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下列元素週期表資料，可供回答問題之參考

1 H 1.0																	2 He 4.0
3 Li 6.9	4 Be 9.0											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
11 Na 23.0	12 Mg 24.0											13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.0	17 Cl 35.5	18 Ar 40.0
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 64.0	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 80.0	36 Kr 83.8

注意!本考卷共有 35 題。ATTENTION ! THIS PAPER CONTAINS 35 QUESTIONS.

1. 鎂可和氯化鐵反應形成氯化鎂和鐵。

$$3Mg(s) + 2FeCl_3(s) \rightarrow 3MgCl_2(s) + 2Fe(s)$$

一混合物含鎂41.0克和氯化鐵175.0克進行反應。請問何者為限量試劑并判斷當反應完成時哪種反應物有剩餘，剩多少?

Magnesium reacts with iron(III) chloride to form magnesium chloride and iron.

$$3Mg(s) + 2FeCl_3(s) \rightarrow 3MgCl_2(s) + 2Fe(s)$$

A mixture of 41.0 g of magnesium and 175.0 g of iron(III) chloride is allowed to react. Identify the limiting reactant and determine the mass of the excess reactant when the reaction is complete.

A. 限量試劑為Mg; 剩餘$FeCl_3$ 67克。
   Limiting reactant is Mg; 67 g of $FeCl_3$ remains.
B. 限量試劑為Mg; 剩餘$FeCl_3$ 134克。
   Limiting reactant is Mg; 134 g of $FeCl_3$ remains.
C. 限量試劑為Mg; 剩餘$FeCl_3$ 104克。
   Limiting reactant is Mg; 104 g of $FeCl_3$ remains.
D. 限量試劑為$FeCl_3$; 剩餘Mg 2克。
   Limiting reactant is $FeCl_3$; 2 g of Mg remains.
E. 限量試劑為$FeCl_3$; 剩餘Mg 87克。
   Limiting reactant is $FeCl_3$; 87 g of Mg remains.

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2. 下列何者為氧化還原反應?
Which of the following is a redox reaction?

A. $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$

B. $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$

C. $K_2Cr_2O_7(aq) + 2KOH(aq) \rightarrow 2K_2CrO_4(aq) + H_2O(l)$

D. $Na_2CO_3(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

E. $H_2O(l) \rightarrow H^+(aq) + OH^-(aq)$

3. 下列敘述何者不適用於理想氣體?
Which of the following statements is NOT applicable to an ideal gas?

A. 氣體分子間彼此沒有吸引力。
There are no attractive forces between the gas molecules.

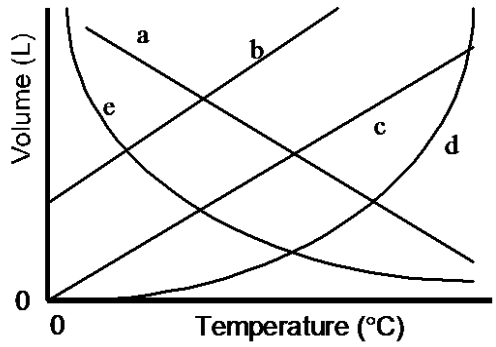
B. 氣體分子間有很强的排斥力。
There are strong repulsive forces between the gas molecules.

C. 氣體分子所占的體積相較於容器體積可忽略。
The volume occupied by the molecules is negligible compared to the container volume.

D. 氣體表現是根據理想氣體方程式。
The gas behaves according to the ideal gas equation.

E. 氣體分子平均動能正比於絕對溫度。
The average kinetic energy of the molecules is directly proportional to the absolute temperature.

4. 由下表體積-溫度(攝氏)圖中，在氣压保持不變下，判斷哪一條線最能代表體積与溫度之關係?
Maintaining the pressure unchanged, which of the lines in the figure below represents the relationship between the volume of a gas and its temperature (in degree Celsius)?



