

Chemistry B (Salters)

Y12 Open-Book Assessment
AS Chemistry

Christopher Shortman

OCR
Oxford Cambridge and RSA

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:

Additional resources may be supplied with this paper.

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 2 hours

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- The total number of marks may take into account some 'either/or' question choices.

1. How many protons are in a hydroxide ion, OH⁻?

- A. 1
- B. 8
- C. 9
- D. 10

Your answer

[1]

2. Which of the following is the correct electronic configuration for a potassium ion, K⁺?

- A. 1s²2s²2p⁶3s¹
- B. 1s²2s²2p⁶3s²3p⁶
- C. 1s²2s²2p⁶3s²3p⁶4s¹
- D. 1s²2s²2p⁶3s²3p⁶4s²

Your answer

[1]

3. Which pair would give a bright yellow precipitate when mixed?

- A. hydrochloric acid and copper(II) sulfate solution
- B. sodium hydroxide solution and iron(III) sulfate solution
- C. sodium iodide solution and lead(II) nitrate solution
- D. sodium sulfate solution and barium nitrate solution

Your answer

[1]

4. Ammonia is made by the reaction shown below.



Which conditions will result in the greatest equilibrium yield of ammonia?

	Temperature	Pressure
A	high	high
B	low	high
C	high	low
D	low	low

Your answer

[1]

5. Why do the boiling points of the halogens increase down the group?

- A. There is an increase in bond enthalpy.
- B. There is an increase in bond polarity.
- C. There is an increase in the strength of instantaneous dipoles.
- D. There is a decrease in electronegativity.

Your answer

[1]

6. The depletion of ozone is catalysed by chlorine radicals.

Which of the following describes a termination step of the radical mechanism?

	Number of radicals	Enthalpy change
A	decreases	negative
B	increases	negative
C	decreases	positive
D	increases	positive

Your answer

[1]

7. What is the effect on the volume when the pressure of an ideal gas is doubled at the same time as the temperature (in Kelvin) is doubled?

- A. halved
- B. remains the same
- C. doubled
- D. quadrupled

Your answer

[1]

8. Concentrated sulfuric acid is warmed with sodium bromide.

Which products are formed?

- A. HBr as the only gas
- B. no products
- C. H_2S , Br_2 and HBr
- D. SO_2 , Br_2 and HBr

Your answer

[1]

9. Which reaction will **not** give bromoethane as a product?

- A. Ethane with bromine in ultraviolet radiation.
- B. Ethene with bromine at room temperature and pressure.
- C. Ethene with hydrogen bromide at room temperature and pressure.
- D. Ethanol with sodium bromide and concentrated sulfuric acid, heated under reflux.

Your answer

[1]

10. Tin reacts with concentrated nitric acid, as shown in the equation below.



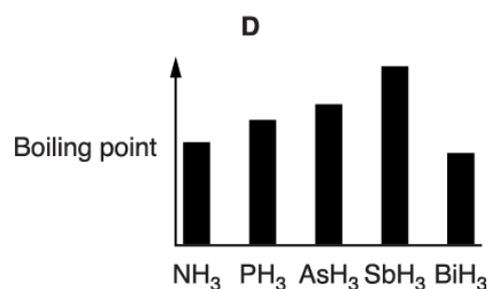
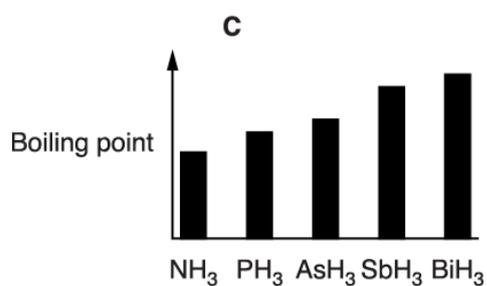
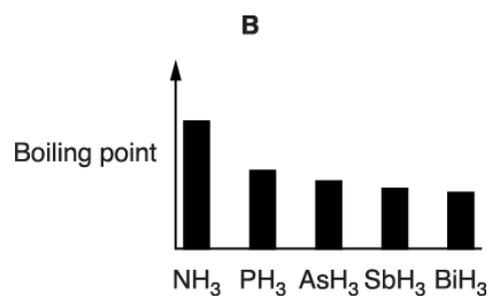
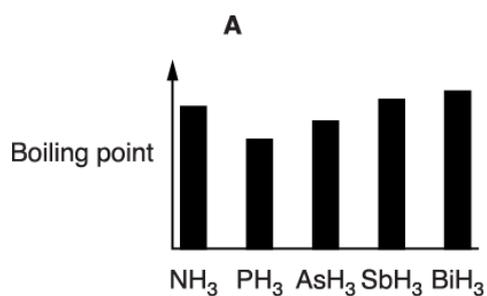
Which row represents the oxidation state changes for nitrogen and tin in this reaction?

