

Name: _____ Class: 15S _____ Reg Number: _____



MERIDIAN JUNIOR COLLEGE
JC2 Preliminary Examination
Higher 2

Chemistry

9647/01

Paper 1 Multiple-Choice Questions

23 September 2016

1 hour

Additional Materials: *Data Booklet*
 OMR Answer Sheet

INSTRUCTIONS TO CANDIDATES

Write your name, class and register number in the spaces provided at the top of this page.

There are **forty** questions in this section. Answer **all** questions. For each question, there are four possible answers labelled **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the OMR answer sheet.

Read very carefully the instructions on the OMR answer sheet.

You are advised to fill in the OMR Answer Sheet as you go along; no additional time will be given for the transfer of answers once the examination has ended.

Use of OMR Answer Sheet

Ensure you have written your name, class register number and class on the OMR Answer Sheet.

Use a **2B** pencil to shade your answers on the OMR sheet; erase any mistakes cleanly. Multiple shaded answers to a question will not be accepted.

For shading of class register number on the **OMR sheet**, please follow the given examples:

If your register number is **1**, then shade **01** in the index number column.

If your register number is **21**, then shade **21** in the index number column.

This document consists of **23** printed pages

Answer all questions in this section.

For each question there are four possible answers, **A**, **B**, **C**, and **D**. Choose the **one** you consider to be correct.

- 1** *Use of the Data Booklet is relevant to this question.*

Sodium percarbonate, $(\text{Na}_2\text{CO}_3)_x \cdot y(\text{H}_2\text{O}_2)$, is an oxidising agent in some home and laundry cleaning products.

20.0 cm³ of 0.0500 mol dm⁻³ sodium percarbonate releases 48.0 cm³ of carbon dioxide at room conditions on acidification.

An identical sample, on titration with 0.0500 mol dm⁻³ K₂Cr₂O₇, requires 20.0 cm³ before the first green colour appears. K₂Cr₂O₇ reacts with H₂O₂ in the mole ratio of 1 : 3.

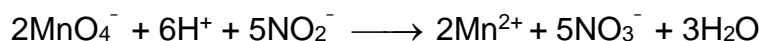
What is the ratio $\frac{y}{x}$?

- A** $\frac{1}{3}$ **B** $\frac{2}{3}$ **C** $\frac{3}{2}$ **D** $\frac{3}{1}$

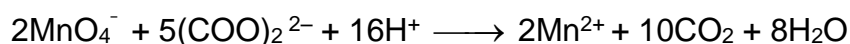
- 2** Magnesium nitrate(V), Mg(NO₃)₂ decomposes on heating to form magnesium oxide, nitrogen dioxide and oxygen, while sodium nitrate(V), NaNO₃ decomposes to form NaNO₂ and oxygen only.



A mixture of magnesium nitrate(V) and sodium nitrate(V) was heated until no more gases were evolved. The water soluble part of the residue was used to prepare 1.00 dm³ of solution. 10.00 cm³ of this solution was reacted with 30.00 cm³ of 0.0200 mol dm⁻³ of acidified potassium manganate(VII) solution.



The excess potassium manganate(VII) solution required 10.00 cm³ of 0.0500 mol dm⁻³ ethanedioic acid solution for complete reaction



What is the mass of sodium nitrate(V) in the mixture?

Given M_r of NaNO₃ = 85.0

- A** 0.85 g **B** 1.36 g **C** 4.25 g **D** 8.50 g

- 3** *Use of the Data Booklet is relevant to this question.*

Dinitrogen tetroxide, N_2O_4 , has a melting point of $-11\text{ }^\circ\text{C}$ and a boiling point of $21\text{ }^\circ\text{C}$.

A sample of 18.4 g of $\text{N}_2\text{O}_4(\text{s})$ is placed in a 24 dm^3 vessel under an atmosphere of helium gas chilled to $-20\text{ }^\circ\text{C}$ at a pressure of 1.0 atm . When the vessel is warmed to $25\text{ }^\circ\text{C}$ and the contents are allowed to reach equilibrium, 40% of the $\text{N}_2\text{O}_4(\text{g})$ has dissociated into $\text{NO}_2(\text{g})$.

What is the total pressure of the gases in the vessel at $25\text{ }^\circ\text{C}$?

- A** 0.28 atm **B** 1.28 atm **C** 1.38 atm **D** 1.46 atm

- 4** *Use of the Data Booklet is relevant to this question.*

The ion X^{4+} contains 46 electrons and 69 neutrons.

Which of the following statements about X^{4+} or X^{2+} is correct?

- A** X^{4+} is deflected to approximately twice the extent as Rb^+ when subjected to an electric field.
B X^{4+} has the same electronic configuration as Sr^{2+} .
C X^{2+} undergoes hydration in water to a greater extent than X^{4+} .
D X^{2+} can be oxidised by Fe^{3+} .

- 5** *Use of the Data Booklet is relevant to this question.*

Which particle contains a single unpaired electron?

- A** a molecule of N_2O
B one of the particles formed after the heterolytic fission of a $\text{H}-\text{Br}$ molecule
C the vanadium ion in VO_2
D the chromium ion in Cr_2O_3

- 6 Use of the Data Booklet is relevant to this question.

In which of the following pairs of compounds would the first compound have a lower melting point than the second compound?

- A $\text{CH}_3\text{CH}(\text{NH}_2)\text{COOH}$ and $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$
B $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_3$
C GaF_3 , GaCl_3
D Na_2S , MgF_2

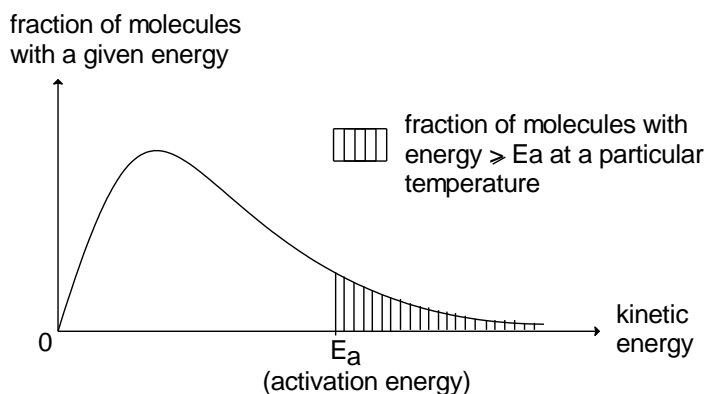
- 7 Compound X has the following properties.

- It is very hard.
- It is a lubricant.
- It can conduct electricity in the solid state.

What is the most likely structure of compound X?

- A simple molecular
B giant molecular
C giant metallic
D giant ionic

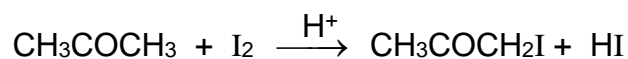
- 8 The *Maxwell-Boltzmann* distribution curve shown below is for a chemical reaction in living systems.



