



**CHEMISTRY ONLINE**  
— **TUITION** —

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# CHEMISTRY

## PHYSICAL CHEMISTRY

<b>LEVEL &amp; BOARD:</b>	OCR (AS - LEVEL)
<b>TOPIC:</b>	Atoms, Amount, Equation & Reactions
<b>PAPER TYPE:</b>	QUESTION PAPER 1
<b>TOTAL QUESTIONS</b>	07
<b>TOTAL MARKS</b>	17

## Compounds, Formulae, and Equations

1. Indium, atomic number 24, is in Period 4 of the Periodic Table. Indium is a Group 3 element. Predict the formula of a Indium ion.

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[1]

2. A chemist carries out reactions of magnesium and magnesium oxide, MgO.

Reaction 1: Magnesium is reacted with water.

Reaction 2: Magnesium oxide is reacted with hydrochloric acid, forming a salt, water.

Reaction 3: Magnesium is reacted with an excess of nitrogen at 800°C, forming magnesium nitride, Mg<sub>3</sub>N<sub>2</sub>.

- i. Write equations for Reaction 1 and Reaction 2.

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[3]

- ii. Predict the structure and bonding of Mg<sub>3</sub>N<sub>2</sub>.

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[1]

- iii. MgO formed in Reaction 3 contains magnesium and oxide ions. The oxide ion has the structure [O]<sup>2-</sup>.

Suggest a 'dot-and-cross' diagram for MgO.  
Show outer shell electrons only.

[1]

3. Chlorine and aluminum react with many elements and compounds. Predict the formula of the compound formed when chlorine reacts with aluminum.

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[1]

4. This question is about inorganic compound

(a) Lead chloride,  $\text{PbCl}_2$ , reacts with concentrated sulfuric acid. A student reacts a sample of  $\text{PbCl}_2$  with an excess of concentrated sulfuric acid in a test-tube.

- i. Describe what the student would observe during this reaction.

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[1]

- ii. Write the equation for the reaction between  $\text{PbCO}_3$  and concentrated nitric acid.

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[1]

**(b)** Compounds of potassium have many uses.

i. Identify a compound of potassium that could be used as a fire suppressant.

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[1]

ii. Potassium sulfide,  $K_2S$ , is an ionic compound used in wastewater treatment. Potassium sulfide can be prepared by reacting potassium metal with sulfur,  $S_8$ .

Write the equation for the reaction of potassium with sulfur to form potassium sulfide.

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[1]

iii. Draw a 'dot-and-cross' diagram to show the bonding in potassium sulfide,  $K_2S$ .

[2]

Show outer electrons only.

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5. This question is about compounds of Group 5 elements.  
Phosphorus will combine directly with chlorine.

Write the equation for the reaction between phosphorus and chlorine.

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[1]

6. A molecule of an alkene has 12 carbon atoms. State the empirical formulae of this alkene.

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[1]

7. A salt used as a food preservative has the empirical formula  $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$ .  
Suggest the formulae of the ions present in this salt.

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[2]

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- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
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