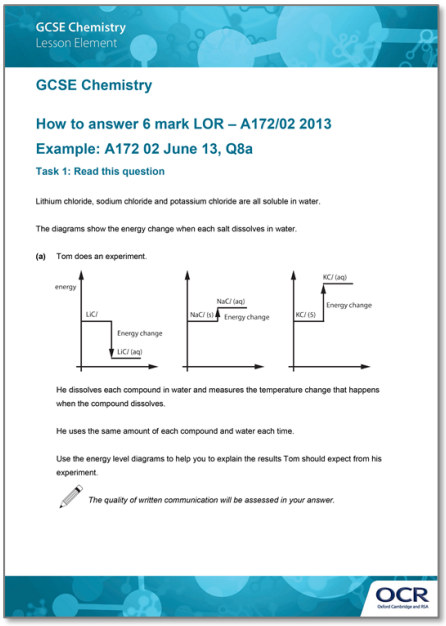
GCSE Chemistry

How to answer 6 mark LOR – A172/02 2013

Instructions and answers for teachers

These instructions should accompany the OCR resource 'How to answer 6 mark LOR' activity *which supports OCR GCSE Chemistry.*


GCSE Chemistry
Lesson Element

GCSE Chemistry

How to answer 6 mark LOR – A172/02 2013

Example: A172 02 June 13, Q8a

Task 1: Read this question

Lithium chloride, sodium chloride and potassium chloride are all soluble in water.

The diagrams show the energy change when each salt dissolves in water.

(a) Tom does an experiment.

He dissolves each compound in water and measures the temperature change that happens when the compound dissolves.

He uses the same amount of each compound and water each time.

Use the energy level diagrams to help you to explain the results Tom should expect from his experiment.

The quality of written communication will be assessed in your answer.

OCR

The Activity:

This resource comprises of 4 tasks.

This activity offers an opportunity for English skills development.

Associated materials:

'How to answer 6 mark LOR' Lesson Element learner activity sheet.

The activity

This activity looks at a chemistry question from a higher tier paper which involves the candidate using a question 'stem' containing data (in this case graphs). These questions are commonly used on this specification, it is a common task for candidates to need to process data given to them, using ideas that they have learned during the course. The activity is designed to 'unpick' how to tackle these types of questions. There are four tasks which lead learners through the stages of how to successfully address a six mark question.

Task 1 encourages learners to look critically at the question to work out what they need to do before they start.
Task 2 involves learners in making judgements about the quality of some answers without reference to a marking scheme.
Task 3 asks learners to draft their own 'model response'.
Task 4 analyses the responses from task 2 in the light of the mark scheme and commentaries on the way that examiners marked these questions.

Teacher Instructions

This task should be able to be completed in about 30-40 minutes of lesson time. It is suggested that learners work in groups on each task with a short plenary / introduction to the next task in between each stage.

Task 1 encourages learners to look critically at the question to work out what they need to do before they start. The teacher could put the question on the board and use a plenary discussion to underline the important points to address. Before task 2, learners could discuss what they think should go into a 'model answer'.

Task 2 involves learners sorting some answers into levels.
Groups could stick the answers onto A3 sheets and write 'bubbles' around the answers to highlight strengths and weaknesses.

It is not intended that a mark scheme be used to do this – learners should make judgements based on the outcomes of task 1 ie what they think the important areas to address should be. This task works well in pairs or small groups. Encourage learners to annotate the answers to justify which they think are strong answers and what is missing from the 'weak' answers (Answer 5 is interesting because it is long, but does not actually answer the question very well!).

A plenary discussion could focus on asking candidates which answer they think is the strongest (actually Answer 1) and which is the weakest (Answer 2).

Task 3 could be done either in pairs or individually.

Task 4 summarises what the examiners thought of the six answers. Learners may work in their original groups to see if their annotations on the answers match the examiners' views, before using the mark scheme to mark their own answers.

It is suggested that at the end of the task, candidates are given some other examples of 'data' type 6 mark questions for them to answer and mark to consolidate their learning. They could work in groups to 'level' each other's answers and then mark them using OCR mark schemes for the questions.

Teacher Preparation

The sheets should be copied before the activity. The learners will need a copy of each of Tasks 1 and 3, and a group set of the sheets for Task 2 and the sheet for Task 4.

Highlighter or coloured pens could be provided for learners to use in Tasks 1 and Task 2. Task 2 may be run by asking candidates to stick the answers onto A3 sheets and write 'bubbles' around the answers to highlight strengths and weaknesses. If so, they will need paper and glue sticks.

Additional examples of data-based questions with their mark schemes may be provided from past papers for learners to extend the activity after Task 4.

