



National
Qualifications
SPECIMEN ONLY

SQ07/H/02

**Chemistry
Section 1 — Questions**

Date — Not applicable

Duration — 2 hours and 30 minutes

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

Instructions for the completion of Section 1 are given on *Page two* of your question and answer booklet SQ07/H/01.

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

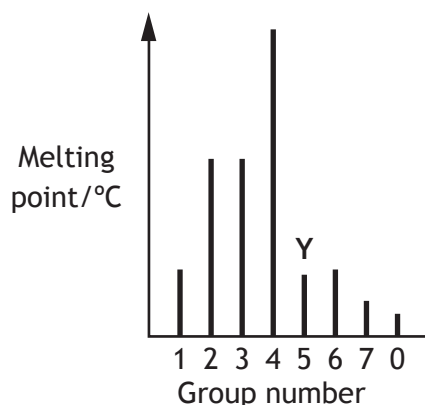


* S Q 0 7 H 0 2 *

SECTION 1 — 20 marks

Attempt ALL questions

- Which type of bonding is **never** found in elements?
 - Metallic
 - London dispersion forces
 - Polar covalent
 - Non-polar covalent
- In which of the following molecules will the chlorine atom carry a partial positive charge ($\delta+$)?
 - Cl–Br
 - Cl–Cl
 - Cl–F
 - Cl–I
- Which of the following is **not** an example of a Van der Waals' force?
 - Covalent bonding
 - Hydrogen bonding
 - London dispersion forces
 - Permanent dipole-permanent dipole interactions
- The diagram shows the melting points of successive elements across a period in the Periodic Table.



Which of the following is a correct reason for the low melting point of element Y?

- It has weak ionic bonds
- It has weak covalent bonds
- It has weakly-held outer electrons
- It has weak forces between molecules

5. In which of the following will **both** changes result in an increase in the rate of a chemical reaction?

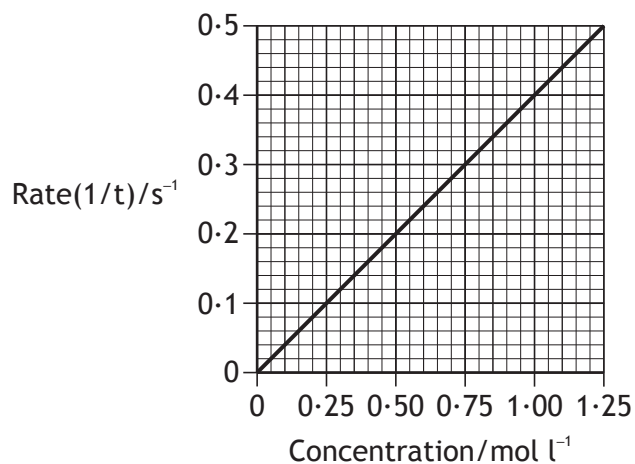
- A A decrease in activation energy and an increase in the frequency of collisions
- B An increase in activation energy and a decrease in particle size
- C An increase in temperature and an increase in the particle size
- D An increase in concentration and a decrease in the surface area of the reactant particles

6. Which of the following is **not** a correct statement about the effect of a catalyst?

The catalyst

- A provides energy so that more molecules have successful collisions
- B lowers the energy that molecules need for successful collisions
- C provides an alternative route to the products
- D forms bonds with reacting molecules.

7. The graph shows how the rate of a reaction varies with the concentration of one of the reactants.



Calculate the reaction time, in seconds, when the concentration of the reactant was 0.50 mol l⁻¹.

- A 0.2
- B 0.5
- C 2.0
- D 5.0

8. In which line of the table are fat, protein and soap correctly classified?

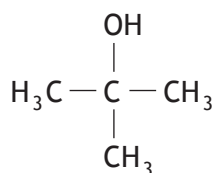
	<i>Amides</i>	<i>Salts</i>	<i>Esters</i>
A	Fat	Soap	Protein
B	Fat	Protein	Soap
C	Soap	Fat	Protein
D	Protein	Soap	Fat

9. The arrangement of amino acids in a peptide is Z-X-W-V-Y where the letters V, W, X, Y and Z represent amino acids.

On partial hydrolysis of the peptide, which of the following sets of dipeptides is possible?