	Nitrogen	Tin
A	increases by 1	decreases by 2
B	increases by 1	decreases by 4
C	decreases by 1	increases by 2
D	decreases by 1	increases by 4

Your answer

[1]

11. Which bar chart shows the boiling points of the group 15 hydrides?



Your answer

[1]

12. A substance has the formula shown below.



Which of the following is a structural **isomer** of this substance?

- A. 2-chlorobut-1-ene
- B. 3-chlorobut-4-ene
- C. 2-chloromethylpropene
- D. 1-chloromethylpropene

Your answer

[1]

13. Which molecule is linear in shape?

- A. SO_2
- B. H_2S
- C. CS_2
- D. C_2O

Your answer

[1]

14. The following data were collected for the equilibrium $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$ at 500 K.

$$[\text{H}_2(\text{g})]_{\text{eqm}} = 0.14 \text{ mol dm}^{-3} \quad [\text{I}_2(\text{g})]_{\text{eqm}} = 0.040 \text{ mol dm}^{-3} \quad K_c = \frac{[\text{HI}(\text{g})]_{\text{eqm}}^2}{[\text{H}_2(\text{g})]_{\text{eqm}} [\text{I}_2(\text{g})]_{\text{eqm}}} = 160$$

What will be the value of $[\text{HI}(\text{g})]_{\text{eqm}}$ under these conditions?

- A. 5.9×10^{-3}
- B. 0.45
- C. 0.90
- D. 0.95

Your answer

[1]

15. Which molecule is non-polar?

- A. IBr
- B. CH_2Cl_2
- C. NF_3
- D. BF_3

Your answer

[1]

16. Propan-1-ol is heated with AZ_2O_3 . The organic product is then reacted with bromine.

What is the final outcome of these two reactions?

- A. 1-bromopropane
- B. 1-bromopropane and 2-bromopropane
- C. 1,2-dibromopropane
- D. 1,3-dibromopropane

Your answer

[1]

17. Which pair of compounds will react to form the ester $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$?

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ and $(\text{CH}_3\text{CO})_2\text{O}$
- C. $\text{CH}_3\text{CH}_2\text{COOH}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
- D. $(\text{CH}_3\text{CH}_2\text{CO})_2\text{O}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$

Your answer

[1]

18. Some students wish to make 0.970 mol of zinc oxide by the reaction shown below. They are told that the reaction gives a 95.0% yield.



What mass of zinc carbonate should they heat?

- A. 83.2 g
- B. 117 g
- C. 122 g
- D. 128 g

Your answer

[1]

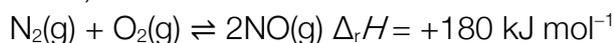
19. Which solution contains the greatest number of ions?

- A. 10.0 cm³ of 0.500 mol dm⁻³ NaCl
- B. 0.300 dm³ of 0.0400 mol dm⁻³ NaCl
- C. 0.0200 dm³ of 0.500 mol dm⁻³ MgCl₂
- D. 40.0 cm³ of 0.150 mol dm⁻³ MgCl₂

Your answer

[1]

20. Nitrogen and oxygen combine, as shown below.



Which statement is correct for this reaction?

- A. The reaction is exothermic.
- B. The activation enthalpy for the reverse reaction is smaller than the activation enthalpy for the forward reaction.
- C. Once energy equal to the activation enthalpy has been provided, the reaction will continue without further energy input.
- D. The sum of the bond enthalpies of bonds made is greater than the sum of the bond enthalpies of bonds broken.

