

# Formulae, Equations & Formula Mass

## N4 & N5 Homework Questions

Answer questions as directed by your teacher.

National 4 level questions are first followed by National 5 level questions.

## National 4 Questions

### Formulae

1. Write chemical formulae for the following compounds that have names containing prefixes:
- |                               |                         |
|-------------------------------|-------------------------|
| (a) nitrogen dioxide          | (b) carbon tetrahydride |
| (c) xenon hexafluoride        | (d) sulphur trioxide    |
| (e) phosphorous pentachloride | (f) silicon trifluoride |
| (g) dihydrogen oxide          | (h) vanadium pentoxide  |
- (8)
2. The compound  $N_2O_4$  is called
- |                        |                       |
|------------------------|-----------------------|
| A nitrogen monoxide    | B nitrogen dioxide    |
| C dinitrogen tetroxide | D dinitrogen trioxide |
- (1)
3. Write chemical formulae for the following compounds that contain two elements:
- |                        |                       |
|------------------------|-----------------------|
| (a) lithium chloride   | (b) magnesium oxide   |
| (c) aluminium fluoride | (d) sodium sulphide   |
| (e) calcium chloride   | (f) aluminium oxide   |
| (g) nitrogen iodide    | (h) germanium hydride |
- (8)
4. The valency of phosphorous in  $P_2S_3$  is:
- |     |     |     |     |
|-----|-----|-----|-----|
| A 2 | B 3 | C 5 | D 1 |
|-----|-----|-----|-----|
- (1)
5. The correct formula for sodium oxide is:
- |          |          |         |           |
|----------|----------|---------|-----------|
| A $SO_2$ | B $S_2O$ | C $NaO$ | D $Na_2O$ |
|----------|----------|---------|-----------|
- (1)
6. X is a metal. It forms a compound with fluorine with the formula  $XF_2$ . The metal X must belong to group
- |     |     |     |     |
|-----|-----|-----|-----|
| A 1 | B 2 | C 3 | D 4 |
|-----|-----|-----|-----|
- (1)
7. Z is a non-metal. It forms a compound with magnesium with the formula  $Mg_3Z_2$ . The metal Z must belong to group
- |     |     |     |     |
|-----|-----|-----|-----|
| A 3 | B 5 | C 6 | D 2 |
|-----|-----|-----|-----|
- (1)

8. Which of the following pairs of elements would form a compound with a formula  $X_2Y_3$ ?  
X is a metal and Y is a non-metal.

	X	Y
A	potassium	chlorine
B	calcium	oxygen
C	magnesium	nitrogen
D	aluminium	sulphur

(1)

9. Write chemical formulae for the following compounds:

- |                         |                        |
|-------------------------|------------------------|
| (a) iron (III) fluoride | (b) copper (II) oxide  |
| (c) copper (I) chloride | (d) iron (II) bromide  |
| (e) lead (I) oxide      | (f) vanadium (V) oxide |
| (g) copper (II) iodide  | (h) lead (IV) oxide    |
| (i) copper (I) sulphide | (j) tin (II) chloride  |

(10)

### Word and Chemical Equations

10. Write **word** equations from the following descriptions of chemical reactions:

- When zinc metal burns, it reacts with oxygen in the air to form zinc oxide, a grey solid.
- Sodium metal reacts violently with water producing hydrogen gas and a solution of sodium hydroxide.
- When iron is produced in the blast furnace from iron ore, the iron (III) oxide in the ore reacts with carbon monoxide gas. Carbon dioxide is also formed in the reaction.
- Carbon dioxide gas and black copper oxide powder are formed when green copper carbonate powder is heated in a test tube.
- In the intestines the starch in our food is broken down to form glucose and water.
- Hydrogen iodide is an unstable liquid that spontaneously decomposes to form water and oxygen gas.

(6)

11. Convert the following word equations into **chemical** equations

- sodium (s) + chlorine (g)  $\longrightarrow$  sodium chloride (s)
- phosphorous (s) + chlorine (g)  $\longrightarrow$  phosphorous chloride (s)
- hydrogen (g) + iodine (g)  $\longrightarrow$  hydrogen iodide (g)
- sodium (s) + water (l)  $\longrightarrow$  sodium hydroxide (aq) + water
- carbon (s) + chlorine (g)  $\longrightarrow$  carbon tetrachloride (l)
- magnesium (s) + zinc sulfate (s)  $\longrightarrow$  zinc (s) + magnesium sulfate (s)

(6)

