| Name: | Target Grade: | Actual Grade: |
|---|---|---|

BRIGHT CULTURE

# SALT PREP
# MCQ and STRUCTURED QUESTIONS

**READ THESE INSTRUCTIONS FIRST**

**INSTRUCTIONS TO CANDIDATES**

**1. Find a quiet, comfortable spot free place from distractions.**

**2. Spend one minute on each mark.**

**3. Time yourself for every single question.**

**4. Every chapter has their own question types. Ensure that you know the different question type for each chapter.**

**5. Make a conscientious effort to remember your mistakes, especially in terms of answering techniques. E.g Take a picture for the mistakes that you made, keep it in a photo album, and revise it over and over again.**

**6. Highlight question types that you tend to keep making mistakes and review them nearing exams.**

**7. Always review the common questions and question type that you tend to make mistakes nearing exams.**

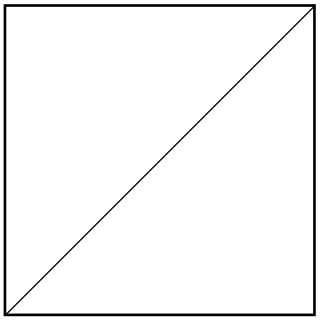
**8. During exams, classify the question type and recall what you have learnt, how you need to analyse the questions for the different question type, what you need to take note of and answer with the correct answering techniques!**

✨ **Wishing you all the best for this test!**

**You've got this!**

💡 **With lots of love,**
**Bright Culture** 💛

**MARKS**



**If you are struggling in this paper, means you need to work harder!**

**If you need any professional guidance and further advice on how to advance, feel free to WhatsApp us at 91870820 or find us at [www.bright-culture.com/.](http://www.bright-culture.com/) We are committed to connect you to your future to reach your goals.**

# ***SALT PREP MCQ***

## Paper 1

**1** A solid can be purified by crystallisation from its aqueous solution.

Which of the following properties does the solid have?

**A** It dissolves in cold water, but not in hot water.
**B** It is equally soluble in hot and cold water.
**C** It is more soluble in hot water than in cold water.
**D** It is very soluble in cold water.

**2** The table shows some information about the solubilities of three solids.

| solid | solubility in water | solubility in propanol |
|---|---|---|
| P | insoluble | soluble |
| Q | soluble | insoluble |
| R | insoluble | insoluble |

The following operations could be carried out to obtain pure P from a mixture of P, Q and R.

**1** evaporate filtrate to dryness
**2** add propanol
**3** filter
**4** add water
**5** collect residue

In what order should the operations be carried out?

**A** 2, 3, 4, 5, 1
**B** 2, 3, 5 only
**C** 4, 1, 2, 3 only
**D** 2, 3, 1 only

3 Which equation shows the most suitable reaction for the production of lead(II) sulfate in the school laboratory with good yield?

**A** $Pb + H_2SO_4 \rightarrow PbSO_4$
**B** $Pb(OH)_2 + H_2SO_4 \rightarrow PbSO_4 + 2H_2O$
**C** $Pb(NO_3)_2 + H_2SO_4 \rightarrow PbSO_4 + 2HNO_3$
**D** $PbCO_3 + H_2SO_4 \rightarrow PbSO_4 + CO_2 + H_2O$

**4** Which of the following pairs of aqueous reagents is **not** suitable for preparing insoluble salts?

**A** Sulfuric acid and calcium chloride
**B** Aluminium chloride and silver nitrate
**C** Barium hydroxide and copper(II) sulfate
**D** Lithium carbonate and iron(II) sulfate

**5** In an experiment, 10.0 $cm^3$ of 0.01 $mol/dm^3$ copper(II) sulfate solution was mixed with 5.0 $cm^3$ of 0.01 $mol/dm^3$ sodium carbonate solution in a flask according to the equation:

$$CuSO_4 + Na_2CO_3 \rightarrow Na_2SO_4 + CuCO_3$$

What was observed in the flask at the end of the reaction?

**A** a colourless solution only
**B** a green precipitate and a blue solution
**C** a green precipitate and a colourless solution
**D** a white precipitate and a colourless solution

**6** A student would like to prepare a high yield of lead(II) sulfate salt.

Which is the best method?

**A** Adding excess dilute sulfuric acid to lead(II) hydroxide.
**B** Adding excess lead(II) carbonate to dilute sulfuric acid.
**C** Adding excess lead metal to dilute sulfuric acid, filter and collect the residue.
**D** Adding excess lead metal to dilute nitric acid, filter, and followed by adding dilute sulfuric acid to filtrate.

