



Chemistry

Unit 3 & 4

Pre-Test feedback and recommendations

Is Year 12 Chemistry the right choice for you?

The Chemistry pre-test is to help you understand what is expected in Year 12 Chemistry, we would like you to do a pre-test.

- 1. Attempt the pre-test.*
- 2. Correct your answers and work out your score.*
- 3. See what we recommend on the last page.*



PRE-TEST DATA PAGE

Use the data tables below and the periodic table to help you answer the pre-test questions.

Table 1: Formulae and charge of selected ions:

Cations	Anions
Na ⁺ sodium	OH ⁻ hydroxide
NH ₄ ⁺ ammonium	Cl ⁻ chloride
Ag ⁺ silver	NO ₃ ⁻ nitrate
Mg ²⁺ magnesium	O ²⁻ oxide
Zn ²⁺ zinc	SO ₄ ²⁻ sulfate
Cu ²⁺ copper	CO ₃ ²⁻ carbonate
Pb ²⁺ lead	PO ₄ ³⁻ phosphate

Table 2: Solubility of ions in water:

Ions that are soluble in water

Compounds with the following ions are always soluble in water	Ammonium NH ₄ ⁺ Sodium Na ⁺ Potassium K ⁺ Nitrate NO ₃ ⁻
Compounds with the following ions are mostly soluble in water	Chloride Cl ⁻ except with silver, Ag ⁺ , or lead, Pb ²⁺ Sulfate SO ₄ ²⁻ except with silver, Ag ⁺ , or lead, Pb ²⁺

Ions that are not soluble in water

Compounds with the following ions are mostly not soluble in water	Hydroxide OH ⁻ Sulfide S ²⁻ Carbonate CO ₃ ²⁻ Phosphate PO ₄ ³⁻	} except with Ammonium NH ₄ ⁺ Sodium Na ⁺ Potassium K ⁺
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Table 3: Molar mass of selected elements:

Element	H	C	O	Ne	Na	Cl	Pb
Molar mass (g per mol)	1.0	12.0	16.0	20.1	23.0	35.5	207.2

Table 4: Molar mass of gases

STP <i>standard temperature and pressure</i> temperature 0°C, pressure 101.3 kPa
One mol of any gas occupies 22.4 litres at STP

SLC <i>standard laboratory conditions</i> temperature 25°C, pressure 101.3 kPa
One mol of any gas occupies 24.5 litres at SLC

Periodic table of the elements

		atomic number		symbol of element		relative atomic mass		name of element																																																																																									
1	H Hydrogen	2	He Helium	3	Li Lithium	4	Be Beryllium	5	B Boron	6	C Carbon	7	N Nitrogen	8	O Oxygen	9	F Fluorine	10	Ne Neon																																																																														
11	Na Sodium	12	Mg Magnesium	13	Al Aluminium	14	Si Silicon	15	P Phosphorus	16	S Sulfur	17	Cl Chlorine	18	Ar Argon	19	K Potassium	20	Ca Calcium																																																																														
37	Rb Rubidium	38	Sr Strontium	39	Y Yttrium	40	Zr Zirconium	41	Nb Niobium	42	Mo Molybdenum	43	Tc Technetium	44	Ru Ruthenium	45	Rh Rhodium	46	Pd Palladium	47	Cd Cadmium	48	In Indium	49	Tl Thallium	50	Pb Lead	51	Sb Antimony	52	Te Tellurium	53	I Iodine	54	Xe Xenon																																																														
55	Cs Caesium	56	Ba Barium	57	La Lanthanum	58	Ce Cerium	59	Pr Praseodymium	60	Nd Neodymium	61	Pm Promethium	62	Sm Samarium	63	Eu Europium	64	Gd Gadolinium	65	Tb Terbium	66	Dy Dysprosium	67	Ho Holmium	68	Er Erbium	69	Tm Thulium	70	Yb Ytterbium	71	Lu Lutetium	72	Hf Hafnium	73	Ta Tantalum	74	W Tungsten	75	Re Rhenium	76	Os Osmium	77	Ir Iridium	78	Pt Platinum	79	Au Gold	80	Hg Mercury	81	Tl Thallium	82	Pb Lead	83	Bi Bismuth	84	Po Polonium	85	At Astatine	86	Rn Radon	87	Fr Francium	88	Ra Radium	89	Ac Actinium	90	Th Thorium	91	Pa Protactinium	92	U Uranium	93	Np Neptunium	94	Pu Plutonium	95	Am Americium	96	Cm Curium	97	Bk Berkelium	98	Cf Californium	99	Es Einsteinium	100	Fm Fermium	101	Md Mendelevium	102	No Nobelium	103	Lr Lawrencium