- A V-Y, Z-X, W-Y, X-W
- B Z-X, V-Y, W-V, X-W
- C Z-X, X-V, W-V, V-Y
- D X-W, X-Z, Z-W, Y-V

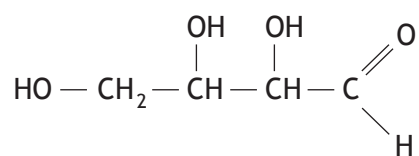
10.



Which of the following compounds is an isomer of the structure shown above?

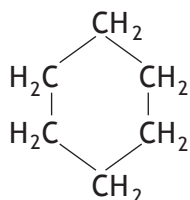
- A Butanal
- B Butanone
- C Butan-1-ol
- D Butanoic acid

11. Erythrose can be used in the production of a chewing gum that helps prevent tooth decay.

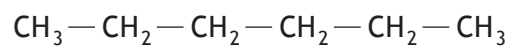


Which of the following compounds will be the best solvent for erythrose?

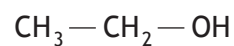
A



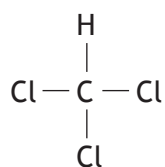
B



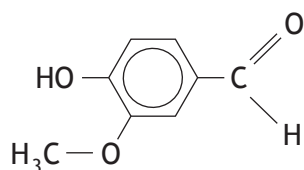
C



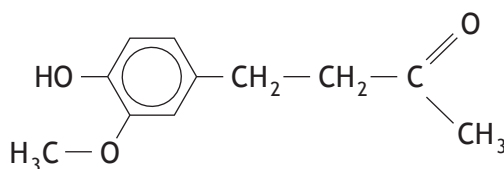
D



12. Vanillin and zingerone are flavour molecules.



vanillin

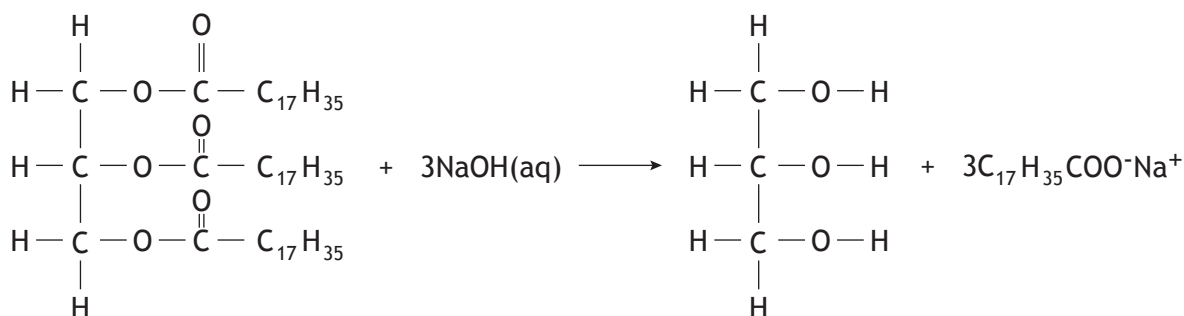


zingerone

Which line in the table correctly compares the properties of vanillin and zingerone?

	<i>More soluble in water</i>	<i>More volatile</i>
A	vanillin	vanillin
B	vanillin	zingerone
C	zingerone	vanillin
D	zingerone	zingerone

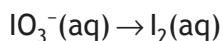
13. Soaps are produced by the following reaction.



This reaction is an example of

- A condensation
- B esterification
- C hydrolysis
- D oxidation.

14. During a redox process in acid solution, iodate ions, $\text{IO}_3^-(\text{aq})$, are converted into iodine, $\text{I}_2(\text{aq})$.



The numbers of $\text{H}^+(\text{aq})$ and $\text{H}_2\text{O}(\ell)$ required to balance the ion-electron equation for the formation of 1 mol of $\text{I}_2(\text{aq})$ are, respectively

- A 3 and 6
B 6 and 3
C 6 and 12
D 12 and 6.
15. $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$

The equation represents a mixture at equilibrium.

Which line in the table is true for the mixture after a further 2 hours of reaction?

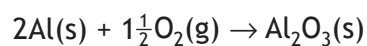
	<i>Rate of forward reaction</i>	<i>Rate of back reaction</i>
A	decreases	decreases
B	increases	increases
C	unchanged	decreases
D	unchanged	unchanged

16. $5\text{N}_2\text{O}_4(\ell) + 4\text{CH}_3\text{NHNH}_2(\ell) \rightarrow 4\text{CO}_2(\text{g}) + 12\text{H}_2\text{O}(\ell) + 9\text{N}_2(\text{g}) \quad \Delta H = -5116 \text{ kJ}$

The energy released when 2 moles of each reactant are mixed and ignited is

- A 1137 kJ
B 2046 kJ
C 2258 kJ
D 2843 kJ.