**7** A student has five reagents.

- dilute hydrochloric acid
- dilute sulfuric acid
- dilute nitric acid
- solid calcium carbonate
- solid copper(II) carbonate

How many soluble salts can be prepared?

**A** 3

**B** 4

**C** 5

**D** 6

**8** How can a pure sample of barium sulfate be obtained from barium carbonate?

**A** Dissolve it in dilute hydrochloric acid, add dilute sulfuric acid, filter and crystallise.
**B** Dissolve it in dilute hydrochloric acid, add dilute sulfuric acid, filter and wash.
**C** Dissolve it in water, add dilute sulfuric acid, filter and crystallise.
**D** Dissolve it in water, add dilute sulfuric acid, filter and wash.

**9** Which of the following does **not** show the appropriate reagents used for preparation of the named salts?

| | salt | reagents |
|---|---|---|
| **A** | barium sulfate | barium nitrate and sulfuric acid |
| **B** | lead(II) chloride | lead(II) nitrate and hydrochloric acid |
| **C** | lithium nitrate | lithium hydroxide and nitric acid |
| **D** | magnesium chloride | magnesium sulfate and hydrochloric acid |

**10** Which metal has a soluble carbonate, chloride and sulfate?

**A** barium
**B** calcium
**C** copper
**D** potassium

**11** Which substance would **not** be used for preparing a pure sample of crystalline magnesium sulfate by reaction with dilute sulfuric acid?

**A** magnesium carbonate
**B** magnesium hydroxide
**C** magnesium nitrate
**D** magnesium oxide

**12** A solution containing lead(II) ions is added to a solution containing iodide ions. A yellow precipitate is formed.

What is the equation for the reaction that occurs?

**A** $Pb^{+} + I^{-} \rightarrow PbI$
**C** $Pb^{2+} + I^{-} \rightarrow PbI$
**B** $Pb^{+} + 2I^{-} \rightarrow PbI_2$
**D** $Pb^{2+} + 2I^{-} \rightarrow PbI_2$

13 Which products are formed when dilute hydrochloric acid reacts with the substances shown in the table?

| | substance | products |
|---|---|---|
| **A** | iron | iron(II) chloride + hydrogen only |
| **B** | iron(II) carbonate | iron(II) chloride + carbon dioxide gas only |
| **C** | iron(II) oxide | iron(II) chloride + oxygen gas only |
| **D** | iron(II) sulfate | iron(II) chloride + sulfur dioxide gas only |

14 Which of the following **does not** show the appropriate reagents used for the preparation of the named salts?

| | salt | reagents |
|---|---|---|
| **A** | lead(II) sulfate | lead(II) carbonate + hydrochloric acid |
| **B** | barium sulfate | barium nitrate + sulfuric acid |
| **C** | sodium nitrate | sodium hydroxide + nitric acid |
| **D** | magnesium chloride | magnesium + hydrochloric acid |

## ***SALT PREP STRUCTURED QUESTIONS***

**Paper 1**

**1** Hydrogen iodide is unstable, decomposes in light, fumes in moist air and can cause severe burns to skin and eyes. When hydrogen iodide is heated, it breaks down as shown in the equation:

$$2HI(g) \rightarrow H_2(g) + I_2(g)$$

Hydrogen iodide is also very soluble in water and it dissociates fully in water to produce ions.

**(a)** Give the chemical formulae of the ions present when hydrogen iodide dissolves in water.

_____[2]

**(b)** In the laboratory preparation of lead(II) iodide, aqueous solution of hydrogen iodide can be used as one of the starting materials. However, it is not a good choice as a starting material because it is a very corrosive solution.

**(i)** Give an alternative starting material in the laboratory preparation of lead(II) iodide.

_____[1]

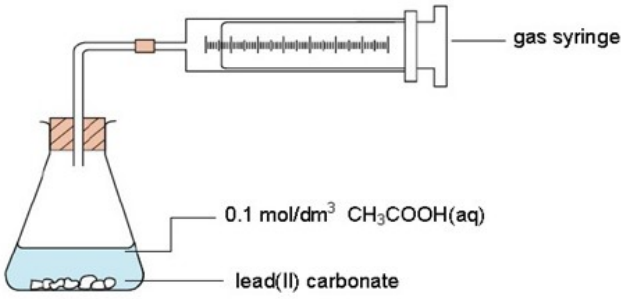
**(ii)** Outline the main steps in the method of preparing a pure and dry sample of lead(II) iodide in the laboratory, starting from the reagent given in **(b)(i)**