Your answer

[1]

21. How many hydrogen atoms are there in 1 mol of methanol?
- A 3
 - B 4
 - C 1.8×10^{24}
 - D 2.4×10^{24}

Your answer

[1]

22. Which row could be correct for **solids** with the structure type named?

	Structure type	Melting point	Solubility in water	Electrical conductivity
A	ionic	high	soluble	high
B	metallic	high	insoluble	high
C	ionic	low	soluble	high
D	metallic	low	insoluble	low

Your answer

[1]

23. What is a correct measure of percentage atom economy?
- A mass of useful products \times 100 / mass of reactants
 - B amount of products \times 100 / amount of reactants
 - C M_r of products \times 100 / M_r of reactants
 - D M_r of useful products \times 100 / M_r of reactants

Your answer

[1]

24. What is correct about hydrogen bromide?
- A It reacts with concentrated sulfuric acid to form Br_2 and H_2S .
 - B It forms white fumes with ammonia.
 - C Its M_r is 79.9.
 - D It does **not** decompose on heating.

Your answer

[1]

25. For which purpose is distillation used?
- A to allow a liquid to boil without the loss of vapour
 - B to purify a liquid product
 - C to remove an involatile impurity
 - D to allow further reaction without the loss of product

Your answer

[1]

26. What is correct about a 'green chemistry' process?
- A It makes waste products that are easier to separate.
 - B It makes processes cheaper.
 - C It uses organic solvents.
 - D It reduces the number of steps necessary.

Your answer

[1]

27. A sample of gas, volume V , has its temperature raised from 0°C to 20°C . The pressure remains constant.
What is the new volume?
- A $0.005 V$
 - B $0.93 V$
 - C $1.07 V$
 - D $20 V$

Your answer

[1]

28. Which row is correct for the silver halide shown?

	Halide	Colour	Solubility in ammonia
A	silver chloride	white	soluble
B	silver bromide	yellow	insoluble
C	silver iodide	yellow	soluble
D	silver iodide	cream	partially soluble

Your answer

[1]

29. $\text{CH}_3\text{C}/$ can be converted to CH_3NH_2 in one step.
What is correct about this process?
- A The reaction is substitution of C/by NH_3 .
 - B The product is an amide.
 - C The reagent is NH_4^+ .
 - D The reagent is a nucleophile.

Your answer

[1]

30. $\text{CH}_3\text{C}/$ and CH_3I both react with hydroxide ions.
What is correct about these reactions?
- A $\text{CH}_3\text{C}/$ reacts faster because the $\text{C}-\text{C}/$ bond is more polar than the $\text{C}-\text{I}$ bond.
 - B CH_3I reacts faster because the $\text{C}-\text{C}/$ bond is stronger than the $\text{C}-\text{I}$ bond.
 - C Both form ethanol.
 - D In each case, homolytic bond fission occurs.

Your answer

[1]

31. What will react with a phenol?
- A sodium carbonate
 - B sodium hydroxide
 - C ethanoic acid
 - D acidified potassium dichromate

Your answer

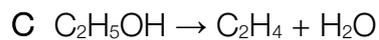
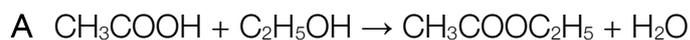
[1]

32. When are insoluble impurities removed during recrystallisation?
- A when the hot solution is filtered
 - B as the solution cools
 - C when the crystals are filtered off
 - D when the crystals are washed

Your answer

[1]

33. Which of these is classified as an elimination reaction?



Your answer

[1]

34. $\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$

0.618 g of copper carbonate ($M_r = 123.5$) is heated.

What is the volume of CO_2 produced at room temperature and pressure?

A 120 cm^3

B 1.2 dm^3

C 240 cm^3

D 12 dm^3

Your answer

[1]

35. What is correct about a sodium chloride lattice?

A There are attractions between ions of different charge.

B The sodium ions are larger than the chloride ions.

