

科目：普通化學

適用：應化系

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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第 1 頁

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選擇題：(每題四分，共四十四分)

1. Which of the following metric relationships is incorrect?

- a) 1 microliter = 10^{-6} liters
- b) 1 gram = 10^3 kilograms
- c) 10^3 milliliters = 1 liter
- d) 1 gram = 10^2 centigrams
- e) 10 decimeters = 1 meter

2. One second contains this many picoseconds.

- a) 1×10^{12} b) 1×10^{-12} c) 1×10^{-9} d) 1×10^9 e) 1×10^{15}

3. 423 Kelvin equals

- a) 150. °F b) 273. °F c) 696. °F d) 150. °C e) 696. °C

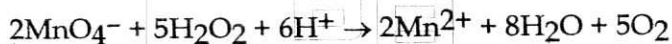
4. In the reaction $2\text{Ca(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{CaO(s)}$, which species is oxidized?

- a) O_2 b) O^{2-} c) Ca d) Ca^{2+} e) none of these

5. Which of the following is *not* determined by the principal quantum number, n , of the electron in a hydrogen atom?

- a) the energy of the electron
- b) the minimum wavelength of the light needed to remove the electron from the atom.
- c) the size of the corresponding atomic orbital(s)
- d) the shape of the corresponding atomic orbital(s)
- e) All of these are determined by n .

6. Given the reaction



determine the number of electrons involved in this reaction.

- a) 10 b) 8 c) 6 d) 4 e) 2

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7. Calculate ΔH° for the reaction $\text{C}_4\text{H}_4(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{C}_4\text{H}_8(\text{g})$, using the following data:

$\Delta H^\circ_{\text{combustion}}$ for $\text{C}_4\text{H}_4(\text{g}) = -2341 \text{ kJ/mol}$

$\Delta H^\circ_{\text{combustion}}$ for $\text{H}_2(\text{g}) = -286 \text{ kJ/mol}$

$\Delta H^\circ_{\text{combustion}}$ for $\text{C}_4\text{H}_8(\text{g}) = -2755 \text{ kJ/mol}$

- a) -128 kJ b) -158 kJ c) 128 kJ d) 158 kJ e) none of these

8-11. A general reaction written as $1\text{A} + 2\text{B} \rightarrow \text{C} + 2\text{D}$ is studied and yields the following data:

[A] ₀	[B] ₀	Initial $\Delta[\text{C}]/\Delta t$
0.150 M	0.150 M	$8.00 \times 10^{-3} \text{ mol/L} \cdot \text{s}$
0.150 M	0.300 M	$1.60 \times 10^{-2} \text{ mol/L} \cdot \text{s}$
0.300 M	0.150 M	$3.20 \times 10^{-2} \text{ mol/L} \cdot \text{s}$

8. What is the order of the reaction with respect to A?

- a) 0 b) 1 c) 2 d) 3 e) 4

9. What is the overall order of the reaction?

- a) 0 b) 1 c) 2 d) 3 e) 4

10. What is the numerical value of the rate constant?

- a) 0.053 b) 1.19 c) 2.37 d) 5.63 e) none of these (a-d)

11. Determine the initial rate of C production ($\Delta[\text{C}]/\Delta t$) if $[\text{A}] = 0.200 \text{ M}$ and $[\text{B}] = 0.500 \text{ M}$?

- a) $4.74 \times 10^{-2} \text{ mol/L} \cdot \text{s}$ b) $2.37 \times 10^{-1} \text{ mol/L} \cdot \text{s}$
 c) $1.19 \times 10^{-1} \text{ mol/L} \cdot \text{s}$ d) $8.23 \times 10^{-2} \text{ mol/L} \cdot \text{s}$ e) none of these (a-d)

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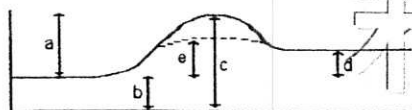
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第 3 頁

填充題：(每題四分,共四十四分)

12-14. Use the potential energy diagram shown to answer the following:



12. Which letter shows the activation energy?

ANS: _____

13. Which letter shows the change in energy for the overall reaction?

ANS: _____

14. Which letter shows the activation energy using a catalyst?

ANS: _____

15-18. Write the chemical formulas for the following compounds or ions.

15) nitrate ion

16) aluminum oxide

17) perchloric acid

18) copper(II) bromide _____

19-20. Draw the functional group of

19) carboxylic acid

20) aldehyde _____

21-22. Write the formula of

21) ethylene glycol _____

22) 2-pentene _____

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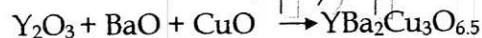
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計算題：(每個答案四分,共十二分,不需顯示小數點後之數值)

23. 10g of $\text{YBa}_2\text{Cu}_3\text{O}_{6.5}$ oxide is prepared by mixing Y_2O_3 , BaO and CuO oxides and then sintering at high temperature. What is the mass of each starting oxide?

Molecular Weight: $\text{Y}=88.9$, $\text{Ba}=137.3$, $\text{Cu}=63.5$, $\text{O}=16.0$ 

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