Student Sheets

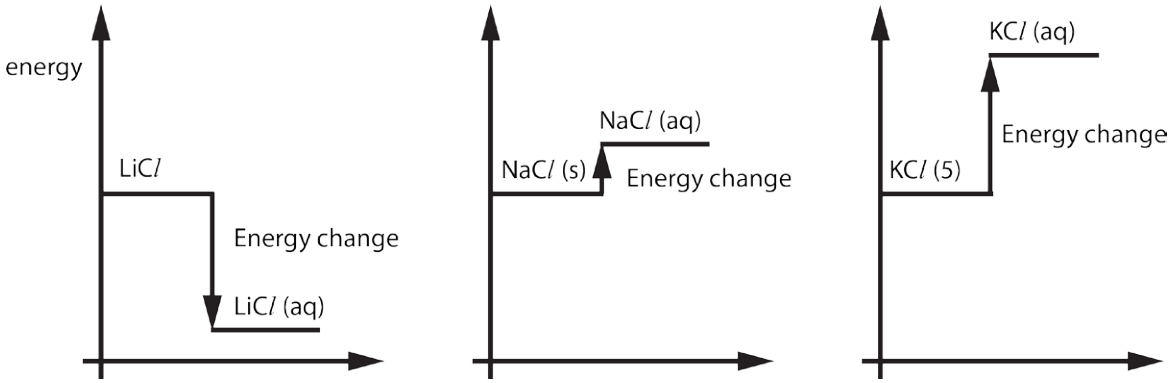
How to answer 6 mark LOR – A172/02 2013

Example: A172 02 June 13, Q8a

Task 1: Read this question

Lithium chloride, sodium chloride and potassium chloride are all soluble in water.

The diagrams show the energy change when each salt dissolves in water.



(a) Tom does an experiment.

He dissolves each compound in water and measures the temperature change that happens when the compound dissolves.

He uses the same amount of each compound and water each time.

Use the energy level diagrams to help you to explain the results Tom should expect from his experiment.

The quality of written communication will be assessed in your answer.

Read the part of the question that tells you what to do….

> 'Use the energy level diagrams to help you to explain the results Tom should expect from his experiment'.

Underline parts of the question that you need to include when you write your answer.

Task 2: What levels are these answers?

Look again at the question. The 'important things to do' have been underlined:

Use the energy level diagrams to help you to **explain** the **results** Tom should expect **from his experiment**'.

A 'good' answer (a **Level 3 answer**) will answer ALL parts of the question so will ….

- use the energy level diagrams.
- give the results that Tom should expect.
- explain the results (that means use science to say WHY).

Answers at **level 2 and level 1** will only answer some parts of the question.

Look at these six examples of candidate answers

In your group, decide whether you think each answer is a 'level 1' or a 'level 2' or a 'level 3' answer. You don't need a mark scheme to do this, just use your judgement, based on what the question is asking. Justify your decisions by…

- Underlining parts of the answers that you 'like' and work out which part of the question the answer links to.
- Making notes on the answer to say what you think is 'missing'.

Answer 1

Use the energy level diagrams to help you to explain the results Tom should expect from his experiment.

The quality of written communication will be assessed in your answer.

For lithium chloride, the reactants have more energy than the products, so they give out energy to the surroundings, meaning the reaction is exothermic. The temperature will increase and has the biggest temperature change. For sodium chloride, the reactants have less energy that the products, so they take in energy from the surroundings, meaning the reaction is endothermic. The temperature will decrease but not by a lot as the energy change is only small. For potassium chloride the same thing happens as sodium chloride but the energy change is greater, so the temperature change is also greater.

Answer 2

The quality of written communication will be assessed in your answer.

Looking at the results I can see that lithium dropped in energy level when it hit the water on the other hand sodium and potassium energy levels both increased when they hit the water. This shows that the reactivity increased as you go lower into the group 1.

Answer 3

The quality of written communication will be assessed in your answer.

When dissolving Lithium chloride into water the product has less energy that the reactants, therefore energy was lost during the reaction. The energy was transferred into the surroundings due to heat, this is a exothermic reaction. So the solution should be quite hot. However when sodium chloride and potassium chloride were dissolved in water they gained energy, which is a endothermic reaction. The product of them two compounds should be cold in touch, so as the temperature changes the compound absorbs energy in the surroundings.

Answer 4

The quality of written communication will be assessed in your answer.

Lithium chloride, when the energy changed its temperature increased and took less time to dissolve. Sodium chloride, when the energy changed its temperature decreased so it took more time to dissolve. Potassium chloride, when the energy changed its temperature decreased so it took more time to dissolve.

Answer 5

The quality of written communication will be assessed in your answer.