A. a　　B. b　　C. c　　D. d　　E. e

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5. 下列哪個過程中顯示 $\Delta H = \Delta E$？
Which of the following processes demonstrates $\Delta H = \Delta E$?
   A. 兩莫爾氨氣在1.2大氣壓下從325°C 降溫至300°C。
   Two moles of ammonia gas are cooled from 325°C to 300°C at 1.2 atm.
   B. 一克水在一大氣壓和100°C下蒸發。
   One gram of water is vaporized at 100°C and 1 atm.
   C. 兩莫爾碘化氫在40升容器中反應產氫氣和碘蒸氣。
   Two moles of hydrogen iodide decompose to hydrogen and iodine in a 40-L container.
   D. 碳酸鈣在可變體積之容器中加熱形成氧化鈣和二氧化碳。
   Calcium carbonate is heated to form calcium oxide and carbon dioxide in a container with variable volume.
   E. 一莫爾二氧化碳固體升華成氣態。
   One mole of solid carbon dioxide sublimes to the gas phase.

6. 原子軌域之發展運用量子力學的:
Atomic orbitals by quantum mechanics are applicable for:
   A. 描述可能在空間範圍中找到電子。
   describing regions of space in which one is most likely to find an electron.
   B. 描述電子運動之正確路徑。
   describing exact paths for electron motion.
   C. 能夠如同波爾模型正確地描述原子結構。
   giving a description of the atomic structure which is essentially the same as the Bohr model.
   D. 使科學家能準確計算出氫原子的精確體積。
   allowing scientists to calculate an exact volume for the hydrogen atom.
   E. 和海森堡的測不準原理抵觸。
   conflict with the Heisenberg Uncertainty Principle.

7. 下列何者為一個電子在*5f* 軌域之量子數?
Which of the following is a correct set of quantum numbers for an electron in a 5*f* orbital?
   A. $n = 5, l = 3, m_l = +1$
   B. $n = 5, l = 2, m_l = +3$
   C. $n = 4, l = 3, m_l = 0$
   D. $n = 4, l = 2, m_l = +1$
   E. $n = 5, l = 4, m_l = 3$

8. 下列离子大小由大到小排序何者正確?
What is the correct order of decreasing size for the following ions?
   A. $P^{3-} > Cl^- > K^+ > Ca^{2+}$
   B. $Ca^{2+} > K^+ > Cl^- > P^{3-}$
   C. $K^+ > Cl^- > Ca^{2+} > P^{3-}$
   D. $K^+ > Cl^- > P^{3-} > Ca^{2+}$
   E. 以上皆非。None of these choices is correct.

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9. 燃燒脂肪比燃燒等量的碳水化合物釋放出更多的能量，是因為
Combustion of fat will release more energy than the combustion of an equal mass of carbohydrate because
   A. 脂肪與氧的鍵結的鍵比碳水化合物來的多。
   fats contain more bonds to oxygen than carbohydrates.
   B. 脂肪與氧的鍵結的鍵比碳水化合物來的少。
   fats contain fewer bonds to oxygen than carbohydrates.
   C. 脂肪中碳-碳和碳-氫鍵的總能量大於反應產物（二氧化碳和水）的碳-氧和氧-氫鍵之能量含量。
   the total energy of the carbon-carbon and carbon-hydrogen bonds in fats is greater than the energy content of the carbon-oxygen and oxygen-hydrogen bonds in the reaction products (carbon dioxide and water).
   D. 脂肪中碳-碳和碳-氫鍵的總能量大於碳水化合物中鍵的能量含量。
   the total energy of the carbon-carbon and carbon-hydrogen bonds in fats is greater than the energy content of the bonds in carbohydrates.
   E. 脂肪的莫爾質量比碳水化合物高。
   fats have higher molar masses than carbohydrates.

10. 在 $COCl_2$ 分子中，碳是中心原子。根據路易士的最佳化結構，碳的形式電荷 (formal charge) 是多少?
In $COCl_2$ molecule, carbon is the central atom. Based on the best Lewis structure for $COCl_2$, what is the formal charge on carbon atom?