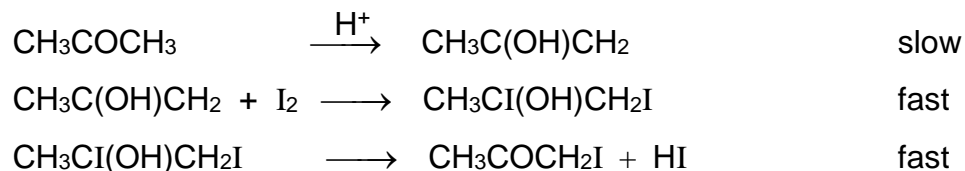
Which statement is **not** true?

- A The total area under the curve is 1.
B The activation energy will decrease with a decrease in temperature.
C When temperature is increased, the peak of the curve becomes lower.
D The shaded area of the curve will decrease when enzymes are denatured.

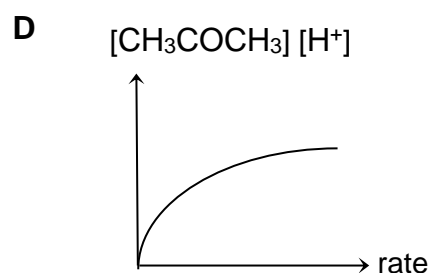
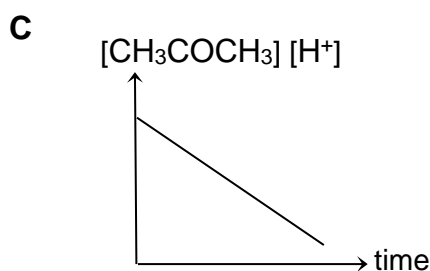
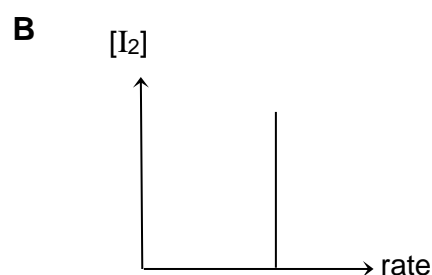
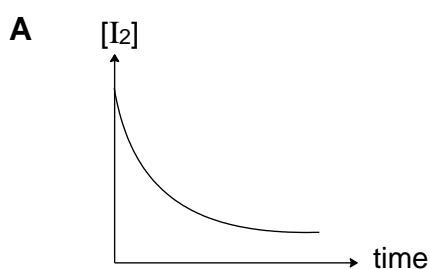
- 9 Propanone reacts with iodine in the presence of an acid:



The mechanism involves the following steps.



Which graph would be obtained?



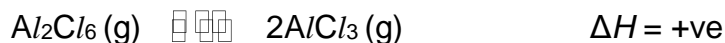
- 10 The following data was obtained from the studies of the reaction between O_2 and NO in a vessel at constant temperature.

Experiment	1	2	3
Initial total pressure of O_2 and NO / atm	1.00	1.30	1.80
Initial partial pressure of O_2 / atm	0.60	0.90	1.20
Initial rate of reaction/ atm s^{-1}	1.08	1.62	4.86

Which of the following statements is correct regarding the above system?

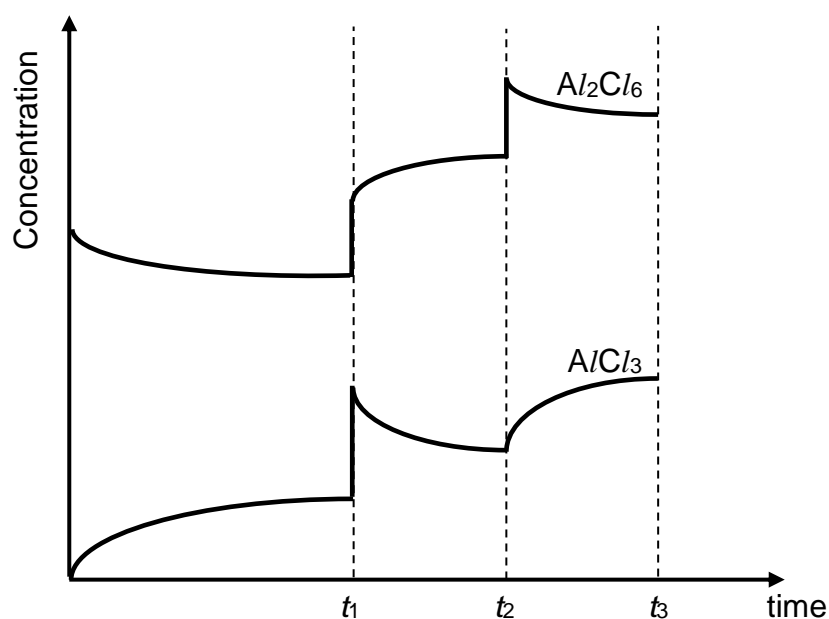
- A** The order of reaction with respect to O_2 is zero.
B The rate constant k has units of $\text{atm}^{-1} \text{s}^{-1}$.
C The rate equation is $\text{rate} = k [\text{NO}][\text{O}_2]^2$.
D The overall order of the reaction is three.

- 11 Aluminium chloride exists in two different forms in the vapour state. When some Al_2Cl_6 was added into a reaction vessel, the following equilibrium is slowly set up.



At different times during the experiment, changes were made to the conditions in the reaction vessel. At each time, there was only one change made to the conditions in the reaction vessel.

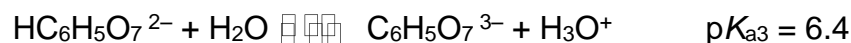
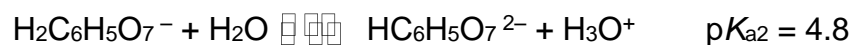
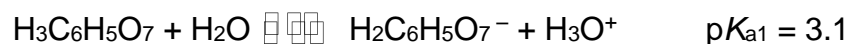
The change in the concentrations in the mixture with time is shown in the graph below.



Which conclusion can be drawn from the graph?

- A At t_1 , the pressure of the system was increased by increasing the volume.
- B At t_2 , a catalyst was added to the system.
- C The temperature of the mixture at t_2 was higher than that at t_1 min.
- D The equilibrium constant, K_p , remains the same at t_1 and t_3 .

- 12 Citrate buffers are commonly used to control pH in household cleaners and pharmaceuticals.



A citrate buffer with pH 5.1 was prepared by dissolving solid $\text{NaH}_2\text{C}_6\text{H}_5\text{O}_7$ and $\text{Na}_2\text{HC}_6\text{H}_5\text{O}_7$. The total sodium concentration of the prepared buffer was 1.0 mol dm^{-3} .

What are the concentrations of $\text{NaH}_2\text{C}_6\text{H}_5\text{O}_7$ and $\text{Na}_2\text{HC}_6\text{H}_5\text{O}_7$ in this buffer?

