

1. Why does molten sodium chloride conduct?
 - ☐ Its ions can move
 - ☐ Its molecules contain no charge
 - ☐ Its atoms become electrons
2. Which substance is a compound?
 - ☐ Oxygen, O₂
 - ☐ Water, H₂O
 - ☐ Helium, He
3. What supported Mendeleev's gaps?
 - ☐ Later elements matched predicted properties
 - ☐ He used the proton numbers of all the elements
 - ☐ He ordered the elements strictly by atomic mass
4. How many shared pairs join the two nitrogen atoms in N₂?
 - ☐ One
 - ☐ Three
 - ☐ Two
5. What explains electrical conduction in a solid copper wire?
 - ☐ Mobile delocalised electrons carry charge
 - ☐ Copper ions stream from one end to the other
 - ☐ Covalent molecules melt before current can flow
6. Calculate the amount in 22 g CO₂ using molar mass 44 g per mol.
_____ mol
7. 25.0 cm³ NaOH reacts with 15.0 cm³ of 0.200 mol per dm³ H₂SO₄. Using the stated 1:2 ratio, find NaOH concentration.
_____ mol per dm³
8. A particle model has 15 H⁺ and 9 OH⁻ ions. After complete neutralisation, how many excess H⁺ ions remain?
_____ ions

9. Two repeat temperatures are 29.2 °C and 29.8 °C. Find their mean.

_____ °C

10. A comparable fixed endpoint takes 40 s. Find the reciprocal-time proxy.

_____ per s

1. Its ions can move

Sodium chloride is ionic; melting frees the ions from the lattice so they can move and carry charge. The solid does not conduct because its ions are fixed, and there are no neutral molecules or free atoms becoming electrons.

2. Water, H₂O

A compound contains two or more DIFFERENT elements chemically joined: water has hydrogen and oxygen. O₂ and helium each contain one element, so they are not compounds, whatever their particle count.

3. Later elements matched predicted properties

Mendeleev left gaps and predicted the missing elements' properties; when gallium and germanium were discovered matching those predictions, the table gained acceptance. He knew nothing of electron configuration.

4. Three

Each nitrogen has five outer electrons and needs three more for a full shell, so the atoms share three pairs - a triple bond in N₂. One pair is a single bond, two pairs a double.

5. Mobile delocalised electrons carry charge

Only the delocalised electrons are free to move through the lattice, so they carry the charge. The copper ions vibrate about fixed positions, and melting is irrelevant to conduction in a solid.

6. 0.5 mol

The result is 0.5 mol. Known: 22 g of CO₂; molar mass 44 g per mole. Use amount = mass / molar mass. Amount = 22/44 = 0.5 mol. That is 0.5 x 6.02 x 10²³ molecules of CO₂.

7. 0.24 mol per dm³

The result is 0.24 mol per dm³. Known: 15.0 cm³ of 0.200 mol per dm³ H₂SO₄; ratio 1:2. Acid moles = 0.200 x 0.0150 = 0.00300 mol. NaOH moles = 2 x 0.00300 = 0.00600 mol. Concentration = 0.00600/0.0250 = 0.24 mol per dm³, using the NaOH volume 25.0 cm³ = 0.0250 dm³.

8. 6 ions

The result is 6 ions. Known: 15 H⁺ and 9 OH⁻ ions; they pair one-to-one forming water. Excess H⁺ = 15 - 9 = 6 ions left over, so the mixture stays acidic. Neutralisation consumes equal numbers of each ion.

9. 29.5 °C

The result is 29.5 °C. Known: repeat temperatures 29.2 and 29.8 degrees C. Mean = (29.2 + 29.8)/2 = 29.5 degrees C. Both repeats are kept; none may be dropped without a recorded reason.

10. 0.025 per s

The result is 0.025 per s. Known: endpoint at 40 s. Use the reciprocal-time proxy = 1/time. Proxy = 1/40 = 0.025 per second. The proxy doubles when the endpoint time halves, under the same observation threshold.