5 競技大會 #1**

The boiling point of a chemical species is 337 °C. It is soluble in water and can only conduct electricity in aqueous state. Which of the following structures would this chemical species have?

A. giant ionic structure
B. giant metallic structure
C. giant covalent structure
D. simple molecular structure

某化學物種的沸點為 337 °C，它可溶於水和只有在水溶狀態下才能導電。這化學物種具有下列哪結構？

A. 巨型離子結構
B. 巨型金屬結構
C. 巨型共價結構
D. 簡單分子結構

D

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5 競技大會 #2**

Consider the following two solutions:

Solution **A** : 10 cm^3 of 1.0 M HCl(aq)

Solution **B** : 10 cm^3 of 1.0 M CH_3COOH(aq)

Which of the following statements is correct?

A. Both solution **A** and solution **B** have no OH^-(aq) ion.

B. There are mobile molecules exist in solution **B** whilst no mobile molecules exist in solution **A**.

C. When a 3 g of lead block is separately added to solution **A** and to solution **B**, the same total volume of gas is formed in both cases.

D. Both HCl and CH_3COOH have one ionisable hydrogen atom.

考慮以下兩個溶液：

溶液 **A** ：10 cm^3 的 1.0 M HCl(aq)

溶液 **B** ：10 cm^3 的 1.0 M CH_3COOH(aq)

下列的陳述，何者正確？

A. 溶液 **A** 和溶液 **B** 均沒有 OH^-(aq)離子。

B. 溶液 **B** 有游動分子存在，但溶液 **A** 沒有。

C. 當把一 3 g 的鉛塊分別加進溶液 **A** 和溶液 **B** 時，都有相同總氣體體積被收集。

D. HCl 和 CH_3COOH 均具有一個可電離的氫原子。

D

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5 競技大會 #3**

Which of the following processes can be used to extract hydrated copper(II) sulphate crystal from copper(II) sulphate solution?

(1) crystallisation

(2) electrolysis with using copper electrodes

(3) simple distillation

A. (1) only

B. (2) only

C. (1) and (3) only

D. (2) and (3) only

下列哪過程能於硫酸銅(II)溶液中提取水合硫酸銅(II)晶體？

(1) 結晶

(2) 使用銅電極進行電解

(3) 簡單蒸餾

A. 只有 (1)

B. 只有 (2) 和 (3)

C. 只有 (1) 和 (3)

D. 只有 (2) 和 (3)

A

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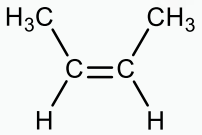
5 競技大會 #4**

Refer to the following two compounds:



X

Which of the following statements is / are correct?

(1) They are *cis-trans* isomers.

(2) They have the same boiling point.

(3) Both the polymerisation of **X** and that of **Y** give the same addition polymer.

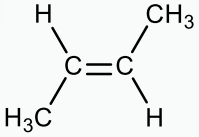
A. (1) only

B. (2) only

C. (1) and (3) only

D. (2) and (3) only

參考以下兩個化合物：



Y

下列的陳述，何者正確？

(1) 它們是*順-反*異構體。

(2) 它們具有相同沸點。

(3) **X** 的聚合反應和 **Y** 的聚合反應，都生成相同的加成聚合物。

A. 只有 (1)

B. 只有 (2) 和 (3)

C. 只有 (1) 和 (3)

D. 只有 (2) 和 (3)

C

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Direction: Question 5 and 6 refer to the following experiment.

指示：回答題 5 和 6 時，請參照以下的實驗。

25.0 cm^3 of a sample of sodium hydroxide solution is withdrawn and made up to 250.0 cm^3 by using volumetric flask. 10.0 cm^3 of the solution from the volumetric flask was transferred to a conical flask and was titrated against 0.5 mol dm^{-3} sulphuric acid by using a suitable indicator. The titration was repeated for several times and the mean value of sulphuric acid used to reach end-point is 22.00 cm^3.