   A. 0　　B. +1　　C. -1　　D. +2　　E. -2

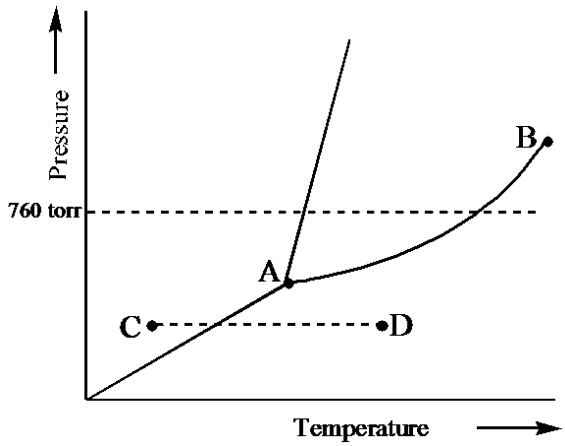
11. 下列有關分子軌域(MO)理論的敘述，何者是錯的?
Which of the following statements relating to molecular orbital (MO) theory is INCORRECT?

   A. 两個原子軌域的混成會產生一個鍵結和一個反鍵結的分子軌域。
   Combination of two atomic orbitals produces one bonding and one antibonding MO.
   B. 一个鍵結的分子軌域之能量低於形成鍵結前的两個原子軌域之能量。
   A bonding MO is lower in energy than the two atomic orbitals from which it is formed.
   C. 两個2*p*軌域的結合可能導致不是 σ 就是 π 的分子軌域。
   Combination of two 2*p* orbitals may result in either σ or π MOs.
   D. 一個鍵結級數為零的物種將不穩定。
   A species with a bond order of zero will not be stable.
   E. 具有偶數個電子的穩定分子中，所有的電子必須成對。
   In a stable molecule having an even number of electrons, all electrons must be paired.

12. 下列敘述製備 1.00 L, 2.0 M 尿素 [$CO(NH_2)_2$] 溶液的方法，何者是對的?
Which of the following statements describes the correct method for preparing 1.00 L of a 2.0 *M* urea [$CO(NH_2)_2$] solution?
   A. 將120克的尿素溶於1公斤的蒸餾水中。
   Dissolve 120 g of urea in 1 kg of distilled water.
   B. 將120克的尿素溶於880克的蒸餾水中。
   Dissolve 120 g of urea in 880 g of distilled water.
   C. 將120克的尿素溶於適量的蒸餾水中來產生1公升的溶液。
   Dissolve 120 g of urea in sufficient distilled water to produce 1 L of solution.
   D. 將120克的尿素溶於1公升的蒸餾水中。
   Dissolve 120 g of urea in 1 L of distilled water.
   E. 須了解尿素的密度，方能進行這種計算。
   The density of urea is needed in order to do this calculation.

13. 二元氧化物X_mO_n的碱性特徵是…..
The basic characteristic of the binary oxides X_mO_n is…..
   A. 當X具有低原子序時較大。
   is greater when X has a smaller atomic number.
   B. 當X為非金屬時較大。
   is greater when X is a nonmetal.
   C. 隨着X的氧化數增加而增加。
   increases as the oxidation number of X increases.
   D. 隨着X的氧化數減少而增加。
   increases as the oxidation number of X decreases.
   E. 不受X的氧化數影響。
   is unaffected by the oxidation number of X.

14. 考慮下面的相變化圖，正確指出从C點到D點發生的過程。
Considering the following phase diagram, identify the process occurring as one goes from point C to point D.



A. 隨着溫度的升高，物體由固體變成液體。
increasing temperature with a phase changing from solid to liquid.
B. 隨着溫度的升高，物體由固體變成氣體。
increasing temperature with a phase changing from solid to gas.
C. 隨着溫度的升高，物體由液體變成氣體。
increasing temperature with a phase changing from liquid to gas.
D. 隨着溫度的升高，物體沒有出現任何相變化。
increasing temperature with no phase change.
E. 溫度升高超過临界溫度。
increasing temperature beyond the critical temperature.