C The numbers of sodium ions and chloride ions are not equal.

D Each sodium ion is surrounded by four chloride ions.

Your answer

[1]

36. What is correct about an exothermic reaction?
- A Heat is taken in.
 - B More bonds are made than broken.
 - C The sign of ΔH is positive.
 - D It is represented by a downwards arrow on an enthalpy profile diagram.

Your answer

[1]

37. What is the functional group in the compound $\text{CH}_3\text{COOCOC}_2\text{H}_5$?
- A carboxylic acid
 - B ester
 - C acid anhydride
 - D ketone

Your answer

[1]

38. This question concerns four compounds each with four carbon atoms.
- | | |
|--|--|
| 1. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ | 2. $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$ |
| 3. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ | 4. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ |

What is the order of their boiling points, largest first?

- A 1 2 3 4
- B 1 2 4 3
- C 4 3 1 2
- D 3 4 2 1

Your answer

[1]

39. Which has the largest bond angle?

- A BF_3
- B CF_4
- C NF_3
- D OF_2

Your answer

[1]

40. Nitrogen monoxide, NO , reacts instantaneously in air to form NO_2 .
What is an explanation for this?

- A NO is a radical taking part in a termination reaction.
- B the activation enthalpy for the reaction is low.
- C oxygen is a very reactive gas.
- D NO_2 is less stable than NO .

Your answer

[1]

41. What is the correct order of radiation in order of increasing wavelength?

- A ultraviolet < visible < infrared
- B ultraviolet < infrared < visible
- C visible < infrared < ultraviolet
- D infrared < visible < ultraviolet

Your answer

[1]

42. Which of the following is a cyclic saturated aliphatic compound?

- A cyclohexene
- B cyclohexane
- C benzene
- D hexane

Your answer

[1]

43. What is **not** a property of hydrogen iodide?

- A It reacts with ammonia.
- B It is soluble in water.
- C It is stable to heat.
- D It reacts with sodium hydroxide.

Your answer

[1]

44. What is the correct order of boiling points with the lowest first?

- A CH_4 $\text{CH}_3\text{C}/$ CH_3OH
- B CH_4 CH_3OH $\text{CH}_3\text{C}/$
- C $\text{CH}_3\text{C}/$ CH_3OH CH_4
- D CH_3OH $\text{CH}_3\text{C}/$ CH_4

Your answer

[1]

45. Which statement about ozone is correct?

- A Ozone is a polluting gas in the stratosphere.
- B Ozone acts as a sunscreen in the stratosphere.
- C There is no ozone in the troposphere.
- D Ozone is an isomer of oxygen.

Your answer

[1]

46. A company makes a cleaning product and is looking for a 'greener' method of making the product.

Which one of the following would the company consider?

- A Finding a reaction with a higher percentage yield.
- B Finding a reaction with a higher atom economy.
- C Using more organic solvents.
- D Using inorganic catalysts rather than enzymes.

Your answer

[1]

47. Name the functional group in HCHO.

- A aldehyde
- B ketone
- C alcohol
- D carboxylic acid

Your answer

[1]

48. 1.0 g of solid carbon dioxide is vaporised.
What volume of gas (in cm³) is produced at RTP?

- A 0.55
- B 24
- C 550
- D 24 000

Your answer

[1]

49. What is the percentage of chlorine by mass in magnesium chloride?

- A 59%
- B 66%
- C 74%
- D 75%

Your answer

[1]

50. Which statement about the reactions of solid halides with concentrated sulfuric acid is correct?

- A Chlorides produce HCl as the only gas.
- B Bromides produce HBr , Br_2 and H_2S .
- C Iodides produce HI , I_2 and SO_2 .
- D Astatides would be expected to produce HAt only.

Your answer

[1]

51. Which statement about electronegativity is correct?

- A Electronegativity is the charge on an element's ion.
- B If a bond is polar, the two atoms have different electronegativities.
- C If a molecule has no dipole, all its atoms have the same electronegativity.
- D Electronegativity increases down a group of the Periodic Table.