58	Ce Cerium	59	Pr Praseodymium	60	Nd Neodymium	61	Pm Promethium	62	Sm Samarium	63	Eu Europium	64	Gd Gadolinium	65	Tb Terbium	66	Dy Dysprosium	67	Ho Holmium	68	Er Erbium	69	Tm Thulium	70	Yb Ytterbium	71	Lu Lutetium
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90	Th Thorium	91	Pa Protactinium	92	U Uranium	93	Np Neptunium	94	Pu Plutonium	95	Am Americium	96	Cm Curium	97	Bk Berkelium	98	Cf Californium	99	Es Einsteinium	100	Fm Fermium	101	Md Mendelevium	102	No Nobelium	103	Lr Lawrencium
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CHEMISTRY UNIT 3

PRE-TEST QUESTIONS

1. Use the Periodic Table to help you answer the following questions.

(a) What is the atomic number of the following elements

(i) silver (ii) radon (iii) radium

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ marks

(b) What is the chemical symbol of the following elements

(i) gold (ii) silicon (iii) sodium (iv) antimony

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$ marks

(c) Identify the element with 13 protons and 13 neutrons.

1 mark

2. Butane, C₄H₁₀ is commonly used in LPG and lighter fluid. Its melting and boiling points are shown below.

melting point/ freezing (solidification) point	-138 °C
boiling (evaporation) point/ condensation point	-0.5 °C

Circle the physical state of butane

at room temperature, 25 °C solid liquid gas

at fridge temperature, 4 °C solid liquid gas

at -5 °C solid liquid gas

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ marks

Use the table of ions (**Table 1**) on the data page to help you answer questions 3 and 4.

3. Identify the ions present in the following ionic compounds and name the compound.

(a) MgCl₂ (b) Na₃PO₄ (c) Ag₂S

3 marks

4. Work out the chemical formula of the following compounds.

(a) Silver hydroxide (b) Magnesium carbonate (c) Zinc nitrate

3 marks

5. Balance the following chemical equations.

(a) Mg_(s) + N_{2(g)} → Mg₃N_{2(s)} (b) Ca_(s) + O_{2(g)} → CaO_(s)

(c) H_{2(g)} + O_{2(g)} → H₂O_(l) (d) Al_(s) + I_{2(l)} → AlI_{6(s)}

4 marks



Pre-test questions continued...

6. Use the solubility table (**Table 2**) on the data page to determine which of the following ionic compound are soluble.

- (a) lead sulfate (b) silver chloride
(c) ammonium chloride (d) zinc carbonate

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$ marks

7. The compound $\text{Cu}(\text{NO}_3)_2$ dissolves in water by dissociation of ions

- (a) Identify the ions in the compound.
(b) Write the ionic equation of the dissociation reaction. Show the state of each compound or ion.

$1 + 2 = 3$ marks

Refer to the molar mass of elements (**Table 3**) on the data page to help you answer questions 8, 9 and 10.

8. Find the molar mass of the following compounds

- (a) H_2O (b) NaCl

2 marks

9. Find the mass of 1.3 mol of CH_4

1 mark

10. Calculate the number of mol contained in the following samples, rounded to three decimal places.

- (a) 50 g of lead (b) 62 g of NaCl

2 marks

Refer to the molar volume of gases (**Table 4**) on the data page to help you answer the following question.