15. 正確選出在光照射下，丁烷与氯分子反應中的主要有機產物。
Identify the principal organic product of the reaction between butane and chlorine under irradiation of sunlight.

$$CH_3CH_2CH_2CH_3 + Cl_2 \xrightarrow{light}$$

A. CH_3Cl B. $CH_3CH_2CHClCH_3$ C. $CH_3CHClCH_3$ D. CH_3CH_2Cl
E. None of these choices is a major product of the reaction.
以上選項都不是反應的主要產物。

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16. 在密閉容器中，$CH_3NC \rightarrow CH_3CN$ 的氣相反應已經被研究出來，并且發現速率方程式為: 速率= $-\Delta[CH_3NC]/\Delta t = k[CH_3NC]$。以下哪項行為最不可能導致反應速率發生變化?
The gas-phase reaction $CH_3NC \rightarrow CH_3CN$ has been studied in a closed vessel, and the rate equation was found to be: Rate = $-\Delta[CH_3NC]/\Delta t = k[CH_3NC]$. Which of the following actions is least likely to cause a change in the rate of the reaction?

A. 降低溫度。
lowering the temperature.
B. 加入催化劑。
adding a catalyst.
C. 在相同容器中使用較大初始量的CH_3NC。
using a larger initial amount of CH_3NC in the same vessel.
D. 使用較大容器，但維持等量的CH_3NC。
using a bigger vessel, but the same initial amount of CH_3NC.
E. 當 CH_3CN 形成時，持續將其移除。
continuously removing CH_3CN as it is formed.

17. 選出在1.0M弱酸HA水溶液中，存在的各物種的正確浓度關係。
Select the correct relationship among the concentrations of species present in a 1.0 M aqueous solution of the weak acid represented by HA.

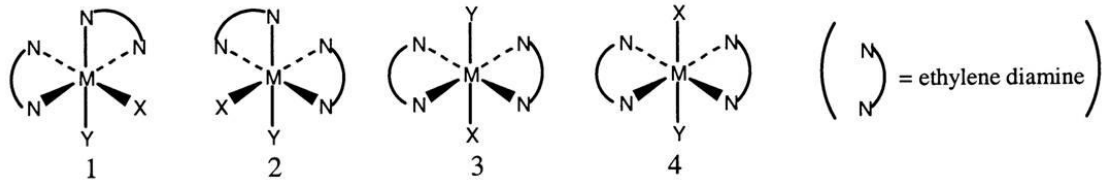
A. $[H_2O] > [A^-] \sim [H_3O^+] > [HA] > [OH^-]$
B. $[H_2O] > [HA] > [A^-] > [H_3O^+] > [OH^-]$
C. $[HA] > [H_2O] > [A^-] > [H_3O^+] > [OH^-]$
D. $[H_2O] > [HA] > [A^-] \sim [H_3O^+] > [OH^-]$
E. $[HA] > [H_2O] > [A^-] \sim [H_3O^+] > [OH^-]$

18. 有一醋酸緩衝溶液pH值為4.40，以下哪項變化會導致pH下降？
An acetate buffer has a pH of 4.40. Which of the following changes will cause the pH to decrease?
A. 溶解少量固體醋酸鈉。
dissolving a small amount of solid sodium acetate.
B. 加入少量稀鹽酸。
adding a small amount of dilute hydrochloric acid.
C. 加入少量稀氫氧化鈉。
adding a small amount of dilute sodium hydroxide.
D. 溶解少量固體氯化鈉。
dissolving a small amount of solid sodium chloride.
E. 用水稀释緩衝溶液。
diluting the buffer solution with water.

19. 以下哪項值是基於热力學第三定律？
Which of the following values is based on the Third Law of Thermodynamics?
A. $\Delta H°_f = 0$ for Al(s) at 298 K
B. $\Delta G°_f = 0$ for H_2(g) at 298 K
C. $S° = 51.446$ J/(mol·K) for Na(s) at 298 K
D. $q_{sys} < 0$ for $H_2O(l) \rightarrow H_2O(s)$ at 0°C
E. 以上皆是。None of these choices is correct.

