

Exercise N5 S4_3A

Write the date in the margin of your homework jotter.

Write the title of this Exercise as a heading: Exercise N5 S4_3A Metals



1.

Which of the following metals will **not** react with a dilute solution of hydrochloric acid?

- A Copper
- B Iron
- C Magnesium
- D Zinc

2.

Metallic bonds are due to

- A pairs of electrons being shared equally between atoms
- B pairs of electrons being shared unequally between atoms
- C the attraction of oppositely charged ions for each other
- D the attraction of positively charged ions for delocalised electrons.

3.

Which of the following elements is an alkali metal?

- A Aluminium
- B Calcium
- C Copper
- D Sodium

5.

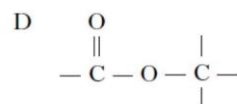
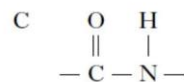
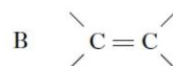
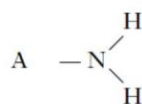
Some metals can be obtained from their metal oxides by heat alone.

Which of the following oxides would produce a metal when heated?

- A Calcium oxide
- B Copper oxide
- C Zinc oxide
- D Silver oxide

6.

What functional group is always found in an ester?



7.

Which of the following oxides dissolves in water to produce a solution with a pH greater than 7?

- A Na_2O
- B Al_2O_3
- C SO_2
- D Ag_2O

4. An element, **X**, has the following properties.

- It is a gas.
- It is **not** made up of molecules.
- It does **not** react with other elements.

Element, **X**, is likely to be in group

- A 0
- B 1
- C 2
- D 7.

8.

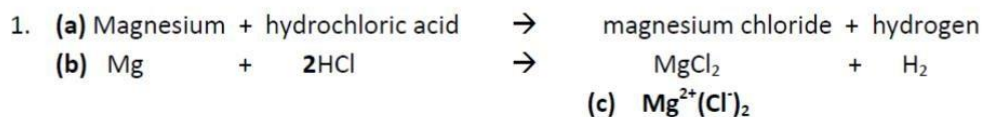
Lemonade can be made by dissolving sugar, lemon and carbon dioxide in water.

From the following list, choose which is the solvent for lemonade?

A	sugar
B	lemon
C	carbon dioxide
D	water

For each of the following reactions, **(a)** complete the word equation (where required), **(b)** write a balanced equation using chemical formulae and **(c)** write the ionic formula for the ionic product.

Question 1 has been completed as an example, you should use this layout for your answers.



9.

- i) Aluminium + nitric acid →
- ii) Lithium + water →
- iii) Calcium + oxygen →
- iv) Potassium + sulphuric acid →
- v) Caesium + water →
- vi) Lead + oxygen → lead (II) oxide
- vii) Strontium + hydrochloric acid →
- viii) Beryllium + oxygen →
- ix) Rubidium + water →

Read the passage and answer the questions that follow.

Gold — a very useful metal

Gold has been associated with wealth since before the first gold coins were minted in Lydia (modern Turkey) about 550 BC. It does not react with water, air, alkalis and almost all acids. Gold only has one naturally occurring isotope with mass 197.

As an element it has many uses in the modern world. 1 gram of gold can be beaten into a gold film covering one square metre and thin coatings of gold are used as lubricants in aerospace applications. Gold electroplating can be used to coat electrical connectors and printed circuit boards.

Chemists have recently discovered that gold nanoparticles make superb catalysts for many reactions such as the conversion of alcohols into aldehydes and ketones. It can also be used as a catalyst for removing trace carbon monoxide from gases. In this reaction carbon monoxide reacts with oxygen to form carbon dioxide.

Gold nanorods can be grown from a dilute solution of auric acid and are used in the treatment of some forms of cancer.

Adapted from *Education in Chemistry*, Volume 45, November 2008

- (a) Suggest a reason why gold was used in the first coins minted. 1
- (b) Calculate the number of neutrons present in the naturally occurring isotope of gold. 1
You may wish to use the data booklet to help you.
- (c) (i) Write an equation, using symbols and formulae, to show the reaction for removing trace carbon monoxide from gases. 1
There is no need to balance this equation.
- (ii) State the role of gold in this reaction. 1
- (d) Circle the correct words to complete the sentence. 1

Gold nanorods can be grown from a solution which contains

more $\left\{ \begin{array}{l} \text{hydroxide} \\ \text{hydrogen} \end{array} \right\}$ ions than $\left\{ \begin{array}{l} \text{hydroxide} \\ \text{hydrogen} \end{array} \right\}$ ions.

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When solid sodium chloride dissolves in water, a solution containing sodium ions and chloride ions is formed.

Which of the following equations correctly shows the state symbols for this process?

- A $\text{NaCl(s)} + \text{H}_2\text{O(l)} \longrightarrow \text{Na}^+(\text{l}) + \text{Cl}^-(\text{l})$
- B $\text{NaCl(s)} + \text{H}_2\text{O(aq)} \longrightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$
- C $\text{NaCl(aq)} + \text{H}_2\text{O(l)} \longrightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$
- D $\text{NaCl(s)} + \text{H}_2\text{O(l)} \longrightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$

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When an atom X of an element in Group 1 reacts to become X^+

- A the mass number of X decreases
- B the atomic number of X increases
- C the charge of the nucleus increases
- D the number of occupied energy levels decreases.

Hydrogen gas can be produced in the laboratory by adding a metal to dilute acid. Heat energy is also produced in the reaction.

(a) State the term used to describe all chemical reactions that release heat energy. 1

(b) A student measured the volume of hydrogen gas produced when zinc lumps were added to dilute hydrochloric acid.

<i>Time (s)</i>	0	10	20	30	40	50	60	70
<i>Volume of hydrogen (cm³)</i>	0	12	21	29	34	36	37	37

(i) Calculate the average rate of reaction, in $\text{cm}^3 \text{s}^{-1}$, between 10 and 30 seconds. 2

Show your working clearly.

(ii) Estimate the time taken, in seconds, for the reaction to finish. 1

(iii) The student repeated the experiment using the same mass of zinc. State the effect on the rate of the reaction if zinc powder was used instead of lumps. 1

(c) Another student reacted aluminium with dilute nitric acid.



(i) Circle the formula for the salt in the above equation. 1

(ii) 1 mole of hydrogen gas has a volume of 24 litres.

Calculate the volume of hydrogen gas, in litres, produced when 0.01 moles of aluminium react with dilute nitric acid. 2

Show your working clearly.



A marking guide for this Homework is available (password required).