Bonding and structure exam practice

Student activity • desk activity

YEAR 10 / LESSON 26 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

The question

Can you apply structure-and-bonding ideas precisely in six timed questions?

Complete six original exam-style questions worth 20 suggested classroom marks, then improve your answers using the separate staff guide. This is not a Pearson paper or an official mark scheme. The property cards use invented samples for reasoning, not measured class results.

Equipment

- Student booklet, pencil and correction pen
- Periodic table and blank diagram paper
- A classroom timer; no chemicals or practical apparatus

Desk activity only. Use pre-cut blunt modelling pieces and keep small parts out of mouths. Keep the workspace clear; no chemicals, flames or electrical supply are required.

Course coverage: Shared-core consolidation of ionic and covalent bonding, structure–property explanations, molecular phase changes and carbon allotropes. No metallic-bonding explanation required.

Your starting point

One bonding explanation I can justify; one I need to check:

Method and reasoning

Read the whole sequence before starting

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1. Read the three fictional property cards. Do not assume a single property uniquely identifies a substance.

2. Spend about 25 minutes answering all six questions independently. Use the mark values to judge detail and write particle-based explanations.

3. Show charges and brackets on ion diagrams and all outer electrons on the requested covalent diagram. Use extra paper if needed.

4. For each property explanation, name the structural feature, the relevant forces or mobile charge carriers and the resulting behaviour.

5. When the teacher starts marking, use a different-colour pen. Award marks for separate scientific points, not for repeating a phrase.

6. Record your score out of 20 and identify which marks were lost through missing reasoning rather than missing recall. No grade boundary is supplied.

7. Rewrite one low-scoring answer fully, then answer the exit question: why can two forms of carbon have different electrical properties?

Cleanup

• Keep your evidence and corrections. Count and return reusable model pieces; recycle unwanted paper. No chemical waste is produced.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Fictional qualitative evidence: A has a high melting point, does not conduct when solid and conducts when molten. B has a low boiling point and its pure liquid does not conduct. C is soft, electrically conducting as a solid and contains only carbon. No numerical measurements are supplied. For Q5 compare pure Cl_2 and I_2 under similar pressure conditions.

Invented sample card	Suggested structure type	Evidence and limitation
A: high mp; no conduction solid; conducts molten		
B: low bp; pure liquid does not conduct		
C: soft; conducts as a solid; carbon only		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Q1 [3]: Suggest the structure type of A. Explain its different electrical behaviour when solid and molten.

2. Q2 [3]: Suggest the structure type of B and explain its low boiling point.

3. Q3 [4]: Draw the outer-electron dot-and-cross diagram for $MgCl_2$, including ions and charges. Explain its 1:2 ratio.

4. Q4 [3]: Draw H_2O with all outer electrons. State what attracts the shared pair to hold one bond together.

5. Q5 [3]: I_2 has a higher boiling point than Cl_2. Explain this without claiming that covalent bonds break during boiling.

6. Q6 [4]: Identify a likely allotrope for C. Explain both its softness and its electrical conductivity.