20. 關於伏打電池和電解電池，以下哪些陳述是正確的？
Which of the following statements about voltaic and electrolytic cells is correct?
A. 伏打電池中的陽極肯定增加重量。
The anode will definitely gain weight in a voltaic cell.
B. 两個電池的陰極處會發生氧化。
Oxidation occurs at the cathode of both cells.
C. 對於伏打電池而言，自由能變化(ΔG)為負值。
The free energy change, ΔG, is negative for the voltaic cell.
D. 在電解電池中，外部電線中的電子从陰極流向陽極。
The electrons in the external wire flow from cathode to anode in an electrolytic cell.
E. 以上皆非。
None of these choices is correct.

21. 下列八面體錯合物皆包含乙二胺和两種不同的單牙配位基X和Y。
Consider the following octahedral complex structures, each consists of ethylene diamine and two different unidentate ligands X and Y.



1 2 3 4

以下哪一項（如果有的話）是一對光學異物？
Which of the following complexes is a pair of optical isomers (if any)?

A. 1 and 2 B. 1 and 3 C. 1 and 4
D. 3 and 4 E. None of these choices is correct.

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22. 同位素$_{21}Sc^{42}$ 不穩定的原因是 ……

The isotope $_{21}Sc^{42}$ is unstable because……

A. 相對於質子的數量來說，中子的數量太大。
the number of neutrons is too large if compared with to the number of protons.

B. 相對於質子的數量來說，中子的數量太小。
the number of neutrons is too small if compared with the number of protons.

C. 原子序太大。
the atomic number is too large.

D. 質量數太大。
the mass number is too large.

E. Sc 同位素皆不穩定。
Sc isotopes are all unstable.

23. Au^{3+}與 Ni^{2+}的還原電位如下:

The reduction potentials for Au^{3+} and Ni^{2+} are as follows:

$Au^{3+} + 3e^- \rightarrow Au \quad E° = +1.50$ V

$Ni^{2+} + 2e^- \rightarrow Ni \quad E° = -0.23$ V

則在 25°C 時下面反應的 $\Delta G°$是多少？法拉第常數為 96.5 kJ.V.mol^{-1}。

Calculate $\Delta G°$ (at 25°C) for the reaction. Given that Faraday constant is 96.5 kJ.V.mol^{-1}.

$$2Au^{3+} + 3Ni \rightarrow 3Ni^{2+} + 2Au$$

A. -1.00×10^3 kJ　　B. –2140 kJ　　C. $+5.00 \times 10^2$ kJ

D. -5.00×10^2 kJ　　E. $+1.00 \times 10^3$ kJ

24. 一位學生以 25.0 mL 的 0.100 *M* NaOH 滴定不知道的弱酸, HA, 以酚酞為指示劑，到滴定終點時呈現淡粉紅色。此學生又再加入 13.0 mL 的 0.100 *M* HCl。此時此溶液之 pH 值是 4.7，則下列敘述哪個是對的?

A student has titrated an unknown weak acid, HA, to a pale pink phenolphthalein endpoint with 25.0 mL of 0.100 *M* NaOH. The student then added another 13.0 mL of 0.100 *M* HCl. The pH of the resulting solution was 4.7. Which of the following statements is true?

A. 在 pH4.7，一半的共軛碱 A^-已轉為 HA。
At pH 4.7, half of the conjugate base, A^-, has been converted to HA.

B. 此酸的 pK_a 是 4.7。
The pK_a of the acid is 4.7.

C. 此酸的 pK_a 是小於 4.7。
The pK_a of the acid is less than 4.7.

D. 此酸的 pK_a 是大於 4.7。
The pK_a of the acid is greater than 4.7.

E. 以上的敘述超過一個以上的答案是對的。
More than one of the above statements are correct

25. 已知乙烷、碳及氫之莫爾燃燒熱 (△H) 依次為 x、y、z，則乙烷之莫爾生成熱為若干?
The molar heat of combustion for ethane, carbon, and hydrogen are x, y, and z, respectively. What is the molar heat of formation of ethane?
(A) y+x-z
(B) y+z-x
(C) x+2y-3z
(D) x-2y-3z
(E) 2y+3z-x

