2024 Higher Chemistry Paper 1 – Q2

Section: Chemical Changes and Structure
Topic: Periodicity (Group Trends)

Question summary (Q2):
Which line in the table is likely to be correct for the element francium at 30 °C?
State at 30 °C / Covalent radius (pm):
A solid / < 238 B liquid / < 238 C solid / > 238 D liquid / > 238

Worked Solution:
• State at 30 °C: Francium is an alkali metal with an extremely low melting point (≈ upper-20s °C). At 30 °C it would be liquid.
• Covalent radius: Down Group 1 the atomic (covalent) radius increases (Li < Na < K < Rb < Cs < Fr). Cesium is already > 238 pm, so francium is expected to be > 238 pm as well.

Final Answer: D — liquid / > 238 pm

Revision Tips:
• Group 1 trend: atomic size ↑ and melting point ↓ down the group.
• Alkali metals are very soft, low-melting; francium is the extreme case (predicted liquid near room temperature).