Your answer

[1]

52. Which substance does **not** have hydrogen bonding between its molecules?

- A $\text{C}_6\text{H}_5\text{OH}$
- B CH_3CHO
- C CH_3COOH
- D $\text{C}_3\text{H}_7\text{OH}$

Your answer

[1]

53. Which statement about the flame colour of lithium is correct?
- A It is yellow.
 - B It is caused by electrons absorbing visible light.
 - C It is the result of bright lines in lithium's emission spectrum.
 - D It follows a pattern of colours in Group 1.

Your answer

[1]

54. 35 cm³ of a solution has a concentration of 0.125 mol dm⁻³.
A student calculates the amount (in moles) of solute in this solution.

Which answer is given to the appropriate number of significant figures?

- A 4.37×10^{-3}
- B 4.375×10^{-3}
- C 4.38×10^{-3}
- D 4.4×10^{-3}

Your answer

[1]

55. Hydrochloric acid reacts with sodium carbonate as shown in the equation.
- $$2\text{HCl} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$$

20 cm³ of 2.0 mol dm⁻³ Na₂CO₃ are added to 20 cm³ 2.0 mol dm⁻³ HCl.

What mass of CO₂ (in g) is produced?

- A 0.88
- B 1.76
- C 22
- D 1760

Your answer

[1]

56. A sample of gas has a mass of m g and occupies a volume V m³ at a pressure p Pa and temperature T K.

Which expression is correct for the M_r of the gas?

- A mRT / pV
- B pV / mRT
- C pV / RT
- D mRT / npV

Your answer

[1]

57. Which statement about carboxylic acids is correct?

- A They can be made by oxidising secondary alcohols.
- B They react with phenols.
- C They do **not** fizz with sodium carbonate solution.
- D They form esters when reacted with tertiary alcohols.

Your answer

[1]

58. What is **not** a consequence of hydrogen bonding?

- A Water expands on freezing.
- B Ethanol is very soluble in water.
- C Sodium chloride dissolves in water.
- D H₂O has a higher boiling point than H₂S.

Your answer

[1]

59. Which statement about a lattice of sodium chloride is correct?
- A The ions are the same size.
 - B The attraction between two sodium ions is greater than the repulsion between two chloride ions.
 - C Each sodium ion is surrounded by six chloride ions.
 - D There are more sodium ions than chloride ions.

Your answer

[1]

60. Which row is correct?

	Name	Formula
A	sodium nitride	Na_3N
B	aluminium sulfate	AlSO_4
C	copper(I) oxide	CuO
D	calcium hydroxide	CaOH_2

Your answer

[1]

61. What is the outer subshell electron configuration of an element in Group 16 of the Periodic Table?

- A p^4
- B p^5
- C p^6
- D p^{16}

Your answer

[1]

62. Geiger and Marsden fired α -particles at a gold foil. What happened in their experiment?

- A The α -particles were scattered randomly.
- B Most α -particles passed through undeflected.
- C Many α -particles bounced back.
- D No α -particles were deflected.

Your answer

[1]

63. Which molecule has no lone pairs?

- A BeCl_2
- B CF_4
- C NH_3
- D BH_3

Your answer

[1]

64. What is the volume (in cm^3) of 4.4 g of CO_2 at RTP?

- A 105.6
- B 2.4×10^3
- C 2.4×10^4
- D 105 600

Your answer

[1]

65. Which reaction will give $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ as a product?

- A Reduction of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
- B Treatment of $\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{CH}_3$ with conc sulfuric acid followed by water
- C Heating $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$ with steam and phosphoric acid under pressure
- D Treatment of $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_3$ with conc sulfuric acid followed by water

Your answer

[1]

66. Which statement about the reaction $\text{RC}/ + \text{NH}_3 \rightarrow \text{RNH}_2 + \text{HC}/$ is correct?

- A An amine is formed.
- B $\text{RC}/$ is acting as an acid.
- C The reaction is electrophilic substitution.
- D An amide is formed.