17. 1670 kJ of energy are given out when 2 moles of aluminium react completely with 1.5 moles of oxygen.

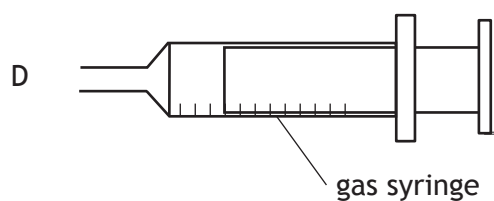
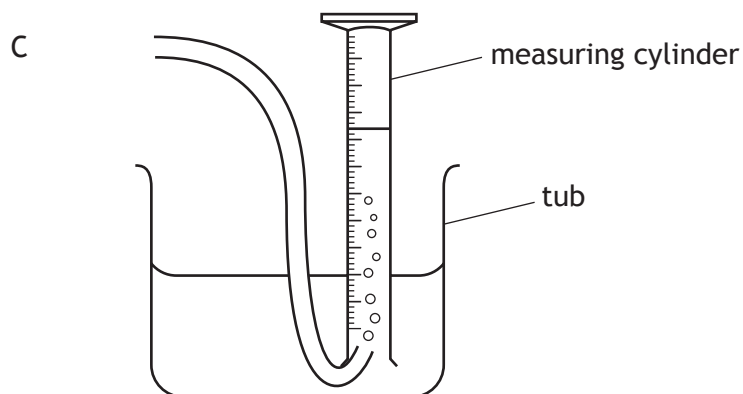
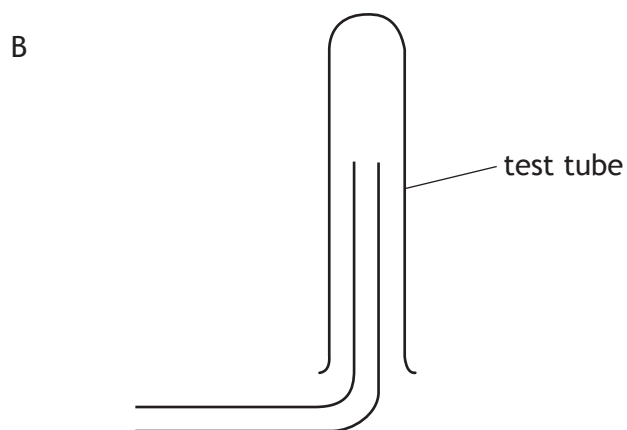
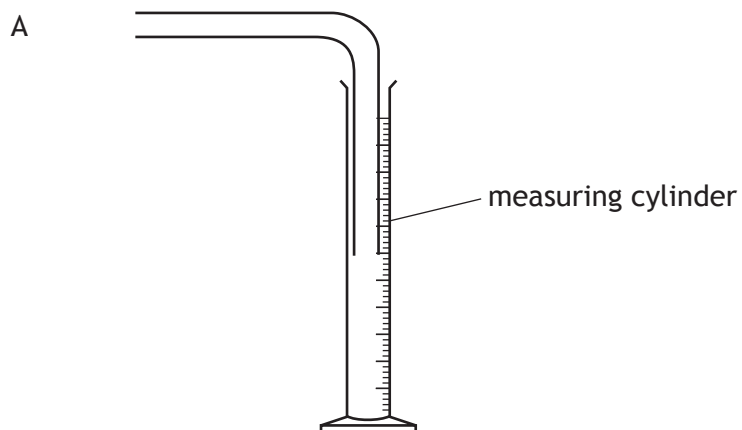


The enthalpy of combustion of aluminium, in kJ mol^{-1} , is

- A -1113
 - B -835
 - C +835
 - D +1113.
18. Which of the following elements is the strongest reducing agent?
- A Lithium
 - B Bromine
 - C Fluorine
 - D Aluminium
19. 45 cm^3 of a solution could be most accurately measured out using a
- A 50 cm^3 beaker
 - B 50 cm^3 burette
 - C 50 cm^3 pipette
 - D 50 cm^3 measuring cylinder.

20. Sulphur dioxide gas is denser than air and is very soluble in water.

Which of the following diagrams shows the most appropriate apparatus for collecting and measuring the volume of sulphur dioxide given off in a reaction?



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