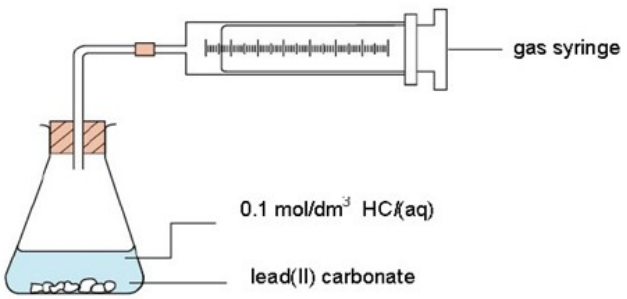
_____

_____

_____[3]

**2** An experiment is conducted using ethanoi acid and hydrochloric acid to prepare two different salts according to the set-up below.



**(a)** Slower effervescence is observed with ethanoic acid at the beginning of the experiment. However, its gas syringe is pushed further away from its initial position at the end of the experiment.

**(i)** Name all the products formed in the reaction between ethanoic acid and lead (II) carbonate [2]

_____

**(ii)** Write the chemical equation, including state symbols, for the reaction between hydrochloric acid and lead (II) carbonate. [2]

_____

**(iii)** Based on your answers for **(i)** and **(ii)**, explain the two observations stated above. [4]

_____

_____

_____

**(b)** Describe how a pure and dry sample of the salt formed between lead (II) carbonate and hydrochloric acid can be prepared in a more efficient way. [3]

_____

_____

_____

_____

_____

**3** Answer the questions below by using the reagents listed below.

| | | |
|---|---|---|
| Cu(s) | $AgNO_3(aq)$ | $H_2SO_4(aq)$ |
| $Na_2CO_3(aq)$ | NaOH(aq) | $Cu(NO_3)_2(aq)$ |
| $(NH_4)_2SO_4(aq)$ | $BaCl_2(aq)$ | Zn(s) |

Each reagent may be used once, more than once, or not at all. Give **two** reagents which when mixed together

**(a)** produce a soluble salt and a gas by using the titration method. [1]

**(b)** produce a blue precipitate. [1]

**(c)** produce an alkaline gas upon warming. [1]

# ***ANSWERS FOR SALT PREP MCQ***

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**7** A student has five reagents.

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- dilute nitric acid
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What is the equation for the reaction that occurs?

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| **B** | barium sulfate | barium nitrate + sulfuric acid |
| **C** | sodium nitrate | sodium hydroxide + nitric acid |
| **D** | magnesium chloride | magnesium + hydrochloric acid |

# ANSWERS FOR SALT PREP STRUCTURED QUESTIONS

**Paper 2**

**1** Hydrogen iodide is unstable, decomposes in light, fumes in moist air and can cause severe burns to skin and eyes. When hydrogen iodide is heated, it breaks down as shown in the equation:

$$2HI(g) \rightarrow H_2(g) + I_2(g)$$

Hydrogen iodide is also very soluble in water and it dissociates fully in water to produce ions.

**(a)** Give the chemical formulae of the ions present when hydrogen iodide dissolves in water.

$H^+$, $I^-$, $OH^-$ [2 marks for all 3 correct ions, deduct 1 mark for a wrong ion] [2]

**(b)** In the laboratory preparation of lead(II) iodide, aqueous solution of hydrogen iodide can be used as one of the starting materials. However, it is not a good choice as a starting material because it is a very corrosive solution.

**(i)** Give an alternative starting material in the laboratory preparation of lead(II) iodide.

KI/ NaI/ $NH_4I$ , or any other soluble iodide [1]

**(ii)** Outline the main steps in the method of preparing a pure and dry sample of lead(II) iodide in the laboratory, starting from the reagent given in **(b)(i)**