26. 當催化劑加入反應混合……
A catalyst is added to a reaction mixture, it……
(A)可增加反應物分子的碰撞速率。
increases the rate of collision between the reactant molecules
(B)可提供反應物更多的能量。
provides reactant molecules with more energy
(C) 降低逆反應速率。
slows down the rate of reverse reaction.
(D) 提供反應新的路徑(極構)。
provides a new path (mechanism) for the reaction
(E) 以上皆非。
none of these.

27. 下列氧化數何者是氮原子在硝酸中的氧化態?
Which of the following is the oxidation state of nitrogen atom in nitric acid?
(A) +3 (B) +4 (C) +5 (D) +6 (E) 以上皆非 None of these

28. 硫化氫和水的反應如下，則 K_2 = ?
Hydrogen sulfide reacts with water according to the following reactions. What is the value of K_2?

$H_2S(g) + H_2O(l) \rightleftharpoons H_3O^+(aq) + HS^-(aq)$ $K_1=1.0 \times 10^{-7}$
$HS^-(aq) + H_2O(l) \rightleftharpoons H_3O^+(aq) + S^{2-}(aq)$ K_2= ?
$H_2S(g) + 2H_2O(l) \rightleftharpoons 2H_3O^+(aq) + S^{2-}(aq)$ $K_3= 1.3 \times 10^{-20}$

(A) 1.3×10^{-27} (B) 2.3×10^{-7} (C) 1.3×10^{-13} (D) 7.7×10^{12} (E) 7.7×10^{26}

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29. 某有機分子式 $C_5H_{10}O_2$，經過檢定確認為具有醛基的酯類。試問符合上述條件之異構物共有几種?

An organic compound with the formula of $C_5H_{10}O_2$ was analyzed and found to be an ester with an aldehyde moiety. How many structural isomers can $C_5H_{10}O_2$ can exist ?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

30. 下列關於氣體動力論敘述何者為非?

The kinetic theory of gases does not assume that

(A) 氣體微小粒子組成且具有固定的不規則運動模式。

Gases are made up of tiny particles in constant chaotic motion.

(B) 氣體分子小於两粒子間的平均距離。

Gas particles are very small compared to the average distance between the particles.

(C) 氣體分子對器壁的碰撞屬於彈性碰撞。

Gas particles collide with the walls of the container in elastic collisions.

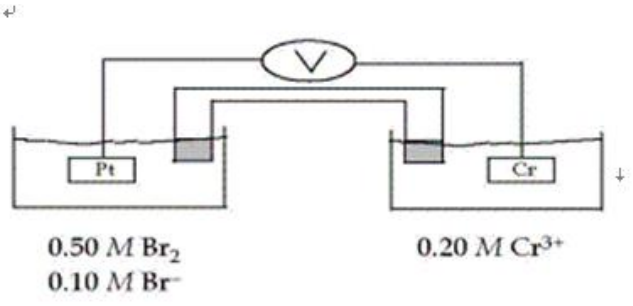
(D) 氣體的平均速度與絕對溫度成正比。

The average velocity of gas particles is directly proportional to the absolute temperature.

(E) 已上皆是。None of these.

31. 以下為伏打電池組成的圖示(各半電池組成如下).

Consider the galvanic cell shown below (the contents of each half-cell are written beneath each compartment).



標準還原電位 (The standard reduction potentials are as follows):

$Cr^{3+} + 3e^- \rightarrow Cr(s)$ $\quad E^o = -0.73V$

$Br_2(aq) + 2e^- \rightarrow 2Br^-$ $\quad E^o = +1.09V$

根據此電池敘述，下列何者為非?

Which of the following statement about this cell is false?

