



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE  
In Chemistry (4WSD3) Unit 3CR

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.edexcel.com](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

Summer 2025

Question Paper Log Number P81767A

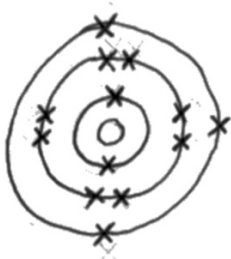
Publications Code 4WSD3\_1CR\_2506\_MS

All the material in this publication is copyright

© Pearson Education Ltd 2025

## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

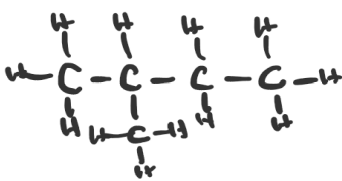
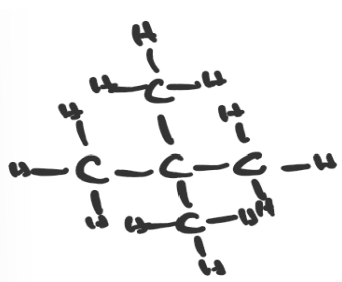
| Question number | Answer                                                                                                                                                                 | Notes                                                                                       | Marks     |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------|
| 1 (a) i         | K                                                                                                                                                                      | ALLOW lower case k                                                                          | 1         |
| ii              | Xe                                                                                                                                                                     |                                                                                             | 1         |
| iii             | Be and O / Ag and Xe                                                                                                                                                   |                                                                                             | 1         |
| (b) i           | 3 (electrons)                                                                                                                                                          | ALLOW three<br>IGNORE 2.8.3                                                                 | 1         |
| ii              | <p>M1 for three electrons on the outer shell</p> <p>M2 for all electrons correct</p>  | ALLOW other suitable ways to show electrons eg dots instead of crosses                      | 2         |
| (c)             | $\frac{(94 \times 32) + (6 \times 34)}{100}$ $= 32.12$                                                                                                                 | ALLOW 32.1<br>DO NOT ALLOW 32 without seeing working out<br>ALLOW 3212 or 0.3212 for 1 mark | 2         |
|                 |                                                                                                                                                                        |                                                                                             | Total = 8 |

| Question number | Answer                                                                                                                                                                                                                                                                                                                 | Notes                                       | Marks     |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----------|
| 2 (a) (i)       | freezing                                                                                                                                                                                                                                                                                                               |                                             | 1         |
| (ii)            | evaporation                                                                                                                                                                                                                                                                                                            |                                             | 1         |
| (iii)           | sublimation                                                                                                                                                                                                                                                                                                            |                                             | 1         |
| (b)             | Any 3 from<br>M1 (particles) are far apart<br>M2 (particles) are randomly / irregularly arranged<br>M3 (particles) have (almost) total freedom of movement / move freely<br>M4 particles have high/higher energy<br>M1 comment on spacing<br>M2 comment on arrangement<br>M3 comment on moving<br>M4 comment on energy | ALLOW no arrangement<br>ALLOW random motion | 3         |
|                 |                                                                                                                                                                                                                                                                                                                        |                                             | Total = 6 |

| Question number | Answer                                                                                                                                                                           | Notes                                                                                                                       | Marks     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------|
| 3 (a)           | H <sup>+</sup> / hydrogen ion                                                                                                                                                    | REJECT H <sub>2</sub><br>IGNORE +1 on its own                                                                               | 1         |
| (b)             | 9                                                                                                                                                                                | ALLOW 8, 9 or 10<br>ALLOW a range that uses the numbers 8, 9 or 10 eg 8-10 or 8-9<br><br>REJECT 7 or any number below 7     | 1         |
| (c)             | potassium chloride                                                                                                                                                               | IGNORE KCl<br>REJECT any other named chemicals                                                                              | 1         |
| (d)             | M1 selection of atomic masses of correct atomic masses<br><br>M2 = (39 × 2) + 12 + (3 × 16)<br><br>M3 = 138                                                                      | ALLOW 138 with or without working<br><br>ALLOW 2 marks for final answer of 67, 99, 106 or 162<br><br>ALLOW 1 mark for 68    | 3         |
| (e)             | M1 B<br><br>M2 this is the only metal carbonate that has dissolved / is soluble / solution is colourless / potassium carbonate is a soluble salt / (tube) does not have sediment | ALLOW the clear tube/second tube<br><br>M2 is dependent on M1<br><br>IGNORE clear / potassium carbonate reacting with water | 2         |
|                 |                                                                                                                                                                                  |                                                                                                                             | Total = 8 |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Notes                                                                                       | Marks     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------|
| 4 (a)           | <p><b>M1</b> P</p> <p><b>M2</b> (P) has the smallest range / almost specific / only 1(°C) difference</p>                                                                                                                                                                                                                                                                                                                                                           | <p><b>M2</b> is dependent on <b>M1</b><br/> <b>ALLOW</b> reverse argument for Q,R and S</p> | 2         |
| (b)             | <p>A description connecting any 4 of the following:</p> <p><b>M1</b> the salt and water solution is heated</p> <p><b>M2</b> the <b>water</b> evaporates / boils away / vaporises</p> <p><b>M3</b> water vapour is cooled in the condenser / distillation tube / condenser is cold tube so condenses water vapour</p> <p><b>M4</b> pure water is collected at the end of the condenser / distillation tube / delivery tube / as distillate / after condensation</p> | <p><b>REJECT</b> salt melts</p> <p><b>ALLOW</b> steam</p>                                   | 4         |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                             | Total = 6 |