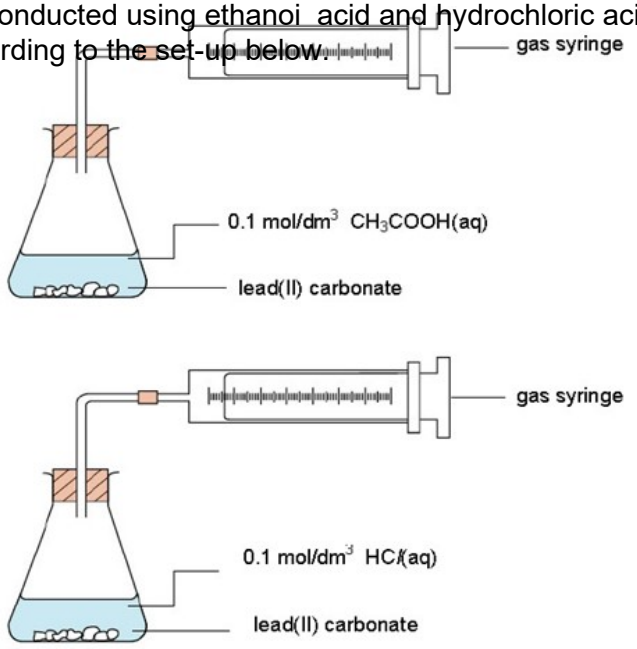
Add aqueous KI/ NaI/ NH4I to aqueous lead(II) nitrate to form a precipitate of lead(II) iodide [1]

Filter the mixture to obtain the lead(II) iodide precipitate [1]

Wash the residue with deionised water and dry between filter paper to obtain dry lead(II) iodide [1]

[3]

**2** An experiment is conducted using ethanoic acid and hydrochloric acid to prepare two different salts according to the set-up below.



**(a)** Slower effervescence is observed with ethanoic acid at the beginning of the experiment. However, its gas syringe is pushed further away from its initial position at the end of the experiment.

**(i)** Name all the products formed in the reaction between ethanoic acid and lead (II) carbonate [2]

lead(II) ethanoate, carbon dioxide and water

[2 marks for all 3 correct products, deduct 1 mark for a wrong product]

**(ii)** Write the chemical equation, including state symbols, for the reaction between hydrochloric acid and lead (II) carbonate. [2]

$2HCl(aq) + PbCO_3(s) \rightarrow PbCl_2(s) + CO_2(g) + H_2O(l)$

Balanced equation with correct formulae [1], correct state symbols [1], correct state symbols but 1 or more incorrect formulae [0]

**(iii)** Based on your answers for **(i)** and **(ii)**, explain the two observations stated above. [4]

Ethanoic acid is a weak acid/ Ethanoic acid molecules are partially ionised into their ions/ Ethanoic acid has a lower concentration of hydrogen ions [2 marks for any 2], thus it will react slower with lead(II) carbonate than hydrochloric acid to produce carbon dioxide. Hence, a slower effervescence is observed with ethanoic acid.

Ethanoic acid reacts with lead(II) carbonate to form soluble lead(II) ethanoate while hydrochloric acid reacts with lead(II) carbonate to form insoluble lead(II) chloride [1]. The reaction of ethanoic acid with lead(II) carbonate will be complete to produce a greater volume of carbon dioxide but with hydrochloric acid, the reaction is incomplete as insoluble lead(II) chloride forms a protective layer which prevents further reaction [1].

**(b)** Describe how a pure and dry sample of the salt formed between lead (II) carbonate and hydrochloric acid can be prepared in a more efficient way. [3]

1) Add excess lead(II) carbonate to dilute nitric acid to form aqueous lead(II) nitrate
2) Add dilute hydrochloric acid to aqueous lead(II) nitrate
3) Filter the mixture from (2) to separate the residue of lead(II) chloride
4) Wash the residue with deionised water
5) Dry the residue with filter paper

[3 marks for all correct steps, 2 marks for 3 to 4 correct steps, 1 mark for 1 to 2 correct steps]

**3** Answer the questions below by using the reagents listed below.

| | | |
|---|---|---|
| Cu(s) | $AgNO_3(aq)$ | $H_2SO_4(aq)$ |
| $Na_2CO_3(aq)$ | NaOH(aq) | $Cu(NO_3)_2(aq)$ |
| $(NH_4)_2SO_4(aq)$ | $BaCl_2(aq)$ | Zn(s) |

Each reagent may be used once, more than once, or not at all. Give **two** reagents which when mixed together

**(a)** produce a soluble salt and a gas by using the titration method. [1]

$Na_2CO_3(aq)$ and $H_2SO_4(aq)$

**(b)** produce a blue precipitate. [1]

$Cu(NO_3)_2(aq)$ and NaOH(aq)

**(c)** produce an alkaline gas upon warming. [1]

$(NH_4)_2SO_4(aq)$ and NaOH(aq)