

TEST 1 REVISION: ATOMS, FORMULAE BONDING AND SOLUTIONS

FULL NAME: ANSWER KEY MARK: /75 %

1. Two different atoms are isolated and their atomic and mass numbers are identified.

If the atoms can be represented as $^{86}_{37}\text{X}$ and $^{32}_{16}\text{D}$

Determine (using a Periodic Table where necessary):

- (a) Number of **protons** in each atom

X: 37

D: 16

(2)

- (b) Number of **valence electrons** in each atom

X 1

D 6

(2)

- (c) the **ion** that each atom would be expected to produce if they reacted together.

X^{+1}

D^{-2}

(2)

- (d) the **formula of the compound** made by reacting X and D together.

X_2D

(1)

2. Explain the difference between a **period** (or row) and a **group** in the Periodic Table. What do each of these tell us about the properties of elements.

Elements in the same period have the same
number of e⁻ shells and is the row number
going down the periodic table that the
element is in. (1)

The group is the number of the column
going from left to right and tells us
that the elements in each group have the
same number of valence electrons. (1)

(2)

3. What is the difference between a MONATOMIC ION and a POLYATOMIC ION?

Monatomic ion is an ion containing a
single element. Polyatomic ions contain
2 or more elements.

(1)

4. Complete the table by putting in the **formulas**. The first one has been done for you.

Positive Ions	Negative Ions				
	Chloride	Sulfide	Hydroxide	Nitrate	Sulfate
Ammonium	NH_4Cl	$(NH_4)_2S$	NH_4OH	NH_4NO_3	$(NH_4)_2SO_4$
Sodium	$NaCl$	Na_2S	$NaOH$	$NaNO_3$	Na_2SO_4
Magnesium	$MgCl_2$	MgS	$Mg(OH)_2$	$Mg(NO_3)_2$	$MgSO_4$
Copper (II)	$CuCl_2$	CuS	$Cu(OH)_2$	$Cu(NO_3)_2$	$CuSO_4$
Iron (III)	$FeCl_3$	Fe_2S_3	$Fe(OH)_3$	$Fe(NO_3)_3$	$Fe_2(SO_4)_3$

$1/2$ each.

(12)

5. **Correct** the following formulae **if necessary**

Iron II carbonate	$Fe_2(CO_3)_3$	<u>$FeCO_3$</u>
Potassium iodide	KI_2	<u>KI</u>
Tin II oxide	Sn_2O	<u>SnO</u>
Calcium hydroxide	$CaOH_2$	<u>$Ca(OH)_2$</u>
Iron II sulfate	$FeSO_4$	<u>✓ correct</u>
Sodium hydrogencarbonate	$NaHCO_3$	<u>✓ correct</u>
Iron (II) chloride	$FeCl$	<u>$FeCl_2$</u>
Silver carbonate	$AgCO_3$	<u>Ag_2CO_3</u>

$1/2$ each

(4)

6. Give the **chemical names** for the following formulae.

FORMULA	NAME
$ZnSO_4$	<u>Zinc sulfate</u>
NH_4Br	<u>ammonium bromide</u>
$Cu(HCO_3)_2$	<u>copper(II) hydrogen carbonate</u>
$BaCO_3$	<u>barium carbonate</u>

1 each

(4)

7. Classify the following as having ionic, covalent or metallic bonds

- a) NaCl ionic
- b) Ag metallic
- c) CO₂ covalent
- d) N₂ covalent
- e) Lead Iodide ionic
- f) Oxygen gas covalent
- g) Magnesium Bromide ionic
- h) Brass metallic

1/2 each

(4)

8. Write M (metallic), C (covalent) or I (Ionic) with each of the following statements to show the type of bonding it is associated with.

Periodic table location	Contains	Structural	Bond	Conductivity	Melting Point
Left, Centre and Right <u>I</u>	Positive Ions only <u>M</u>	Soft if solid <u>C</u>	Shared electron pairs <u>C</u>	High for solids <u>M</u>	Low to high <u>M</u>
Left and Centre <u>M</u>	Negative ions <u>I</u>	Brittle and hard <u>I</u>	Oppositely charged ions <u>I</u>	Not as solids but does when molten <u>I</u>	High <u>I</u>
Right <u>C</u>	No ions <u>C</u>	Malleable <u>M</u>	Delocalised electrons and positive ions <u>M</u>	Not as solids or liquids <u>C</u>	Usually low <u>C</u>

(Mercury, sodium etc low mp)

1/2 each (9)

9. Fill in the blanks:

Metal atoms lose electrons to form positive ions.

Oxidation is a loss of e⁻ Reduction is a gain of e⁻

The group on the periodic table tells us how many electrons are in the outer shell of an element.