	$[\text{NaH}_2\text{C}_6\text{H}_5\text{O}_7] / \text{mol dm}^{-3}$	$[\text{Na}_2\text{HC}_6\text{H}_5\text{O}_7] / \text{mol dm}^{-3}$
A	0.10	0.20
B	0.20	0.40
C	0.20	0.10
D	0.40	0.30

- 13 Use of the Data Booklet is relevant to this question.

Excess aqueous $(\text{COOH})_2$ was added to an acidified solution of potassium dichromate(VI) in a conical flask. Effervescence was observed until all $(\text{COOH})_2$ had completely reacted. The resulting solution was then left to stand in air for a long time.

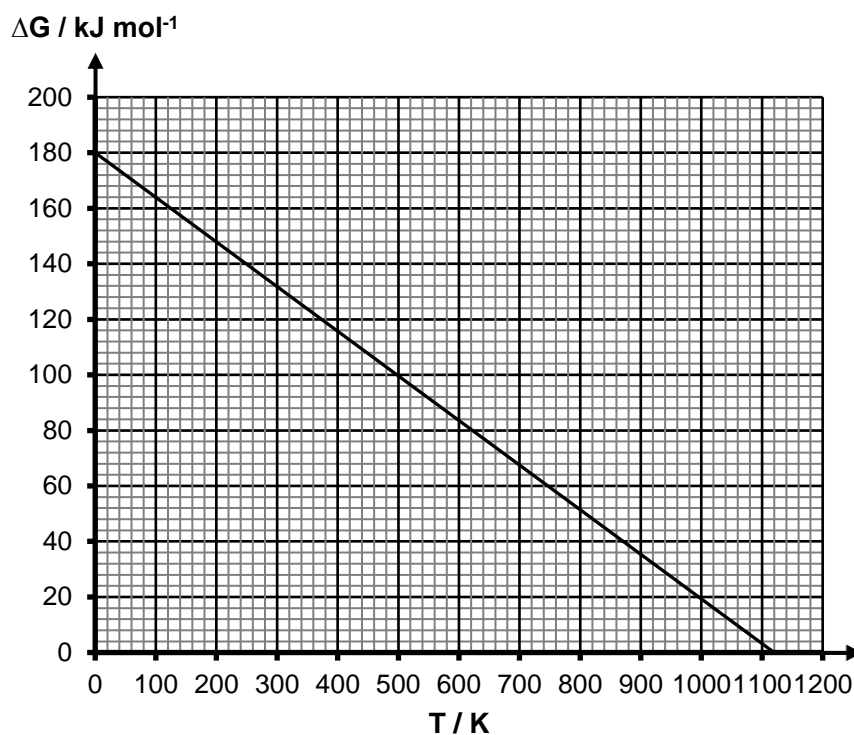


What is the colour of the final solution?

- | | |
|----------|----------|
| A Blue | B Green |
| C Yellow | D Orange |

- 14 When heated, magnesium carbonate decomposes to form carbon dioxide and magnesium oxide.

A graphical plot of ΔG versus T , describing the change of the Gibbs free energy of the decomposition of magnesium carbonate with respect to temperature, is shown below.

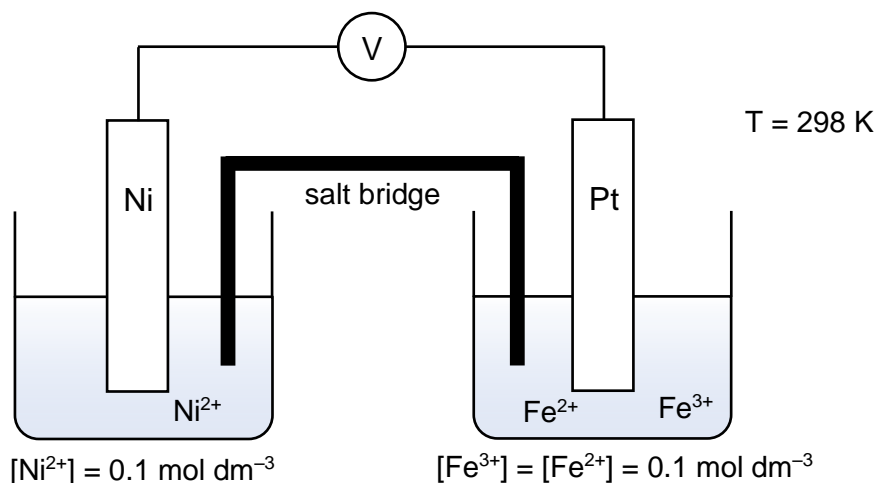


Using the information from the graph, what is the value of ΔS^\ominus for the decomposition reaction?

- | | |
|---|---|
| A $+ 6.22 \times 10^3 \text{ J mol}^{-1} \text{ K}^{-1}$ | B $+ 6.04 \times 10^2 \text{ J mol}^{-1} \text{ K}^{-1}$ |
| C $+ 1.61 \times 10^2 \text{ J mol}^{-1} \text{ K}^{-1}$ | D $+ 1.80 \times 10^6 \text{ J mol}^{-1} \text{ K}^{-1}$ |

- 15 Use of the Data Booklet is relevant to this question.

An electrochemical cell is set up as shown:



Which statement about the e.m.f. of the above cell is correct?

- A The e.m.f of the cell is +1.02 V.
 - B Addition of water to the $\text{Fe}^{3+} / \text{Fe}^{2+}$ half-cell increases the e.m.f of the cell.
 - C Increasing the mass of the nickel electrode decreases the e.m.f of the cell.
 - D Addition of excess aqueous ammonia to the $\text{Ni}^{2+} / \text{Ni}$ half-cell increases the e.m.f of the cell.
- 16 In which row of the table are all statements comparing calcium and barium as well as their hydroxides correct?

	Melting point		Flame Test		Solubility of hydroxide	
	Calcium	Barium	Calcium	Barium	$\text{Ca}(\text{OH})_2$	$\text{Ba}(\text{OH})_2$
A	higher	lower	green	red	lower	higher
B	higher	lower	red	green	lower	higher
C	higher	lower	white	green	higher	lower
D	lower	higher	red	green	higher	lower

- 17 Element **Z** is in Period 3 of the Periodic Table. The following four statements were made about the properties of element **Z** or its compounds.

Three statements are correct descriptions and one is false.

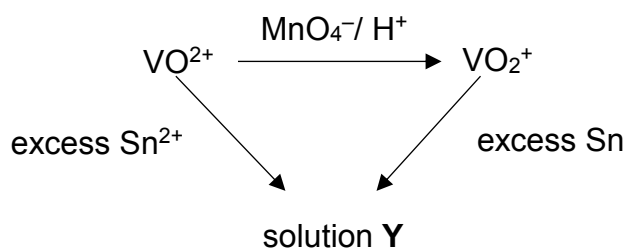
Which statement does **not** fit with the other three?

