



# Chem!stry

Name: ..... ( )

Class: .....

Date: ..... / ..... / .....

## Assignment on Acids, Bases and Salts #3

### Question 1:

Which salt is best prepared by a titration method?

- A Copper(II) sulphate
- B Lead(II) sulphate
- C Magnesium sulphate
- D Sodium nitrate

### Question 2:

A sample of air was bubbled into pure water. The pH of the water slowly changed from 7 to 6. Which gas in the sample caused this change?

- |                   |                  |
|-------------------|------------------|
| A Argon.          | B Carbon dioxide |
| C Carbon monoxide | D Nitrogen       |

### Question 3:

In which of the following pairs would the two substances react to form a salt and water only?

- A Iron and steam.
- B Aqueous sodium carbonate and dilute sulphuric acid.
- C Aqueous sodium chloride and aqueous silver nitrate.
- D Aqueous sodium hydroxide and dilute ethanoic acid.

### Question 4:

Which of the following salts **cannot** be prepared by a reaction between a dilute acid and a metal?

- |                     |                       |
|---------------------|-----------------------|
| A Calcium chloride  | B Copper(II) chloride |
| C Iron(II) chloride | D Magnesium sulphate  |

**Question 5:**

Oxides of elements may be classified as acidic, basic or amphoteric. Which set of oxides is correctly classified?

	<b>Acidic</b>	<b>Basic</b>	<b>Amphoteric</b>
<b>A</b>	Carbon dioxide	Copper(II) oxide	Zinc oxide
<b>B</b>	Carbon dioxide	Zinc oxide	Copper(II) oxide
<b>C</b>	Copper(II) oxide	Carbon dioxide	Zinc oxide
<b>D</b>	Zinc oxide	Carbon dioxide	Copper(II) oxide

**Question 6:**

In which of the following reactions do the products formed **not** include a salt?

- A** Copper(II) sulphate with sodium hydroxide.
- B** Copper(II) carbonate with sulphuric acid.
- C** Copper(II) oxide with sulphuric acid.
- D** Copper(II) oxide with hydrogen.

**Question 7:**

Which of the following elements burns in air to form an oxide which, when shaken with water, gives a solution with a pH greater than 7?

- A** Carbon      **B** Copper      **C** Hydrogen      **D** Magnesium

**Question 8:**

Which salt could be obtained as the insoluble product of a reaction between a dilute acid and an aqueous salt?

- A** Barium sulphate      **B** Copper(II) sulphate  
**C** Magnesium sulphate      **D** Silver nitrate

**Question 9:**

Which equation represents the reaction between aqueous sodium carbonate and dilute hydrochloric acid?

- A**  $\text{NaCO}_{3(s)} + \text{HCl}_{(g)} \rightarrow \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)} + \text{CO}_{2(l)}$   
**B**  $\text{NaCO}_{3(aq)} + 2\text{HCl}_{(aq)} \rightarrow \text{NaCl}_{2(aq)} + \text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)}$   
**C**  $\text{Na}_2\text{CO}_{3(aq)} + 2\text{HCl}_{(aq)} \rightarrow 2\text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)}$   
**D**  $\text{Na}_2\text{CO}_{3(s)} + \text{HCl}_{(aq)} \rightarrow \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)}$

**Question 10:**

Barium sulphate is insoluble in water. Which method could be used to prepare a pure sample of the salt from dilute sulphuric acid?

- A Add an excess of barium carbonate, filter, crystallise the filtrate.
- B Add an excess of barium carbonate, filter, wash and dry the residue.
- C Add an excess of barium hydroxide, filter, crystallise the filtrate.
- D Add excess barium chloride, filter, wash and dry the residue.

**Question 11:**

Which equation represents the neutralisation of dilute sulphuric acid by aqueous sodium hydroxide?