11. (a) Work out the volume of 1.4 mol of chlorine (Cl_2) at STP
(b) Work out the mass of 2.8 L of neon (Ne) gas at SLC

$1 + 1 = 2$ marks

The table below summarises the different types of acid reactions:

Reactions of acids	The chemical formulae of selected compounds.
1. acid + metal \rightarrow salt + hydrogen This reaction does not occur with Cu, Hg, or Ag.	HCl (aq) CuCl_2 (aq) Na_2CO_3 (aq) H_2O (l) NaCl (aq) H_2SO_4 (aq) H_2O (l) NaOH (aq) CO_2 (g) Na_2SO_4 (aq) CuO (s)
2. acid + metal carbonate \rightarrow salt + water + carbon dioxide	
3. acid + metal oxide \rightarrow salt + water	
4. acid + metal hydroxide \rightarrow salt + water Carbonates contain the CO_3^{2-} ion	



Pre-test questions continued...

12. Use the summary of acid reactions shown on the table on previous page to predict the products of the following reactions:

- (a) $\text{HCl (aq)} + \text{Mg (s)} \rightarrow$
- (b) $\text{HCl (aq)} + \text{Na}_2\text{CO}_3 \text{ (aq)} \rightarrow$
- (c) $\text{HCl (aq)} + \text{CuO (s)} \rightarrow$
- (d) $\text{H}_2\text{SO}_4 \text{ (aq)} + \text{NaOH (aq)} \rightarrow$

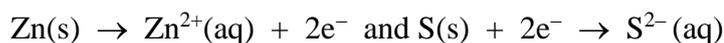
1 + 1 + 1 + 1 = 4 marks

13. Are the following reactions oxidation or reduction reactions?

- (a) $\text{Cl}_2\text{(g)} + 2\text{e}^- \rightarrow 2\text{Cl}^- \text{ (aq)}$
- (b) $\text{Pb (s)} \rightarrow \text{Pb}^{2+} \text{ (aq)} + 2\text{e}^-$

$\frac{1}{2} + \frac{1}{2} = 1$ mark

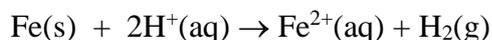
14. The reaction $\text{Zn(s)} + \text{S(s)} \rightarrow \text{ZnS (aq)}$ can be written as two half reactions:



- (a) Identify the oxidant in this redox reaction
- (d) Identify the reductant in this redox reaction

$\frac{1}{2} + \frac{1}{2} = 1$ mark

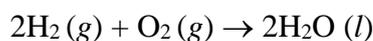
15. Iron reacts with hydrochloric acid according to the ionic equation



- (a) What has been oxidised in this reaction?
- (b) Write a half equation for the oxidation reaction.
- (d) What has been reduced in this reaction?
- (e) Write a half equation for the reduction reaction.

$\frac{1}{2} + 1 + \frac{1}{2} + 1 = 3$ marks

16. Hydrogen gas and oxygen gas react to form water according to the reaction



10 g of oxygen is reacted in excess hydrogen.

- (a) How many mol of oxygen was reacted?
- (b) How many mol of hydrogen is required?
- (c) Work out the mass of hydrogen reacted.

1 + 1 + 1 = 3 marks

END OF PRE-TEST



Your pre-test result... What we recommend ...

If your score was less than $\frac{20}{40}$

You will most likely need a lot of time and support for Year 12 Chemistry. Students scoring less than 20 out of 40 tend to find the subject too difficult. We strongly recommend that you contact the Chemistry teachers to discuss your options.

You will most likely need revision support throughout the year to develop the skills expected. This means making extra time available for your studies. We suggest that you consider realistically whether you will be able to make the extra study time available. Please contact the Chemistry teachers to discuss your options.

If your score was between $\frac{20}{40}$ and $\frac{30}{40}$

If your score was between $\frac{30}{40}$ and $\frac{40}{40}$

You should be able to cope with most of the skills expected. However, you will also need to make regular study time a part of your weekly schedule. If you have any concerns, contact the VSV, and speak to the Chemistry teachers.