- A Element **Z** burns in oxygen with a bright white flame.
- B Element **Z** is a solid at room temperature which does not conduct electricity.
- C The oxide of element **Z** reacts with water to form a solution that turns red on addition of Universal Indicator.
- D Adding NaOH (aq) to the solution resulting from the reaction of the chloride of **Z** with water produces a white precipitate which is soluble in an excess of NaOH (aq).

- 18 *Use of the Data Booklet is relevant to this question.*

Paramagnetism is the property of being attracted to a magnetic field. Many transition compounds that contain unpaired electrons tend to be paramagnetic while those that do not contain unpaired electrons tend to be diamagnetic. Some compounds are more paramagnetic than others as they contain more unpaired electrons.

A blue solution of VO^{2+} undergoes the following reactions.

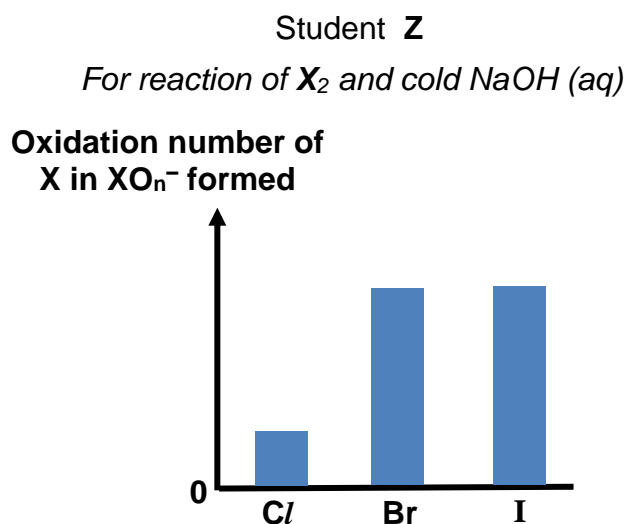
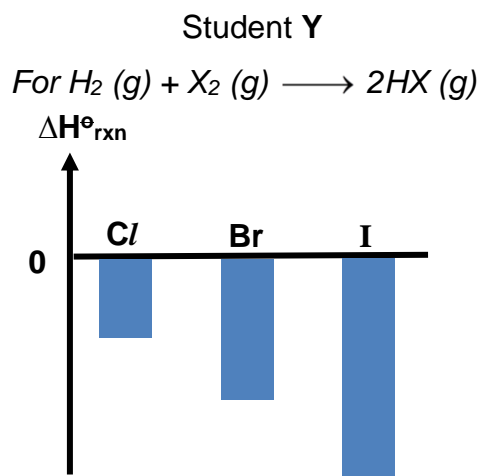
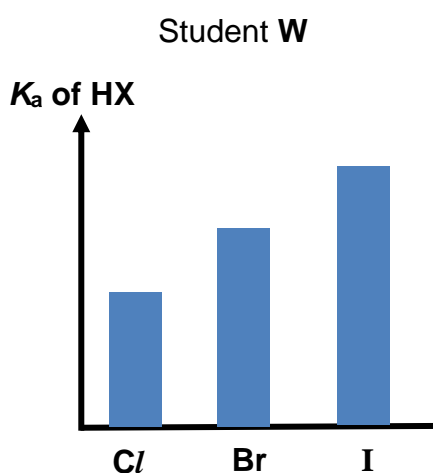


Which of the following statements is **incorrect**?

- A Solution **Y** contains $[\text{V}(\text{H}_2\text{O})_6]^{3+}$.
- B Both Sn^{2+} and Sn act as reducing agents.
- C The reacting ratio of VO^{2+} and MnO_4^- is 5 : 1.
- D VO^{2+} is diamagnetic while VO_2^+ is paramagnetic.

- 19 Three students, **W**, **Y** and **Z**, were asked to draw bar charts to represent how some properties of the halogens and their compounds differ in magnitude.

Their diagrams are shown.

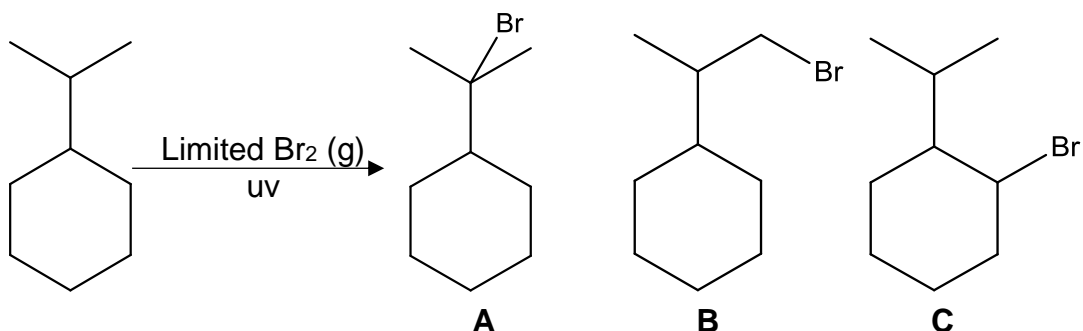


Which of the students' diagrams are correct?

- | | |
|---|---|
| <p>A both W and Z</p> <p>C both Y and Z</p> | <p>B both W and Y</p> <p>D none of the diagrams</p> |
|---|---|
- 20 How many isomers (both structural and stereoisomers) are there for a compound with the formula $C_4H_{10}O$ that can react with $Na(s)$?

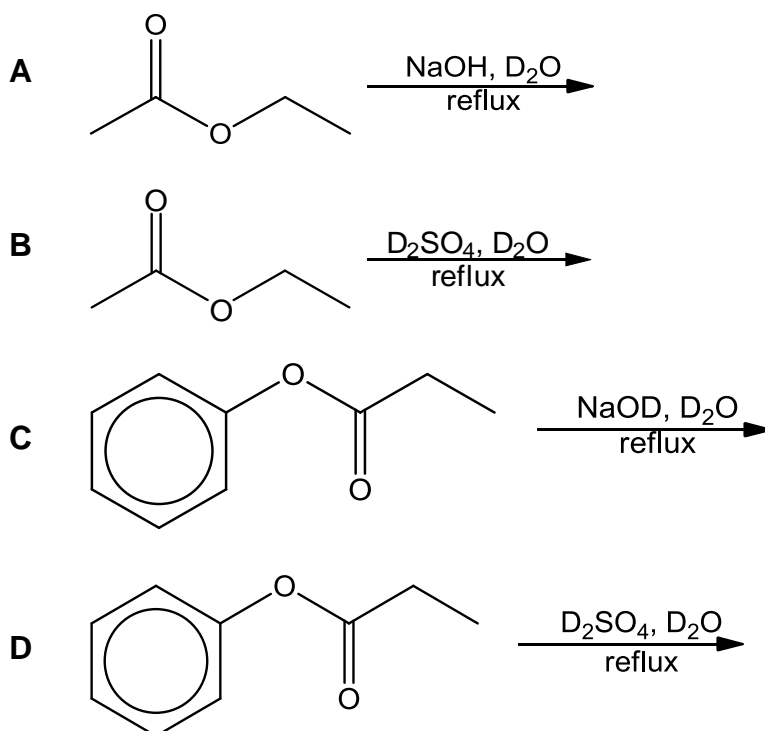
- | | | | |
|------------|------------|------------|------------|
| A 3 | B 4 | C 5 | D 6 |
|------------|------------|------------|------------|

- 21 Isopropylcyclohexane reacts with bromine gas to form different mono-substituted products. Three of the products are shown below.