- A  $\text{H}^+_{(\text{aq})} + \text{OH}^-_{(\text{aq})} \rightarrow \text{H}_2\text{O}_{(\text{l})}$
- B  $2\text{H}^+_{(\text{aq})} + \text{SO}_4^{2-}_{(\text{aq})} \rightarrow \text{H}_2\text{SO}_{4(\text{aq})}$
- C  $\text{H}_2\text{SO}_{4(\text{aq})} + 2\text{OH}^-_{(\text{aq})} \rightarrow \text{SO}_4^{2-}_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})}$
- D  $2\text{Na}^+_{(\text{aq})} + \text{SO}_4^{2-}_{(\text{aq})} \rightarrow \text{Na}_2\text{SO}_{4(\text{aq})}$

**Question 12:**

Which of the following reacts with both an acid and an alkali to give a salt and water?

- A Zinc hydroxide
- B Calcium hydroxide
- C Copper(II) hydroxide
- D Iron(III) hydroxide

**Question 13:**

What property does hydrochloric acid have?

- A It liberates ammonia from ammonium salts.
- B It reacts with any base to give a salt.
- C It reacts with any metal to give hydrogen.
- D It turns red litmus paper blue.

**Question 14:**

Which of the following reacts with dilute sulphuric acid to give a gas and water as two of the products?

- A Zinc
- B Zinc carbonate
- C Zinc hydroxide
- D zinc oxide

**Question 15:**

What is the best method for making copper(II) sulphate?

- A Adding copper to aqueous zinc sulphate.
- B Adding dilute sulphuric acid to copper.
- C Adding dilute sulphuric acid to copper(II) oxide.
- D Adding aqueous sodium sulphate to copper(II) carbonate.

**Question 16:**

What is the concentration of hydrogen ions in 0.05 mol/dm<sup>3</sup> solution of sulphuric acid?

- A 0.025 mol/dm<sup>3</sup>
- B 0.05 mol/dm<sup>3</sup>
- C 0.10 mol/dm<sup>3</sup>
- D 0.01 mol/dm<sup>3</sup>

**Question 17:**

The table below gives information about the solubilities of the hydroxides, carbonates and sulphates of calcium, sodium and zinc:

	<b>Hydroxide</b>	<b>Carbonate</b>	<b>Sulphate</b>
<b>Calcium</b>	Slightly Soluble	Insoluble	Slightly Soluble
<b>Sodium</b>	Soluble	Soluble	Soluble
<b>Zinc</b>	Insoluble	Insoluble	Soluble

What is the best way of making zinc carbonate?

- A Shake solid zinc hydroxide with aqueous sodium hydroxide and pass in carbon dioxide.
- B Shake solid zinc sulphate and solid calcium carbonate with water.
- C Shake solid zinc sulphate with water and add aqueous sodium carbonate.
- D Shake aqueous zinc sulphate with solid calcium hydroxide and pass in carbon dioxide.

**Question 18:**

The table below gives information about three indicators:

Indicator	Colour at pH 1	pH at which colour changes	Colour at pH 12
Thymol Blue	Red	3	Yellow
Congo Red	Blue	5	Red
Phenolphthalein	Colourless	10	Red

What colours would be obtained when each indicator was added separately to pure water?

	Thymol Blue	Congo Red	Phenolphthalein
A	Red	Blue	Red
B	Yellow	Blue	Colourless
C	Yellow	Blue	Red
D	Yellow	Red	Colourless

**Question 19:**

Five students each dissolved an indigestion tablet in 100 cm<sup>3</sup> of distilled water. They then titrated 25.0 cm<sup>3</sup> portions of their solutions with dilute hydrochloric acid, using the same indicator. The results are shown in the table below:

Student:	1	2	3	4	5
Titration Value / cm <sup>3</sup>	20.4	20.5	20.4	20.6	22.0

Which statement could explain the result obtained by student 5?

- A The burette was washed out with hydrochloric acid.
- B The pipette was washed out with the tablet solution.
- C The student measured to the top of the meniscus in the pipette.
- D The titration flask was washed out with the tablet solution.