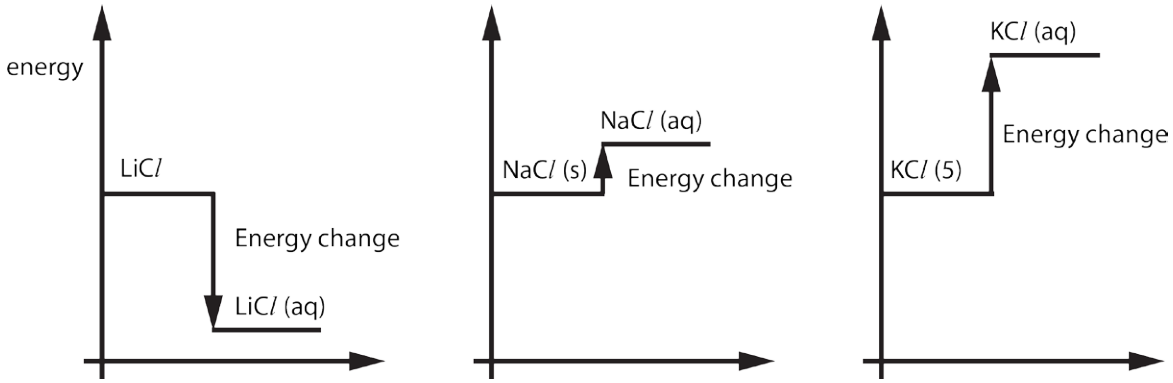
The energy level diagrams help to explain that the lower down the group (group 1) the increase the energy change should be (excluding the energy level diagram of lithium chloride). The energy level diagrams from sodium chloride and potassium chloride prove to show how Toms results should be endothermic reactions and increase as you go down the group. Although the first energy level diagram does not show this exactly, overall Tom should expect endothermic reactions with increasing energy change as you go down. He should expect an increasing energy change from solid to solute.

Task 3: Writing your own answer

Now write your own answer to the question on this sheet.

8 Lithium chloride, sodium chloride and potassium chloride are all soluble in water.

The diagrams show the energy change when each salt dissolves in water.



(a) Tom does an experiment.

He dissolves each compound in water and measures the temperature change that happens when the compound dissolves.

He uses the same amount of each compound and water each time.

Use the energy level diagrams to help you to explain the results Tom should expect from his experiment.

The quality of written communication will be assessed in your answer.

Task 4: How did the examiners mark these answers?

This is the mark scheme for the question that the examiners used to mark the question.

Question			Answer	Marks	Guidance
8	(a)		**Level 3 (5–6 marks)** Links all three diagrams to correct energy changes and correctly predicts direction of temperature changes. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Links all three diagrams to correct energy changes or temperature changes. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Links at least one diagram to a correct energy change or to a correct temperature change. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to A** **Indicative scientific points may include:** **Energy changes** (during dissolving) • lithium chloride gives out energy/gives out heat/is exothermic • sodium chloride and potassium chloride both take in energy/take in heat/are endothermic • idea that energy taken in is greater for potassium chloride than for sodium chloride. **Temperature change** • temperature increases when lithium chloride dissolves • temperature decreases when sodium chloride and potassium chloride dissolve • the temperature change is greater for potassium chloride than for sodium chloride.

This is some information about the marks that the examiners gave for each answer.

Answer	Level	Mark	Comments
1	**3**	6	This is 6 marks because all three energy changes are correct, all three linked temperature changes are correct. Notice they have also compared the relative sizes of the three temperature changes (LiCl is the biggest, followed by KCl followed by NaCl) so this is a very clear and detailed response worth a strong 6 marks.
2	**0**	0	This answer initially looks ok, but they are only describing the graphs. They are saying 'LiCl goes down, NaCl and KCl go up'. The answer does not 'add anything' to the information. There is no mention of energy going out or in so this is not enough to get any marks at all.
3	**3**	5	All three energy changes are the correct direction. The temperature changes are not very well expressed (lithium chloride solution is 'hot' whereas sodium and potassium chloride are 'cold to the touch'). However, the direction is correct so level 3. As the temperature is not well expressed, 'communication is impeded' so 5 not 6.
4	**2**	4	This answer does not describe energy changes but all three temperature changes are correct. Communication is clear. Level 2, 4 marks
5	**1**	2	This answer correctly links sodium chloride and potassium chloride to endothermic changes. Level 1 requires only one diagram to be linked to a correct energy change so this meets the criterion for level 1 (but not level 2 which requires all three). So level 1, 2 marks

Task 4 – Look at the levels you gave for each answer

Did you agree with the examiner level? If not, look at the comments and work out why.

Now use the mark scheme to mark your own answer.