Your answer

[1]

67. The mass spectrum of ethanoic acid has a peak at m/z 45. Which species could cause this?

- A CH_3COOH^+
- B COOH^+
- C $^{13}\text{CH}_3\text{COOH}^+$
- D CH_3^+

Your answer

[1]

68. What is formed at the cathode when aqueous aluminium sulfate is electrolysed?

- A Hydrogen
- B Oxygen
- C Aluminium
- D Sulfur dioxide

Your answer

[1]

69. Which term correctly describes cyclohexane?

- A Arene
- B Alkene
- C Aliphatic
- D Unsaturated

Your answer

[1]

70. Urea has formula $\text{CO}(\text{NH}_2)_2$.

What is the percentage of nitrogen by mass in urea?

- A 23%
- B 25%
- C 41%
- D 47%

Your answer

[1]

71. What is a property of solid iodine?

- A It is very soluble in water.
- B It is purple in colour.
- C It dissolves in organic solvents.
- D It melts when heated at room pressure.

Your answer

[1]

72. Silver nitrate solution is added to solutions of sodium halides.

Which row is correct?

	Halide	Precipitate formed with silver nitrate
A	chloride	white, insoluble in ammonia
B	iodide	cream, insoluble in ammonia
C	chloride	cream, soluble in ammonia
D	iodide	yellow, insoluble in ammonia

Your answer

[1]

73. What is the action (if any) of concentrated sulfuric acid on HBr?

- A No reaction
- B Forms SO_2
- C Forms H_2S
- D Forms sulfur

Your answer

[1]

74. Which molecule forms permanent dipole – permanent dipole bonds as its strongest intermolecular bond?

- A CH_3CHO
- B CH_3COOH
- C CCl_4
- D CO_2

Your answer

[1]

75. A student says that bio-ethanol is carbon neutral.

Which option provides evidence that disagrees with the student's statement about bio-ethanol?

- A It gives off carbon dioxide when it burns.
- B It is made from crops that absorb carbon dioxide.
- C Energy from conventional power-stations is used to make it.
- D Valuable land is used up growing the crops used to make bio-ethanol.

Your answer

[1]

76. Which substance **cannot** be made in a single step from C_2H_4 ?

- A C_2H_5OH
- B C_2H_5Br
- C C_2H_6
- D $C_2H_5NH_2$

Your answer

[1]

77. Which substance will **not** give 3-methylpentane when reduced with hydrogen?

- A 2-ethylbut-1-ene
- B 3-methylpent-2-ene
- C 2-methylpent-1-ene
- D 3-methylpent-1-ene

Your answer

[1]

78. What is **not** a reaction of 2-methylpropan-2-ol?

- A Reaction with an acid anhydride to form an ester
- B Oxidation to a ketone
- C Dehydration to an alkene
- D Reaction with HCl to form a haloalkane

Your answer

[1]

79. Which statement about instantaneous dipole – induced dipole bonds is correct?

- A They become weaker with increasing chain length of an organic compound.
- B They become stronger with increased branching in organic compounds.
- C They occur between molecules rather than atoms in molecules.
- D In any molecule they are always the weakest intermolecular bond.

Your answer

[1]

80. Which of the following is a redox reaction?

- A $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- B $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$
- C $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$
- D $\text{MgCO}_3 \rightarrow \text{MgO} + \text{CO}_2$

Your answer

[1]

81. Which statement is correct about fusion reactions?
- A They occur at room temperature and pressure.
 - B They result in the formation of new elements.
 - C They only occur in stars.
 - D They only occur when a large nucleus collides with a small nucleus.

Your answer

[1]

82. Which statement is correct about orbitals?
- A s-orbitals are circular.
 - B Orbitals always contain two electrons
 - C A/has an orbital containing a single electron.
 - D A p-orbital can contain up to six electrons.

Your answer

[1]

83. Which statement is correct about the melting points and structures of the elements in Period 2?
- A The melting points increase across the Period.
 - B Elements on the left have ionic structures.
 - C Elements on the right have covalent structures.
 - D Metals have the highest melting points.

Your answer

[1]

84. What is a reason that the first ionisation enthalpy increases across a Period?
- A Each electron is attracted to more protons.
 - B The electrons are further from the nucleus.
 - C The atoms get larger.
 - D The charge density of the ions increases.

