Oils contain carbon to carbon double bonds which can undergo addition reactions with iodine.

The iodine number of an oil is the mass of iodine in grams that will react with 100 g of oil.

Which line in the table shows the oil that is likely to have the lowest melting point?

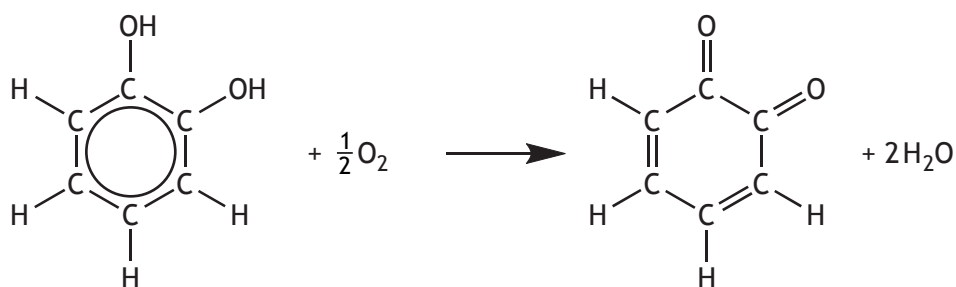
	<i>Oil</i>	<i>Iodine number</i>
A	Corn	123
B	Linseed	179
C	Olive	81
D	Soya	130

9. When an oil is hydrolysed, which of the following molecules is always produced?



10. Enzymes are involved in the browning of cut fruit.

One reaction taking place is:



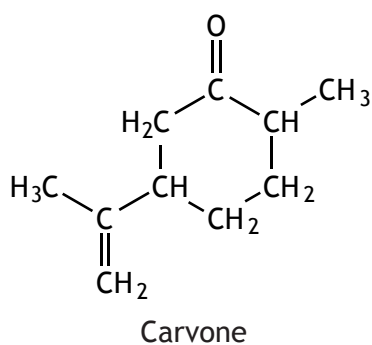
Which of the following correctly describes the above reaction?

- A Oxidation
- B Reduction
- C Hydrolysis
- D Condensation

11. Which of the following statements is correct for ketones?

- A They are formed by oxidation of tertiary alcohols.
- B They contain the group  $\begin{array}{c} \text{O} \\ // \\ \text{---C} \\ \backslash \\ \text{H} \end{array}$ .
- C They contain a carboxyl group.
- D They will not react with Fehling's solution.

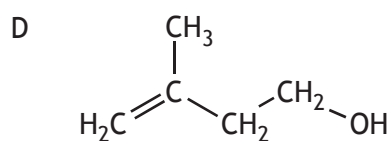
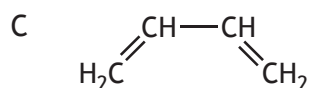
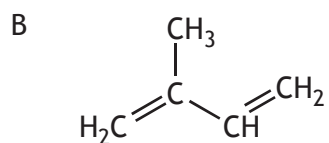
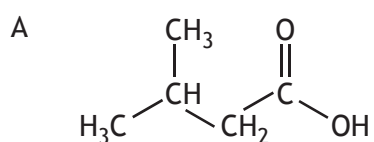
12. Carvone is a natural product that can be extracted from orange peel.



Which line in the table correctly describes the reaction of carvone with bromine solution and with acidified potassium dichromate solution?

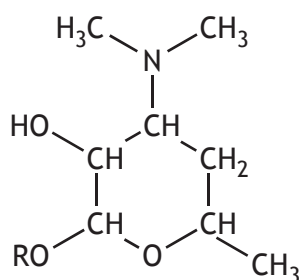
	<i>Reaction with bromine solution</i>	<i>Reaction with acidified potassium dichromate solution</i>
A	no reaction	no reaction
B	no reaction	orange to green
C	decolourises	orange to green
D	decolourises	no reaction

13. The structure of isoprene is

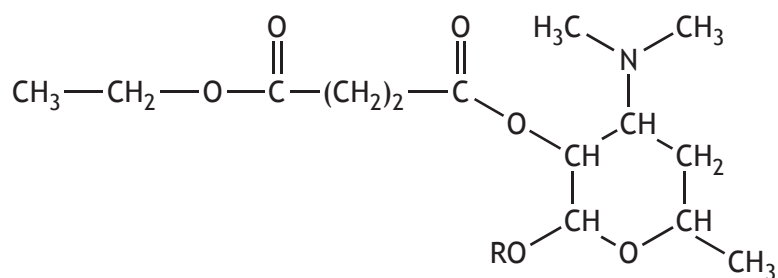


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14. The antibiotic, erythromycin, has the following structure.



To remove its bitter taste, the erythromycin is reacted to give the compound with the structure shown below.



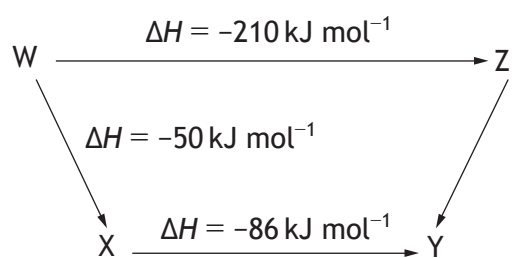
Which of the following types of compound has been reacted with erythromycin to produce this compound?