抽取 25.0 cm^3 的氫氧化鈉溶液樣本，並用容量瓶配備至 250.0 cm^3。從容量瓶中抽取 10.0 cm^3 的溶液轉移至一錐形瓶，與 0.5 mol dm^{-3} 硫酸進行滴定，並使用合適的指示劑。重覆數次滴定，達到終點所需的硫酸是 22.00 cm^3。

5 競技大會 #5**

What is the concentration of the sample of sodium hydroxide solution ?

氫氧化鈉溶液樣本的濃度是多少?

A. 4.4 mol dm^{-3}
B. 8.8 mol dm^{-3}
C. 11.0 mol dm^{-3}
D. 22.0 mol dm^{-3}

A. 4.4 mol dm^{-3}
B. 8.8 mol dm^{-3}
C. 11.0 mol dm^{-3}
D. 22.0 mol dm^{-3}

5 競技大會 #6**

It is found that the answer calculated in question 5 was lower than actual. Which of the following actions may lead to this result?

已知題 5 所得的答案比實際的為低。下列的行動，何者會導致這個結果？

(1) carrying out the titration with the filter funnel remained on top of the burette after using it to fill the burette with the sulphuric acid

(2) rinsing the conical flask with distilled water only before transferring the diluted sample of sodium hydroxide solution to it

(3) rinsing the burette with distilled water only before filling the sulphuric acid to it

(1) 利用漏斗把硫酸注入滴定管後，於進行滴定時仍讓漏斗留在滴定管的頂部

(2) 只用蒸餾水沖洗錐形瓶，然後把稀釋的氫氧化鈉溶液樣本轉移至瓶中

(3) 只用蒸餾水沖洗滴定管，然後把硫酸注入滴定管中

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

A. 只有 (1)
B. 只有 (2) 和 (3)
C. 只有 (1) 和 (3)
D. 只有 (2) 和 (3)

D A

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5 競技大會 #7**

There is dative covalent bond in H_3O^+ ion. Which of the following statements concerning H_3O^+ ion are correct ?

(1) In forming H_3O^+ ion, dative covalent bond is formed between H^+ ion and H_2O molecule.

(2) There is dative covalent bond between H atom and O atom in H_3O^+ ion.

(3) H_3O^+ ion is present in all aqueous solution.

A. (1) and (2) only

B. (1) and (3) only

C. (2) and (3) only

D. (1), (2) and (3)

H_3O^+離子具有配位共價鍵。下列有關 H_3O^+離子的陳述，何者正確？

(1) 在形成 H_3O^+離子時， H^+離子和 H_2O 分子間形成配位共價鍵。

(2) 在 H_3O^+離子中，H 原子和 O 原子間具有配位共價鍵。

(3) 所有水溶溶液均存在 H_3O^+離子。

A. 只有 (1) 和 (2)

B. 只有 (1) 和 (3)

C. 只有 (2) 和 (3)

D. (1)、(2) 及 (3)

D

5 競技大會 #8**

Which of the following processes can be used to distinguish between $Na_2CO_3(s)$ and $CaCl_2(s)$?

(1) performing a flame test

(2) adding silver nitrate solution

(3) adding potassium hydroxide solution

A. (1) and (2) only

B. (1) and (3) only

C. (2) and (3) only

D. (1), (2) and (3)

下列哪些過程可用來辨別 $Na_2CO_3(s)$和 $CaCl_2(s)$？

(1) 進行焰色試驗

(2) 加入硝酸銀溶液

(3) 加入氫氧化鉀溶液

A. 只有 (1) 和 (2)

B. 只有 (1) 和 (3)

C. 只有 (2) 和 (3)

D. (1)、(2) 及 (3)

B

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5 競技大會 #9**

1st statement	2nd statement	第一陳述句	第二陳述句
The pH value of water is 7 at room conditions.	Water is neutral at room conditions.	在室內條件下，水的 pH 值為 7。	在室內條件下，水是中性的。

B

5 競技大會 #10**

1st statement	2nd statement	第一陳述句	第二陳述句
In Group I, the strength of metallic bond increases down the group.	In Group I, the atomic size increases down the group.	在第 I 族中，金屬鍵強度同族依次向下時上升。	在第 I 族中，原子大小同族依次向下時上升。

C

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