| Question number | Answer                                                                                                                                                               | Notes                                                                                                                                                                                 | Marks     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 5 (a)           | water<br><br>oxygen                                                                                                                                                  | <b>ALLOW</b> moisture / H <sub>2</sub> O<br><br><b>ALLOW</b> air / O <sub>2</sub><br><br><b>ALLOW</b> answers in either order                                                         | 2         |
| (b) (i)         | galvanising / galvanisation                                                                                                                                          | <b>IGNORE</b> sacrificial protection                                                                                                                                                  | 1         |
| (ii)            | <b>M1</b> zinc is more reactive than iron<br><br><br><br><br><b>M2</b> (zinc) is oxidised / reactions with oxygen / loses electrons more readily                     | <b>IGNORE</b> zinc acts as a barrier<br><br><b>ALLOW</b> zinc reacts first / before iron<br><br><b>ALLOW</b> (zinc) corrodes instead of iron<br><br><b>REJECT</b> zinc displaces iron | 2         |
| (c) (i)         | Displacement                                                                                                                                                         |                                                                                                                                                                                       | 1         |
| (ii)            | FeSO <sub>4</sub> (aq) + Mg(s) → Fe(s) + MgSO <sub>4</sub> (aq)<br><br><b>M1</b> for correct formulae<br><br><b>M2</b> for correct state symbols on correct formulae | <b>ALLOW</b> multiples                                                                                                                                                                | 2         |
|                 |                                                                                                                                                                      |                                                                                                                                                                                       | Total = 8 |

| Question number | Answer                                                                                                                                                                                                                                                                       | Notes                                                                                                                                                                                             | Marks      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 6 (a)           | alkane(s)                                                                                                                                                                                                                                                                    | not alkene(s)                                                                                                                                                                                     | 1          |
| (b)             | M1 when sulfur (impurity in fuels) burns /combusts<br>M2 sulfur dioxide / SO <sub>2</sub> forms<br>M3 which dissolves / reacts with (rain) water                                                                                                                             | ALLOW sulfur reacts with oxygen<br><br>do not allow acid rain alone as this is in the question<br><br>IGNORE mention of nitrogen and NO <sub>2</sub> and carbon dioxide<br><br>M3 dep on M1 or M2 | 3          |
| (c) (i)         | temperature 600-700°C<br><br>catalyst alumina/silica/aluminosilicates/zeolites /Al <sub>2</sub> O <sub>3</sub> /SiO <sub>2</sub>                                                                                                                                             |                                                                                                                                                                                                   | 2          |
| (ii)            | M1 long-chain alkanes/hydrocarbons have lower demand or are less useful<br><br>M2 (cracking produces) shorter alkanes that are more flammable / more useful as fuels or petrol or gasoline<br><br>M3 (cracking produces) alkenes that can be used to make polymers /alcohols | ALLOW short chain hydrocarbons/alkanes are more useful/higher demand                                                                                                                              | 3          |
| (d) (i)         | M1 same molecular formula                                                                                                                                                                                                                                                    | ALLOW same number of carbons and hydrogens                                                                                                                                                        | 2          |
| (ii)            | M2 different structural/displayed formulae<br><br><br>                                                 | ALLOW different of arrangement of atoms                                                                                                                                                           | 2          |
|                 |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                   | Total = 13 |

| Question number | Answer                                                                                                                                                                                     | Notes                                                                                                                                           | Marks      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 7 (a) (i)       | Any two of the following<br><br>M1 use a polystyrene cup<br><br>M2 less <b>heat</b> will be lost<br><br>M3 leave to reach a steady temperature to record it                                | ALLOW use a beaker with a lid<br><br>ALLOW any piece of apparatus which is better insulated                                                     | 2          |
| (ii)            | the zinc/powder/it is in excess                                                                                                                                                            |                                                                                                                                                 | 1          |
| (iii)           | blue to colourless                                                                                                                                                                         |                                                                                                                                                 | 1          |
| (b) (i)         | M1 $\Delta T = 30.1(^{\circ}\text{C})$<br><br>M2 $25 \times 4.2 \times 30.1$<br><br>M3 $3160.5(\text{J})$                                                                                  | ALLOW ecf from M1<br><br>ALLOW any number of significant figures from 2                                                                         | 3          |
| (ii)            | M1 (moles of $\text{CuSO}_4$ ) $6.38 \div 159.5$ OR $0.04 \text{ mol}$<br><br>M2 $3800 \div 0.04$ OR $95000$<br><br>M3 division by 1000 = $95 \text{ (kJ)}$<br><br>M4 $-95 \text{ kJ/mol}$ | ALLOW ecf from M1<br><br>ALLOW ecf from M2<br><br>correct answer $-95$ scores 4<br><br>ecf $-79$ scores 3 (using the energy change from (b)(i)) | 4          |
|                 |                                                                                                                                                                                            |                                                                                                                                                 | Total = 11 |