The period on the periodic table tells us how many shells contain electrons.

Non-metals become less reactive as the periods increase.

On the periodic table, Potassium is found in group 1 and period 4.

When ionic compounds are dissolved in water, their ions dissociate.

(5)

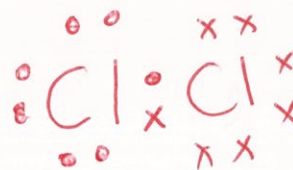
1/2 each

10. Draw electron dot diagrams for the following:

a) Na



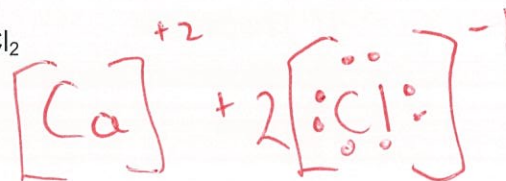
d) Cl_2



b) Cl^{-1}



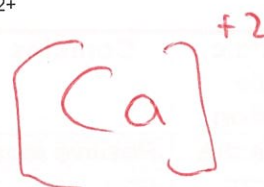
e) CaCl_2



c) O_2



f) Ca^{2+}



1 each

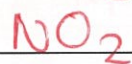
(6)

11. Write the chemical formula for the following covalent compounds

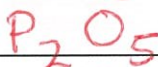
Sulfur trioxide



Nitrogen dioxide



Diphosphorus pentaoxide



Carbon tetrachloride

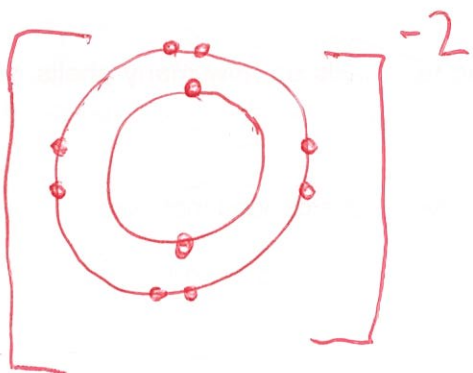


1 each

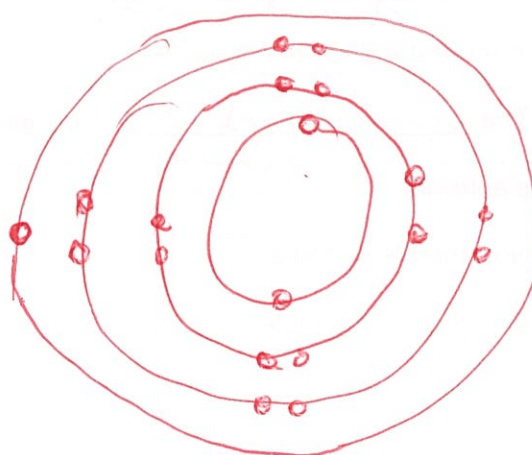
(4)

12. Draw the electron shell configuration diagrams for the following:

a) An oxide ion



b) A potassium atom



(2)

1 each.

13. Write the correct term next to each definition

(3 marks)

A mixture formed when a substance is dissolved in a liquid

solution

The substance that dissolves in a liquid

solute

A substance that will not dissolve

insoluble

An insoluble solid that emerges from a liquid solution

precipitate

$\frac{1}{2}$ each

A substance that will dissolve

soluble

The liquid that dissolves a substance

solvent

14. Identify the following ionic solids as soluble or insoluble in water

(4 marks)

$\text{Mg}_3(\text{PO}_4)_2$

insoluble

KBr

soluble

AgNO_3

soluble

CuSO_4

soluble

FeS

insoluble

Aluminium Hydroxide

insoluble

Potassium Carbonate

soluble

Calcium Chloride

soluble

$\frac{1}{2}$ each

15. When the following solutions are mixed write the formula for the products formed and identify the solubility of each product.

(8 marks)

a. $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq})$

$\text{NaNO}_3(\text{aq}) + \text{AgCl}(\text{s})$

b. $\text{FeCl}_3(\text{aq}) + 3\text{NaOH}(\text{aq})$

$3\text{NaCl}(\text{aq}) + \text{Fe}(\text{OH})_3(\text{s})$

c. $\text{K}_2\text{CO}_3(\text{aq}) + \text{Ca}(\text{NO}_3)_2(\text{aq})$

$\text{CaCO}_3(\text{s}) + 2\text{KNO}_3(\text{aq})$

d. $3\text{MgCl}_2(\text{aq}) + 2(\text{NH}_4)_3\text{PO}_4(\text{aq})$

$\text{Mg}_3(\text{PO}_4)_2(\text{s}) + 6\text{NH}_4\text{Cl}(\text{aq})$

1 for formulas
1 for states.