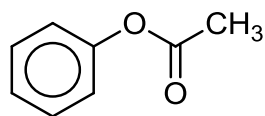


Given that the rate of abstraction of primary, secondary and tertiary hydrogen is 2 : 3 : 6 respectively, what is the expected ratio of the mono-substituted products **A** : **B** : **C** formed?

- | | | | |
|----------|-----------|----------|-----------|
| A | 6 : 2 : 3 | B | 1 : 1 : 1 |
| C | 1 : 2 : 2 | D | 1 : 6 : 4 |
- 22 Which of the following reactions will **not** incorporate deuterium (D) into any of the organic products formed? (D = ^2_1H , an isotope of hydrogen)



- 23 Phenyl acetate is commonly used in the laboratory as a precursor for organic synthesis.

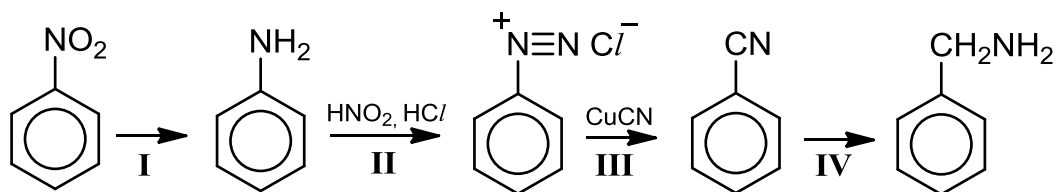


phenyl acetate

Which pair of compounds would produce phenyl acetate in high yield when reacted together?

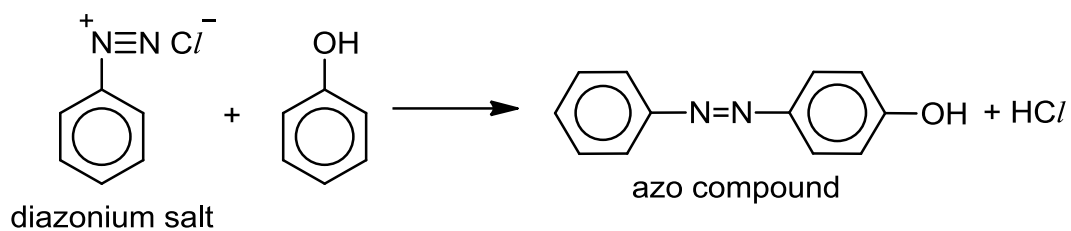
- A
- B
- C
- D

Use of the following reaction scheme is relevant for **Q24** and **Q25**.

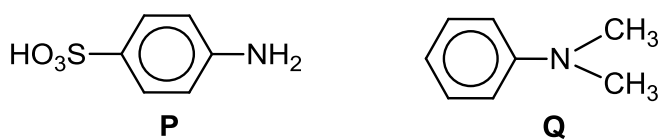


- 24 Which of the following statements is correct about the reaction scheme?
- A The reagent for stage **I** is LiAlH_4 .
- B Stage **II** is neutralisation reaction.
- C Stage **III** is nucleophilic substitution reaction.
- D The reagent for stage **IV** is hot aqueous NaOH .

- 25** Stage **II** is the formation of the diazonium salt, which can undergo coupling reactions with other organic compounds, such as phenol, to form azo compounds which are useful dyes.

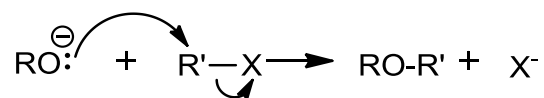


What is the structure of the azo compound formed when **P** and **Q** react together in the presence of HNO_2 and HCl ?

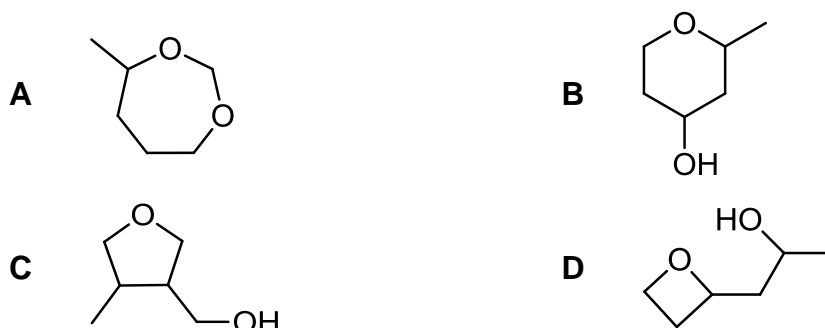
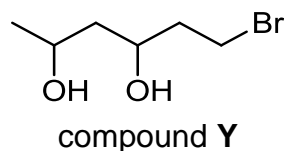


- A**
- B**
- C**
- D**

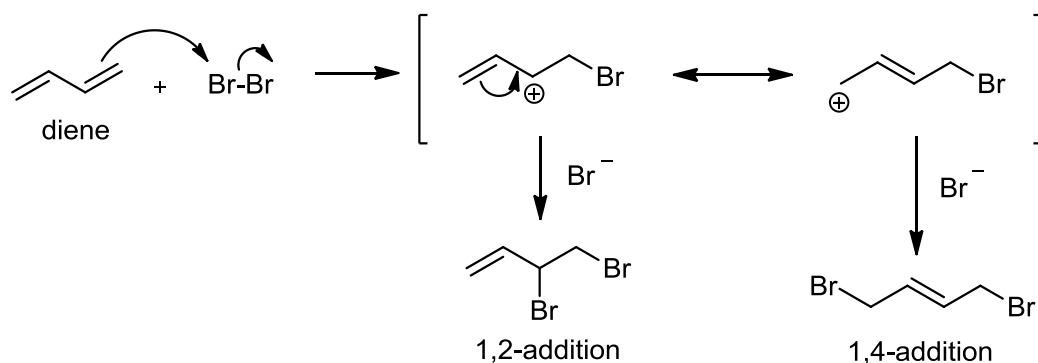
- 26 Williamson ether synthesis is a very useful reaction in the formation of ethers via the S_N2 mechanism shown below.



Which of the following compounds will be formed as a **major** product when compound **Y** undergoes Williamson ether synthesis followed by acidification?