Your answer

[1]

85. Which compounds will react together under appropriate conditions?
- A phenols and acid anhydrides
 - B carboxylic acids and phenol
 - C alcohols and phenols
 - D ethers and carboxylic acids

Your answer

[1]

86. Which compound does **not** exist?
- A Fe_2SO_4
 - B Ag_2SO_4
 - C PbSO_4
 - D $\text{Fe}_2(\text{SO}_4)_3$

Your answer

[1]

87. One method of producing hydrogen is the thermal decomposition of steam in the presence of a catalyst.



Which set of conditions will produce the highest yield of hydrogen?

	Temperature	Pressure
A	High	High
B	High	Low
C	Low	Low
D	Low	High

Your answer

[1]

88. Tests are done on an aqueous solution containing two sodium salts.

The results are shown below.

Test	Result
Add aqueous chlorine followed by an organic solvent	Brown aqueous layer and brown organic layer
Add aqueous barium nitrate	White precipitate

What are the anions in the solution?

- A bromide and sulfate
- B sulfate and iodide
- C sulfate and chloride
- D bromide and chloride

Your answer

[1]

89. What is a reason that BF_3 has no overall dipole?

- A It is the same shape as ammonia.
- B B and F have very similar electronegativities.
- C It is trigonal.
- D It is a small molecule.

Your answer

[1]

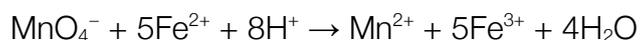
90. What is correct about a solution of phenol?

- A It will give a red colour with neutral iron(III) chloride.
- B It will fizz with sodium carbonate.
- C It will get warm when sodium hydroxide is added.
- D It will react with a solution of ethanoic acid to form an ester.

Your answer

[1]

91. MnO_4^- ions react with Fe^{2+} ions according to the equation shown below.



What volume of $0.100 \text{ mol dm}^{-3}$ potassium manganate(VII) is needed to react with 0.250 grams of iron dissolved in sulfuric acid?

- A 8.96 cm^3
- B 22.4 cm^3
- C 44.8 cm^3
- D 224 cm^3

Your answer

[1]

92. A chemist wants to accurately determine the aspirin content of an aspirin tablet.

Which of the following techniques should the chemist use?

- A. thin layer chromatography
- B. melting point determination
- C. addition of a neutral solution of iron(III) chloride
- D. titration with sodium hydroxide solution

Your answer

[1]

93. What volume of $0.250 \text{ mol dm}^{-3}$ sodium hydroxide solution should be diluted to 1000 cm^3 to make a $0.0100 \text{ mol dm}^{-3}$ solution?

- A. 40 cm^3
- B. 50 cm^3
- C. 80 cm^3
- D. 160 cm^3

Your answer

[1]

94. A student carries out a titration. Sodium hydroxide solution is transferred to a conical flask using a pipette. Methyl orange indicator is added to the flask. Hydrochloric acid is added from a burette until the indicator changes colour.

Which of the following would lead to the titre being larger than it should be?

- A. Rinsing the conical flask with water before adding the sodium hydroxide solution.
- B. Rinsing the burette with water before filling it with hydrochloric acid.
- C. Rinsing the pipette with water before filling it with sodium hydroxide solution.
- D. Adding extra drops of indicator.

Your answer

[1]

95.

In a pilot plant making ammonia, NH_3 , 200 cm^3 of nitrogen are mixed with 300 cm^3 of hydrogen.

What would be the final volume (at the same temperature and pressure) if complete reaction occurs?