**Question 20:**

When two liquids are mixed, a solution with a pH value of 7 is formed. Which of the following are the pH values of the two liquids?

	First Liquid pH	Second Liquid pH
<b>A</b>	5	2
<b>B</b>	5	12
<b>C</b>	6	1
<b>D</b>	14	7

Please write your answers to the multiple choice questions in the table provided below:

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	15.
16.	17.	18.	19.	20.

**Question 21:**

a) Give the formula of the ion which is produced in aqueous solution by:

(i) An acid:

.....

(ii) An alkali:

.....

b) Write the *ionic equation*, including state symbols, for the reaction between an acid and an alkali:

.....

c) Write a balanced chemical equation, including state symbols, for the reaction between calcium and nitric acid:

.....

d) Write the balanced chemical equation for the reaction between magnesium hydroxide and hydrochloric acid:

.....

e) Write a balanced chemical equation, including state symbols, for the reaction between copper(II) carbonate and sulfuric acid:

.....

f) Write a balanced chemical equation, including state symbols, for the reaction between ammonium sulfate and sodium hydroxide.

.....

**Question 22:**

An aqueous solution containing 1 mol/dm<sup>3</sup> of compound **A** has a pH of 2.

An aqueous solution containing 1 mol/dm<sup>3</sup> of compound **B** has a pH of 5.

What can you deduce about the nature of **A** and **B**?

.....  
.....  
.....  
.....

**Question 23:**

This question is about oxides. Use only the following oxides as answers:

Carbon dioxide	Water	Copper(II) oxide	Silicon dioxide
Sodium oxide	Zinc oxide	Sulphur dioxide	Aluminium oxide

- a) Which oxide(s) are *basic*? .....
- b) Which oxide(s) are *neutral*? .....
- c) Which oxide(s) are *acidic*? .....
- d) Which oxide(s) are *amphoteric*? .....

**Question 24:**

Barium sulphate is a white *insoluble* salt.

a) Write a balanced chemical equation to show how barium sulfate can be prepared in the laboratory:

.....

b) What are the *three* steps required to obtain a pure, dry sample of the precipitated barium sulphate from the reaction that you proposed in **Question 24 a)**?

**Step 1:** .....

**Step 2:** .....

**Step 3:** .....

**Question 25:**

a) Write a balanced chemical equation, including state symbols, for the reaction between copper(II) oxide and sulfuric acid:

.....

b) A student reacted 6.00 g of copper(II) oxide with an excess of sulfuric acid. After crystallising and weighing the product, the student found that they had managed to prepare 9.36 g of copper(II) sulfate crystals.

i) Calculate the number of moles of copper(II) oxide used:

ii) Calculate the number of moles, and hence the mass in grams, of copper(II) sulfate produced:

iii) Calculate the percentage yield of copper(II) sulfate from the reaction:

**Question 26:**

Ammonia is manufactured by reacting nitrogen and hydrogen together under specific conditions.

a) Write the balanced chemical equation, including state symbols, for the reaction between nitrogen and hydrogen to form ammonia:

.....

b) Name the catalyst that is used in the manufacture of ammonia:

.....

c) A high yield of ammonia can be obtained by using a low temperature, e.g. 250 °C. In practice, a temperature of 450 °C is used. Explain why a temperature of 450 °C rather than 250 °C is used:

.....

.....

d) A high yield of ammonia can be obtained by using a high pressure, e.g. 500 atm. In practice, a pressure of 250 atm. is used. Explain why a pressure of 250 atm. rather than 500 atm. is used:

.....

.....



- Scan the QR code given below for the answers to this assignment.



[http://www.chemist.sg/acids/acids\\_assignments/acids\\_assignment\\_3\\_ans.pdf](http://www.chemist.sg/acids/acids_assignments/acids_assignment_3_ans.pdf)