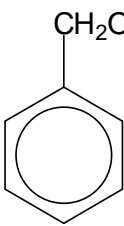
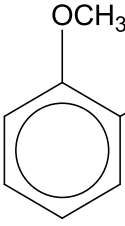
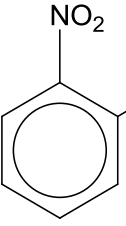
- 27 When a conjugated diene undergoes electrophilic addition with Br_2 , it forms two products through the 1,2-addition and the 1,4-addition, which is shown in the mechanism below.



Which of the following statements is **not** correct?

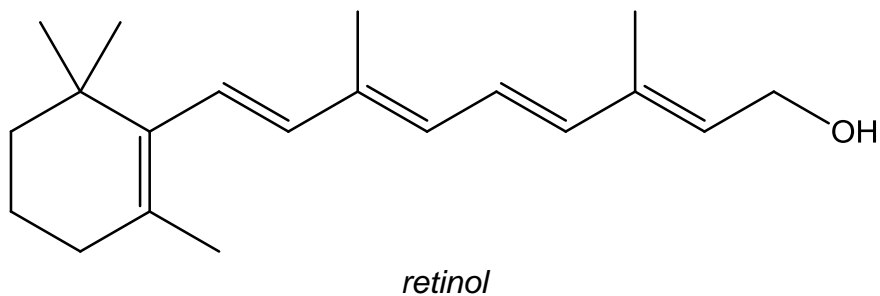
- A** The overall rate law is second order.
- B** The carbocation intermediates are resonance stabilised.
- C** The 1,2-addition product formed when HCl is used is
- D** The 1,4-addition product formed when ICl is used is

- 28 Which of the following shows the given species arranged in order of decreasing K_b values?

$\text{CH}_3\text{CH(I)COO}^-$			
I	II	III	IV

- A** I, III, IV, II **B** I, IV, III, II
C II, III, IV, I **D** II, IV, III, I

- 29 The rod cells at the back of the eye contain a primary alcohol called *retinol* which is responsible for their sensitivity to light. *Retinol* is oxidised by an enzyme-catalysed reaction that keeps the double bonds intact, to *retinal*, an aldehyde.



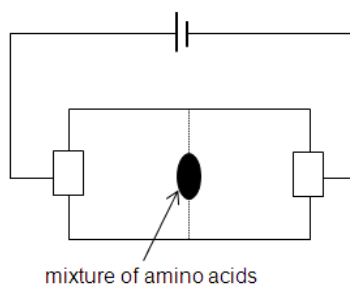
Which of the following is correct?

- A** The number of stereoisomers in *retinol* is 32.
B There are six σ bonds formed by $2sp^2-2sp^3$ overlap in a molecule of *retinol*.
C In laboratory preparations, *retinal* can be formed from heating *retinol* under reflux with hot potassium dichromate(VI).
D One mole of *retinol* reacts with 4 moles of hydrogen gas in the presence of palladium catalyst.

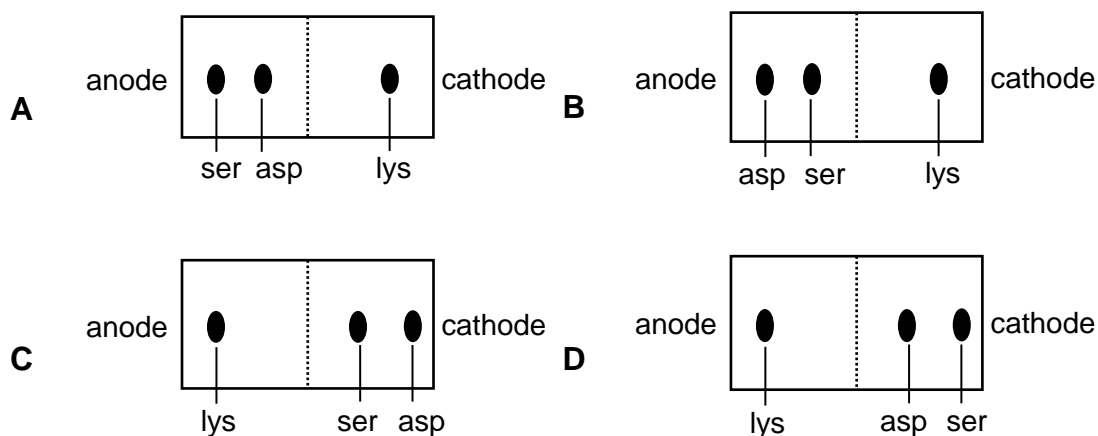
30 The table below gives some information pertaining to three amino acids.

amino acid	structure	isoelectric point
lysine (lys)	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ (\text{CH}_2)_4\text{NH}_2 \end{array}$	9.6
serine (ser)	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2\text{OH} \end{array}$	5.7
aspartic acid (asp)	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2\text{COOH} \end{array}$	2.9

A mixture of these three amino acids can be separated by electrophoresis.



Which of the following diagrams shows the result of the separation of the amino acids mixture at pH 7.0?



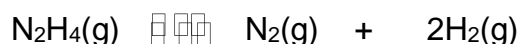
For questions 31 to 40, one or more of the three numbered statements 1 to 3 may be correct. Decide whether each of the statements is or is not correct (you may find it helpful to put a tick against the statements which you consider to be correct.)

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

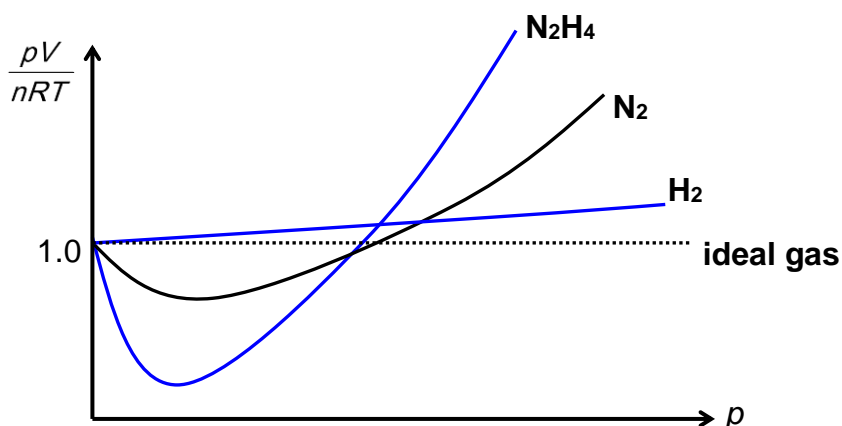
- 31** In a closed reaction vessel of 10 dm³ maintained at a temperature of 150 °C, gaseous hydrazine decomposes into nitrogen and hydrogen. The system reaches equilibrium with a total pressure of 1 atm.



The average M_r of the equilibrium gas mixture in the 10 dm³ vessel is found to be 20.

