

# Science 10

## Chemistry Unit Review

KEY

This review sheet outlines the key concepts that you must know for your exam. Your class notes will be your best study tool. If you are missing information, then consult your textbook.

1. Give the correct formula and IUPAC name for the compound containing the following elements or polyatomic ions. The first one is done as an example for you.

	Formula	Name
sodium and oxygen	Na <sub>2</sub> O	sodium oxide
chlorine and magnesium	MgCl <sub>2</sub>	magnesium chloride
sulphate and hydrogen	H <sub>2</sub> SO <sub>4</sub>	
aluminum and sulphur	Al <sub>2</sub> S <sub>3</sub>	aluminum sulfide
iron(II) and iodine	FeI <sub>2</sub>	iron (II) iodide
copper(I) and phosphate	Cu <sub>3</sub> PO <sub>4</sub>	copper (I) phosphate
permanganate and ammonium	NH <sub>4</sub> MnO <sub>4</sub>	ammonium permanganate

2. For the following compounds, give the IUPAC name and state its solubility in water (either solid or aqueous). For multivalent metals, remember to include the stock number. The first one is done as an example for you.

	Name	s or aq
CuOH	copper(I) hydroxide	s
(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	ammonium carbonate	aq
Fe(NO <sub>3</sub> ) <sub>2</sub>	iron (II) nitrate	aq
PbCl <sub>4</sub>	lead (IV) chloride	aq
Fe <sub>2</sub> (SO <sub>3</sub> ) <sub>3</sub>	iron (III) sulfite	s

3. How can you tell if a compound is an ionic or molecular compound?

cation + anion, usually contains a metal  $\rightarrow$  contains only nonmetals

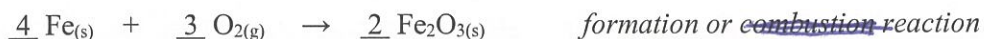
4. What is a polyatomic element? List 3 examples of diatomic element and 2 examples of a polyatomic element.

element that exists bonded to more than 2 of itself

diatomic N<sub>2</sub> H<sub>2</sub> Fe polyatomic P<sub>4</sub> S<sub>8</sub>

5. Write balanced chemical equations for the following reactions. Include states of matter and indicate the reaction type. The first one is done as an example for you.

a. solid iron plus oxygen gas yields solid iron(III) oxide



b. solid mercury (II) oxide decomposes into liquid mercury and oxygen gas



c. hydrogen sulphide gas plus oxygen gas yields sulphur dioxide gas plus water



d. sodium chloride (aq) plus silver nitrate (aq) yields sodium nitrate (aq) and solid silver chloride.



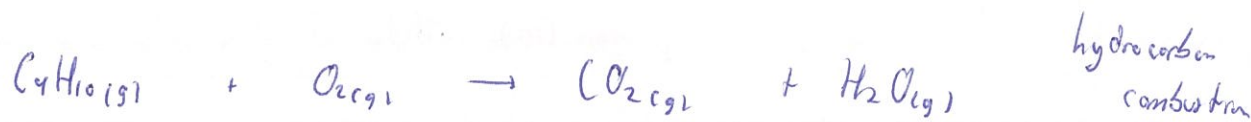
e. nitric acid plus calcium hydroxide in solution yields aqueous calcium nitrate and water



f. a solution of lead(II) nitrate plus a solution of potassium iodide yields solid lead(II) iodide plus aqueous potassium nitrate.



g. butane (C<sub>4</sub>H<sub>10</sub>) reacts with oxygen gas to produce the usual products.



h. solid potassium chlorate decomposes into solid potassium chloride and oxygen gas.



6. Answer the following:

- a. The type of bond between atoms in a molecular compound: *covalent*
- b. The type of bond in which electrons are transferred: *ionic*
- c. The phase of all ionic compounds at room temperature: *solids*
- d. The particles which determine the atomic mass number of an element: *protons and neutrons*
- e. How many valence electrons does oxygen have? *6*
- f. How many protons neutrons does a carbon-12 atom have? *6 p<sup>+</sup> and 6 n*
- g. What is the atomic mass of a carbon atom containing 8 neutrons? *14*
- h. How many valence electrons does a **sodium atom** have? *1*
- i. How many valence electrons does a **sodium ion** have? *8*
- j. What is the name of the group containing:
  - i. sodium? *alkali metals*
  - ii. chlorine? *halogens*
  - iii. magnesium? *alkali earth metals*
- k. The number of energy levels occupied by electrons for elements in period 3: *3*
- l. The formation of an insoluble product in a reaction: *precipitate*

7. What is the difference between an element and a compound?

*→ made up of 2 or more elements*

8. What are the differences between a molecular and an ionic compound?

9. What are the outermost electrons called?

*valence electrons*

10. What types of elements form **positive** ions? What is another name for positive ions?

*metals*

*cations*

11. What kind elements form **negative** ions? What is another name for negative ions?

*non-metals*

*anions*

12. Draw the Bohr models for the following atoms and/or ions. Make sure to include the number of protons in the nucleus.

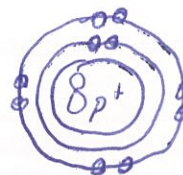
a. calcium atom

d. oxide ion

b. fluorine atom



e. argon



c. beryllium atom



f. nitride ion

13. Determine the molar mass for the following:

a. zinc  $Zn(s)$

65.39 g/mol

d. sodium borate  $Na_2B_4O_7$

127.78 g/mol

b. oxygen  $O_2(g)$

32.00 g/mol

e.  $Ba(NO_3)_2$

261.35 g/mol

c. NaCl

58.44 g/mol

f. calcium carbonate  $CaCO_3$

100.09 g/mol

14. Classify the following changes as either physical or chemical:

a. Boiling water P

b. Burning wood C

c. Exploding dynamite C

d. Freezing water P

15. Besides the halogens, which other elements exist as diatomic molecules?



16. What two elements are liquids in their natural states?



17. List three differences between acids and bases.

18. Name the following polyatomic ions:

a.  $OH^-$  hydroxide

d.  $CrO_4^{2-}$  chromate

b.  $CO_3^{2-}$  carbonate

e.  $CH_3COO^-$  acetate (ethanoate)