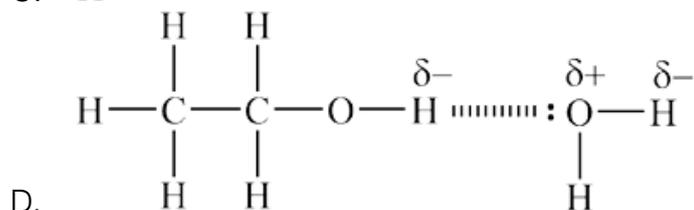
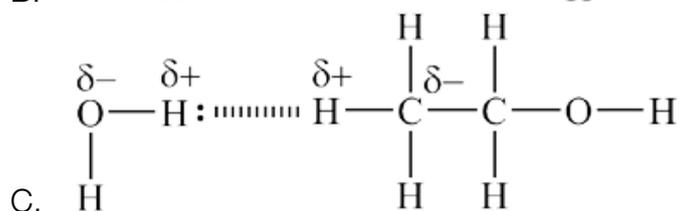
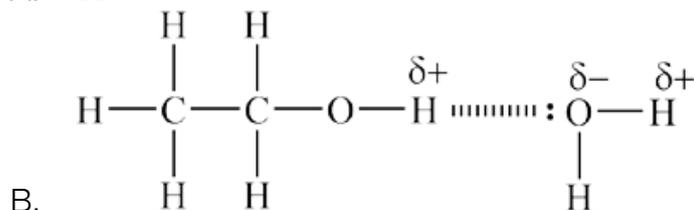
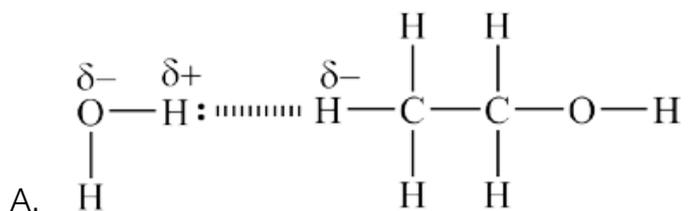
- A. 200 cm^3
- B. 250 cm^3
- C. 300 cm^3
- D. 400 cm^3

Your answer

[1]

96. Alcoholic drinks are solutions of ethanol in water. Ethanol is soluble in water due to hydrogen bonding.

Which diagram best illustrates hydrogen bonding between a molecule of ethanol and a molecule of water?



Your answer

[1]

97. Four solutions, **W**, **X**, **Y**, **Z**, are known to contain ethanol, phenol, ethanoic acid and sodium carbonate. It is not known which solution is which.

When solution **X** is mixed with solution **Z**, bubbles of gas are seen.

Drops of universal indicator solution are added to separate samples of each solution. The results of this test are shown below.

	Solution W	Solution X	Solution Y	Solution Z
Universal indicator solution	red solution	blue solution	green solution	red solution

Which solution contains phenol?

- A. Solution **W**
- B. Solution **X**
- C. Solution **Y**
- D. Solution **Z**

Your answer

[1]

98. A chemist has four solutions, labelled **A**, **B**, **C** and **D**. Each contain one of salicylic acid ($\text{HOOC}_6\text{H}_4\text{COOH}$), ethanoic acid, phenol, ethanol or aspirin ($\text{HOOC}_6\text{H}_4\text{OCOCH}_3$).

It is not known which solution is which.

Neutral iron(III) chloride solution and sodium carbonate solution are added separately to samples of **A**, **B**, **C** and **D**. The results of the tests are shown below.

	Solution A	Solution B	Solution C	Solution D
Neutral iron(III) chloride solution	purple colour	yellow colour	purple colour	yellow colour
Sodium carbonate solution	gas evolved	gas evolved	no change observed	no change observed

Which solution contains salicylic acid?

- A. Solution A
- B. Solution B
- C. Solution C
- D. Solution D

Your answer

[1]

99. Exhaust gases from vehicle engines contain potential pollutants.

Which substance(s) could be present in the exhaust gases from a vehicle engine as a result of the incomplete combustion of a hydrocarbon?

- 1: Carbon monoxide
 - 2: Particulates
 - 3: Unburnt hydrocarbons
- A. 1, 2 and 3
 - B. Only 1 and 2
 - C. Only 2 and 3
 - D. Only 1

Your answer

[1]

100. Which of the following gases is / are produced when hydrogen burns in air at high temperature?

1: Water vapour

2: NO_x

3: Carbon dioxide

- A. 1, 2 and 3
- B. Only 1 and 2
- C. Only 2 and 3
- D. Only 1

Your answer

[1]

END OF QUESTION PAPER