Which of the following statements are correct?

- In liquid form, both reactants and products flowing from a burette remain undeflected when subjected to close vicinity to a charged rod.
- The mass of the gaseous mixture inside the reaction vessel is 5.75 g.
- The following graphs depicts the correct behaviour of the three gases under standard conditions.



The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

- 32** Metal thiocyanates have very different industrial uses. For example, calcium thiocyanate, $\text{Ca}(\text{NCS})_2$, is used as a stiffening agent of fabrics.

The following data is provided:

$$\Delta H_{\text{latt}}^\ominus (\text{Ca}(\text{NCS})_2) = -2118 \text{ kJ mol}^{-1}$$

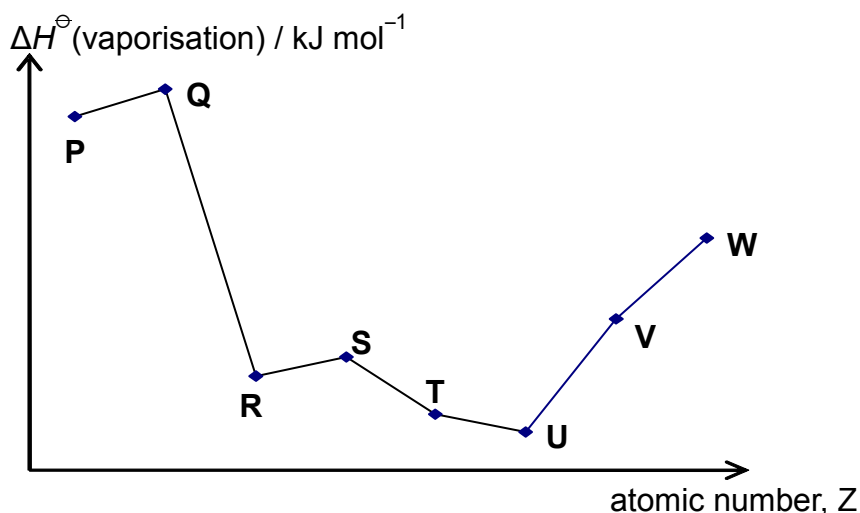
$$\Delta H_{\text{hyd}}^\ominus (\text{NCS}^-) = -310 \text{ kJ mol}^{-1}$$

$$\Delta H_{\text{hyd}}^\ominus (\text{Ca}^{2+}) = -1577 \text{ kJ mol}^{-1}$$

Which of the following statements are correct?

- The magnitude of $\Delta H_{\text{soln}}^\ominus$ of $\text{Ca}(\text{NCS})_2$ is 79 kJ mol^{-1} .
- Magnitude of $\Delta H_{\text{latt}}^\ominus$ of $\text{Ba}(\text{NCS})_2$ is smaller than that of $\text{Ca}(\text{NCS})_2$.
- $\Delta G_{\text{soln}}^\ominus$ of $\text{Ca}(\text{NCS})_2$ is negative at all temperatures.

- 33** The graph below shows the variation in the standard enthalpy change of vaporisation, $\Delta H^\ominus(\text{vaporisation})$, for eight consecutive elements in the Periodic Table, all with atomic number, $Z \leq 20$.



Which of the following statements are correct?

- The chloride of element **Q** is acidic in aqueous solution.
- The oxide of element **R** has a higher melting point than that of element **S**.
- Electrical conductivity decreases from element **P** to **W**.

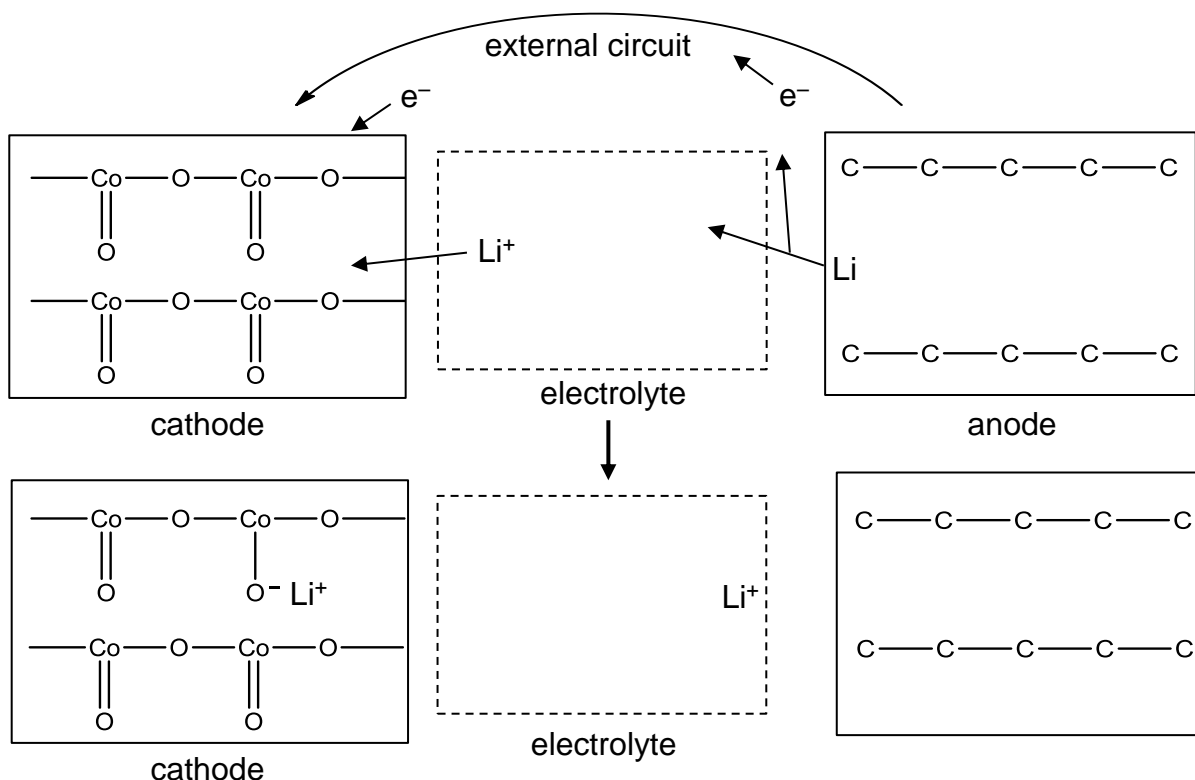
The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

- 34** A lithium-ion battery consists of: a cathode made from cobalt oxide, CoO_2 ; an anode made from graphite with lithium atoms inserted between the layers.

During discharge, Li atoms at the anode give up electrons to become Li^+ ions. The electrons travel round the external circuit, and are picked up by the cathode. A Li^+ ion from the electrolyte also moves to the cathode. This is illustrated in the following diagram in which C—C—C—C—C is a simplified representation of a layer of carbon atoms in graphite.