c.  $HPO_4^{2-}$  hydrogen phosphate

f.  $NO_2^-$  nitrite

19. Name the following ionic compounds. ~~If the metal is multi-valent, include the stock number:~~

a.  $CaCl_2$  calcium chloride

d.  $AlCl_3$  aluminum chloride

b.  $Na_2O$  sodium oxide

e.  $Fe_2O_3$  iron (III) oxide

c.  $LiCl$  lithium chloride

f.  $MgF_2$  magnesium fluoride

20. Give the chemical formula for the following ionic compounds:

a. aluminum fluoride  $AlF_3$

c. potassium iodide  $KI$

b. lithium sulphide  $Li_2S$

d. sodium nitrate  $NaNO_3$

21. Name the following molecular compounds. Remember that some may go by common names:

a.  $CO_2$  carbon dioxide

e.  $N_2O$  dinitrogen monoxide

b.  $SO_3$  sulfur trioxide

f.  $CO$  carbon monoxide

c.  $CH_4$  methane

g.  $CCl_4$  carbon tetrachloride

d.  $NH_3$  ammonia

h.  $NO$  nitrogen monoxide

22. Give the chemical formula for the following molecular compounds:

a. dinitrogen tetroxide  $N_2O_4$

c. sulphur trioxide  $SO_3$

b. phosphorus pentachloride  $PCl_5$

d. methane  $CH_4$

23. Write out the chemical formulas for the following compounds. State whether they are ionic (I), molecular (M) or acids (A). The first one is done as an example

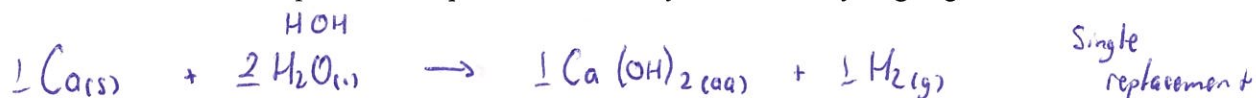
	Chemical formula	I, M, A
dinitrogen monoxide	$N_2O$	M
phosphoric acid	$H_3PO_4(aq)$	A
sodium sulphate	$Na_2SO_4$	I
nitric acid	$HNO_3(aq)$	A
lithium phosphide	$Li_3P$	I
sulphur	S <sub>8</sub>	M
hydrobromic acid	$HBr(aq)$	A
chlorous acid	$HClO_2(aq)$	A
calcium bromide	$CaBr_2$	I
nitric acid	$HNO_3(aq)$	A
copper(I) oxide	$Cu_2O$	I
sulphuric acid	$H_2SO_4(aq)$	A

24. State the solubility (solid or aqueous) for the following compounds that are placed in water

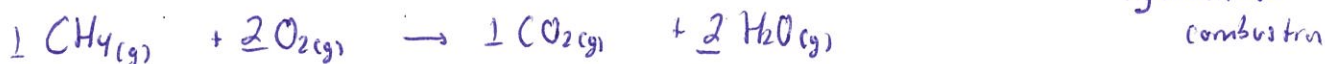
- |               |    |             |    |
|---------------|----|-------------|----|
| a. HCl        | aq | e. AgCl     | s  |
| b. $Ca(OH)_2$ | s  | f. $NH_4OH$ | aq |
| c. MgS        | aq | g. HgI      | s  |
| d. AgCl       | s  | h. $FeSO_4$ | aq |

25. Write out the following reactions as balanced chemical equations. Include the states of matter. In some cases you are told the products. In other cases you must predict the products.

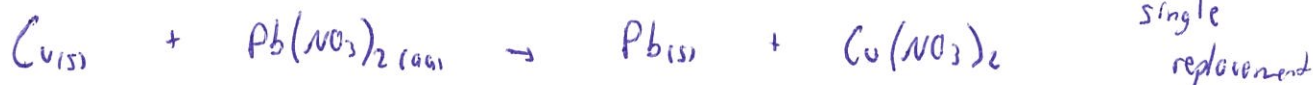
a. solid calcium reacts with liquid water to produce calcium hydroxide and hydrogen gas.



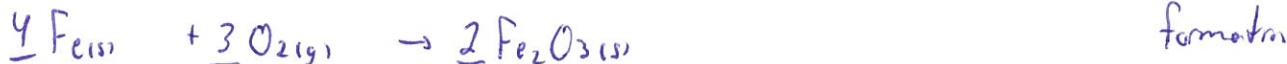
b. methane gas, CH<sub>4</sub>, is burned with oxygen.



c. solid copper reacts with lead(II) nitrate<sub>(aq)</sub> to produce solid lead and copper(II) nitrate<sub>(aq)</sub>



d. solid iron and oxygen gas combine to form iron(III) oxide.



e. when heated, calcium carbonate decomposes into its elements.



f. zinc phosphide decomposes.



g. solutions of sodium phosphate and calcium iodide react