- A Alcohol
- B Aldehyde
- C Carboxylic acid
- D Ketone

15. Which of the following is an isomer of 2,2-dimethylpentan-1-ol?

- A  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$
- B  $(\text{CH}_3)_3\text{CCH}(\text{CH}_3)\text{CH}_2\text{OH}$
- C  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- D  $(\text{CH}_3)_2\text{CHC}(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{OH}$

16. Consider the reaction pathway shown below.



According to Hess's Law, the  $\Delta H$  value, in  $\text{kJ mol}^{-1}$ , for reaction Z to Y is

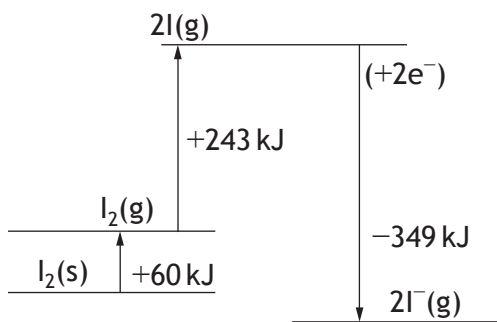
- A +74
- B -74
- C +346
- D -346.

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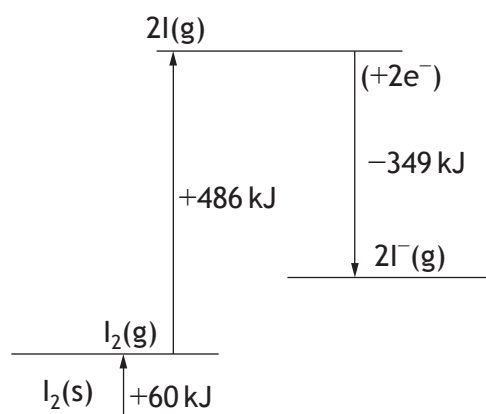
17.  $I_2(s) \rightarrow I_2(g) \quad \Delta H = +60 \text{ kJ mol}^{-1}$   
 $I_2(g) \rightarrow 2I(g) \quad \Delta H = +243 \text{ kJ mol}^{-1}$   
 $I(g) + e^- \rightarrow I^-(g) \quad \Delta H = -349 \text{ kJ mol}^{-1}$

Which of the following would show the energy diagram for  $I_2(s) + 2e^- \rightarrow 2I^-(g)$ ?

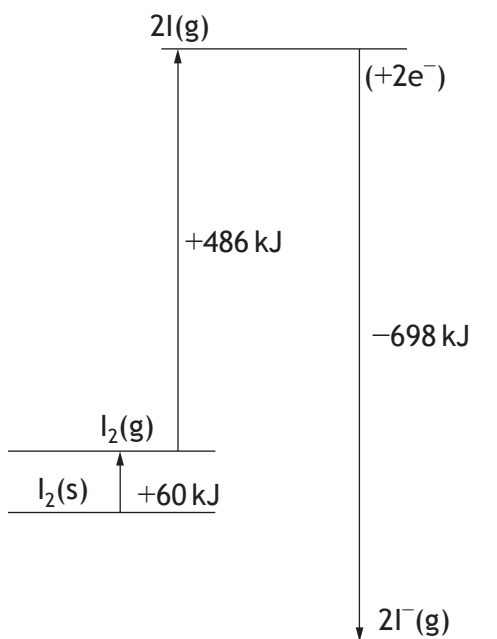
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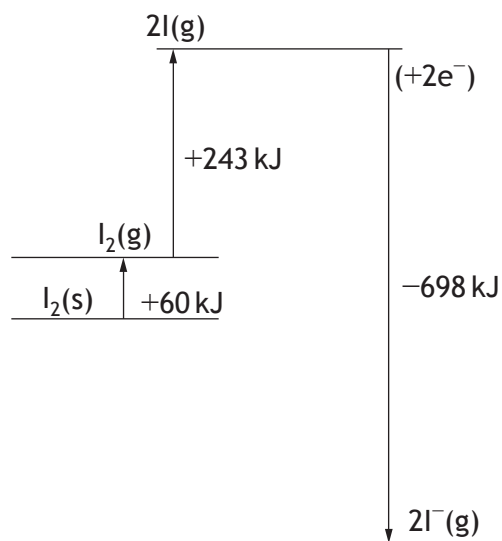
B



C



D

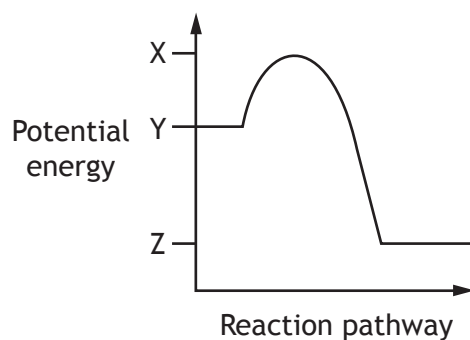




18. Which of the following statements regarding a chemical reaction at equilibrium is always correct?

- A The rates of the forward and reverse reactions are equal.
- B The concentration of reactants and products are equal.
- C The forward and reverse reactions have stopped.
- D The addition of a catalyst changes the position of the equilibrium.

19. A reaction has the following potential energy diagram.



The activation energy for the forward reaction is

- A  $X - Y$
  - B  $Y - X$
  - C  $Y - Z$
  - D  $Z - Y$ .
20. Which of the following will react with  $\text{Br}_2$  but **not** with  $\text{I}_2$ ?
- A  $\text{OH}^-$
  - B  $\text{SO}_3^{2-}$
  - C  $\text{Fe}^{2+}$
  - D  $\text{Mn}^{2+}$

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

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