Which of the following statements are true?

- The mass of lithium metal that is deposited when a current of 3 A is passed through the battery during the charging process in 1 h 20 min is 1.03 g.
- The oxidation number of cobalt oxide cathode after discharge is +3.
- The bonding between the lithium atoms and the layers of carbon atoms is ionic in nature.

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

- 35** A chemist allowed a halogen, **X₂**, to react completely with $\text{S}_2\text{O}_3^{2-}(\text{aq})$. This resultant acidic solution was treated with an excess of aqueous barium nitrate to produce a white precipitate which is insoluble in dilute nitric acid.

Another halogen, **Y₂**, gave a different sulfur-containing product with $\text{S}_2\text{O}_3^{2-}(\text{aq})$.

Which of the following statements are correct with regards to the chemistry described?

- 1** A possible identity for **X₂** is **Br₂**.
- 2** A possible identity for **Y₂** is **I₂**.
- 3** **Y₂** is a stronger oxidising agent than **X₂**.

- 36** Which statements concerning the first row transition metal ions are **incorrect**?

- 1** Addition of $\text{K}_2\text{CO}_3(\text{aq})$ to $\text{CrCl}_3(\text{aq})$ produces a green precipitate of $\text{Cr}_2(\text{CO}_3)_3$.
- 2** Addition of $\text{KI}(\text{aq})$ to $\text{Fe}_2(\text{SO}_4)_3(\text{aq})$ produces a brown precipitate of FeI_3 .
- 3** Addition of $\text{NaOH}(\text{aq})$ to $\text{K}_2\text{CrO}_4(\text{aq})$ produces an orange solution of $\text{K}_2\text{Cr}_2\text{O}_7(\text{aq})$.

- 37** A catalytic converter is part of the exhaust system of modern cars.

Which reactions occur in a catalytic converter?

- 1** $2\text{C}_x\text{H}_y + (4x + y) \text{NO} \longrightarrow 2x \text{CO}_2 + y \text{H}_2\text{O} + (2x + \frac{y}{2}) \text{N}_2$
- 2** $2\text{CO} + 2\text{NO} \longrightarrow 2\text{CO}_2 + \text{N}_2$
- 3** $\text{CO}_2 + \text{NO} \longrightarrow \text{CO} + \text{NO}_2$

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

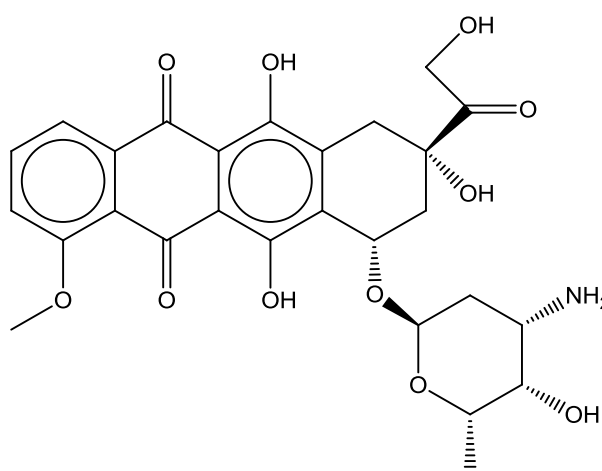
- 38** A non-cyclic organic compound has the molecular formula $C_5H_9O_2N$.

Which pair of functional groups could be present in this molecule?

- 1** one ketone group and one amide group
- 2** one ester group and one nitrile group
- 3** one carboxylic acid group and one nitrile group

- 39** *Doxorubicin* is an anti-cancer drug used to treat a wide range of cancers including blood cancers, like leukaemia and lymphoma.

[The ether group, R-O-R' is inert].



doxorubicin

Which of the following statements about *doxorubicin* are true?

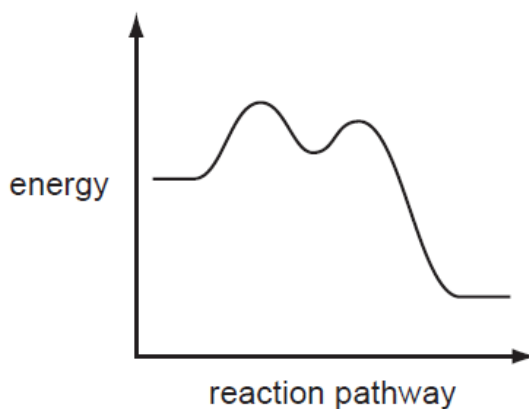
- 1** Addition of sodium boron hydride causes six atoms of hydrogen to be incorporated into the molecule.
- 2** On reacting with ethanoyl chloride, six moles of ethanoyl chloride is used up per mole of *doxorubicin*.
- 3** On reacting with thionyl chloride, five moles of thionyl chloride is used up per mole of *doxorubicin*.

The responses **A** to **D** should be selected on the basis of

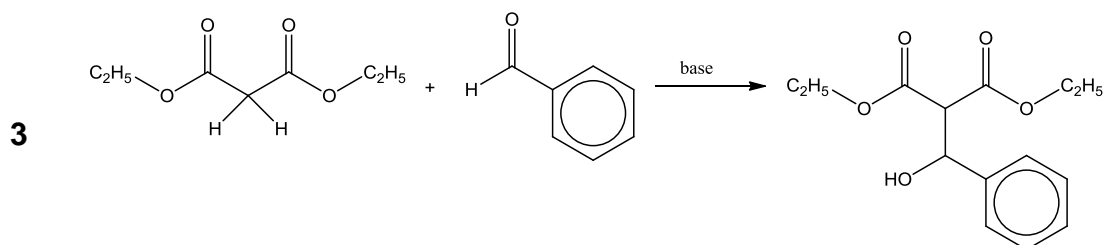
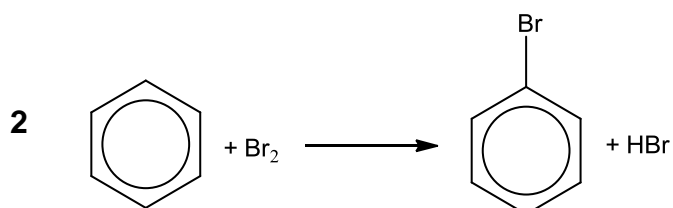
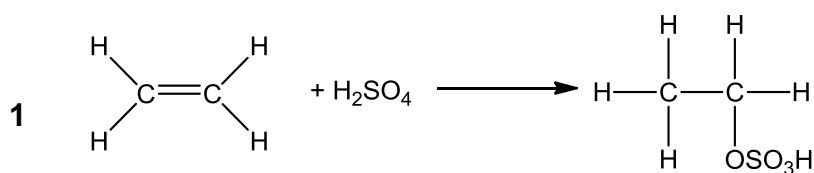
A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

40 A reaction pathway diagram is shown.



Which organic reactions could have such a profile?



END OF PAPER