## Formula Mass

12. Work out the formula mass of the following compounds:

- |   |                        |
|---|------------------------|
| (a) CH <sub>4</sub>                               | (b) MgO                |
| (c) C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> | (d) HCl                |
| (e) carbon dioxide                                | (f) oxygen gas         |
| (g) sodium fluoride                               | (h) nitrogen hydride   |
| (i) iron (III) oxide                              | (j) magnesium chloride |
- (10)

## National 5 Questions

### Formulae

1. Write chemical formulae for the following compounds that contain group ions:

- |                         |                         |
|-------------------------|-------------------------|
| (a) sodium sulphate     | (b) potassium nitrate   |
| (c) calcium carbonate   | (d) magnesium hydroxide |
| (e) ammonium chloride   | (f) lithium sulphate    |
| (g) aluminium carbonate | (h) ammonium hydroxide  |
| (i) ammonium sulphate   | (j) lithium carbonate   |
| (k) aluminium hydroxide | (l) sodium phosphate    |
| (m) potassium hydroxide | (n) radium sulphate     |
| (o) ammonium carbonate  | (p) sodium sulphate     |
- (16)

2. Write chemical formulae for the following compounds:

- |                        |                           |
|------------------------|---------------------------|
| (a) iron (II) sulphate | (b) copper (II) carbonate |
| (c) lead (II) nitrate  | (d) iron (III) hydroxide  |
- (4)

3. The correct formula for copper (II) nitrate is

- A CuNO<sub>3</sub>      B Cu(NO<sub>3</sub>)<sub>2</sub>      C Cu<sub>2</sub>NO<sub>3</sub>      D Cu<sub>2</sub>N<sub>3</sub>      (1)

4. In the compound Cr<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, chromium has a valency of

- A 4      B 3      C 2      D 1      (1)

5. Write **ionic** formulae for the following compounds that contain 2 elements:

- |                        |                         |
|------------------------|-------------------------|
| (a) sodium oxide       | (b) magnesium chloride  |
| (c) lithium iodide     | (d) aluminium oxide     |
| (e) sodium phosphide   | (f) calcium nitride     |
| (g) zinc (II) chloride | (h) silver (I) fluoride |
| (i) iron (III) nitride | (j) copper (II) bromide |
- (10)

6. Write **ionic** formulae for the following compounds that contain group ions:

- |                          |                         |
|--------------------------|-------------------------|
| (a) lithium nitrate      | (b) ammonium chloride   |
| (c) aluminium phosphate  | (d) sodium permanganate |
| (e) magnesium carbonate  | (f) calcium chromate    |
| (g) copper (I) hydroxide | (h) iron (III) sulphate |
| (i) zinc (II) hydroxide  | (j) copper (II) nitrate |
- (10)

### Balanced Equations

7. Balance the following equations:

- (a)  $\text{H}_2 + \text{Cl}_2 \longrightarrow \text{HCl}$   
(b)  $\text{N}_2 + \text{I}_2 \longrightarrow \text{NI}_3$   
(c)  $\text{Ca} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{H}_2$   
(d)  $\text{SeO}_2 + \text{O}_2 \longrightarrow \text{SeO}_3$   
(e)  $\text{Al} + \text{Na}_2\text{SO}_4 \longrightarrow \text{Al}_2(\text{SO}_4)_3 + \text{Na}$   
(f)  $\text{C}_6\text{H}_{12} + \text{O}_2 \longrightarrow \text{CO}_2 + \text{H}_2\text{O}$
- (6)

8. Write **balanced chemical** equations for the following chemical reactions:

- (a) sulphur dioxide + oxygen  $\longrightarrow$  sulphur trioxide  
(b) nitrogen hydride reacting with oxygen to form nitrogen and water  
(c) burning of ethene ( $\text{C}_2\text{H}_4$ ) to form carbon dioxide and water  
(d) decomposition of hydrogen iodide  
(d) barium chloride + sodium sulphate  $\longrightarrow$  sodium chloride + barium sulphate  
(e) calcium carbonate + hydrochloric acid (HCl)  $\longrightarrow$  calcium chloride + carbon dioxide + water
- (12)

### Formula Mass

9. Work out the formula mass of the following compounds:

- |                             |                              |
|-----------------------------|------------------------------|
| (a) $\text{K}_2\text{CO}_3$ | (b) $\text{Mg(NO}_3)_2$      |
| (c) sodium sulphate         | (d) calcium phosphate        |
| (e) aluminium oxide         | (f) sodium hydrogencarbonate |
| (g) ammonium chloride       | (h) copper (II) carbonate    |
| (i) iron (III) hydroxide    | (j) silver (I) chromate      |
- (10)