# YEAR 11 | CHEMISTRY

## Student practice paper

Name: _____ Date: _____

Suggested time: 60-75 minutes. Show reasoning and use evidence where appropriate. Questions are original and intended for MYP 5 / pre-DP preparation.

## Section A - Atomic structure and bonding (20 marks)

1. An atom has 17 protons and 18 neutrons. Give atomic and mass numbers and number of electrons in a neutral atom. [4]

2. Explain how ionic bonding forms in sodium chloride and why solid NaCl does not conduct electricity. [6]

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3. Compare covalent and metallic bonding, including one property explained by each. [6]

4. Write the electronic configuration (shell notation) for magnesium (atomic number 12) and predict its common ion. [4]

## Section B - Reactions and calculations (25 marks)

5. Balance: Fe + O2 -> Fe2O3. [3]

6. Calculate moles in 5.85 g of NaCl (Mr = 58.5). [4]

7. A reaction uses 0.20 mol of Mg and excess hydrochloric acid: Mg + 2HCl -> MgCl2 + H2. Find moles of H2 produced. [4]

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8. Explain why increasing temperature often increases reaction rate using collision theory. [6]

9. Explain the difference between an exothermic and an endothermic reaction with reference to energy transfer. [4]

10. A solution has pH 3 and another pH 5. How do their hydrogen-ion concentrations compare? [4]

## Section C - Investigation (15 marks)

11. Plan a fair investigation of how calcium carbonate particle size affects reaction rate with hydrochloric acid. Include variables, method, measurement and safety. [10]

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12. Explain how a graph of gas volume against time can indicate reaction rate and completion. [5]

# ANSWER KEY & TUTOR GUIDANCE

## Chemistry

The following pages contain suggested answers, marking points and tutor guidance. For open-ended tasks, answers are indicative rather than the only acceptable responses.

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## Tutor answer and marking guide

## Worked answers

1: Atomic number 17; mass number 35; electrons 17. [4]

2: Na transfers electron to Cl; oppositely charged ions form lattice; ions are fixed in solid and cannot carry current. [6]

3: Covalent bonds involve shared electron pairs; molecular substances often have low melting points. Metals have delocalised electrons allowing electrical conduction. [6]

4: 2,8,2; Mg2+. [4]

5: 4Fe + 3O2 -> 2Fe2O3. [3]

6: n = mass/Mr = 5.85/58.5 = 0.100 mol. [4]

7: Mg:H2 = 1:1 so 0.20 mol hydrogen. [4]

8: More kinetic energy means more frequent collisions and a greater fraction exceeding activation energy. [6]

9: Exothermic transfers energy to surroundings; endothermic absorbs energy from surroundings. [4]

10: pH 3 has 100 times higher hydrogen ion concentration than pH 5. [4]

11: Equal mass CaCO3 in differently sized chips, same acid volume/concentration and temperature, measure CO2 volume over time; goggles and careful acid handling; compare initial gradients. [10]

12: Steeper gradient means faster gas production; plateau indicates reaction has stopped producing gas. [5]

## Tutor notes

Credit balanced chemical equations, units, clear variables, repeat trials and appropriate safety. Total 60 marks.