(A) 電子流經由 Cr 電極到 Pt 電極。

Electrons flow from the Cr electrode to the Pt electrode.

(B) 電子流經由 Pt 電極到 Cr 電極。

Electrons flow from the Pt electrode to the Cr electrode.

(C) 還原反應發生在 Pt 電極。

Reduction reaction occurs at the Pt electrode.

(D) 這電池不在標準狀態。

The cell is not at standard condition.

(E) 鹽橋上的陽離子進入左邊的半電池，而陰離子進入右邊的半電池形成完整的迴路。

To complete the circuit, cations migrate into the left half-cell and anions migrate into the right half-cell from the salt bridge.

32. HBr(g)的偶極矩為: 0.792D, 鍵長為 1.5×10^{-8} cm, H-Br 鍵的離子性占多少百分比?

The dipole moment of HBr(g) is 0.792D and the bond length is 1.5×10^{-8} cm. What is the percentage of the ionic character of H-Br bond?

(Note: e =1.6×10^{-19} C, D= 3.336×10^{-30} C.m)

(A) 8%　(B) 11%　(C)21%　(D)28%　(E)35%

33. 下列哪一個水溶液可與同體積的 0.1 mol L^{-1} NH_3(aq) 會產生緩衝溶液?

Which one of the following aqueous solutions, when mixed with an equal volume of 0.10 mol L^{-1} aqueous NH_3, will produce a buffer solution?

(A) 0.10 mol L^{-1} HCl　(B) 0.20 mol L^{-1} HCl

(C) 0.10 mol L^{-1} CH_3COOH　(D) 0.05 mol L^{-1} NaOH

(E) 0.20 mol L^{-1} NH_4Cl.

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34. $PdCl_2$ 的溶解度為: 0.45 g/100 mL，試求其 *K*sp？$PdCl_2$ 的分子量為 177.33 g/mol。
The solubility of Palladium(II) chloride is 0.45 g/100 mL of solution. What is the *K*sp of $PdCl_2$? Given that molar mass of $PdCl_2$ is 177.33 g/mol.
(A) 4.9×10^{-2} (B) 1.7×10^{-5} (C) 8.5×10^{-6} (D) 4.2×10^{-6} (E) $<1 \times 10^{-6}$

35. 實驗桌上有三瓶試藥，只知其為氯化鈉、碘化鈉及碳酸鈉，但因標籤脫落，難以辨識。陳同學从三瓶中各取出少許，分別置入 A、B、C 三隻試管，再以鹽酸溶液及硝酸鉛溶液進行檢驗，所得結果如下表所示:
The three bottles containing of NaCl, NaI, and Na_2CO_3 have lost their labels. In order to identify the chemicals in these bottles, small amount of chemicals from each bottle is put in the test tubes A, B, and C, respectively, and tested with HCl and $Pb(NO_3)_2$ solutions, respectively. The test results are shown in the following table.

試劑 (reagent)	試管 A (tube A)	試管 B (tube B)	試管 C (tube C)
鹽酸溶液 HCl solution	無色 colorless	無色 colorless	產生氣泡 producing gas
硝酸鉛溶液 $Pb(NO_3)_2$ solution	黃色沈澱 yellow precipitate	白色沈澱 white precipitate	白色沈澱 white precipitate

根據其檢驗結果，試問 A、B、C 三試管所含的物質依序為何?
Based on the experimental results, what are the chemicals in tubes A, B, and C, respectively?

(A) 碘化鈉 (NaI)、氯化鈉 (NaCl)、碳酸鈉 (Na_2CO_3)
(B) 氯化鈉 (NaCl)、碘化納 (NaI)、碳酸鈉 (Na_2CO_3)
(C) 碳酸鈉 (Na_2CO_3)、碘化納 (NaI)、氯化鈉 (NaCl)
(D) 碘化鈉 (NaI)、碳酸鈉 (Na_2CO_3)、氯化鈉 (NaCl)
(E) 碳酸鈉 (Na_2CO_3)、氯化鈉 (NaCl)、碘化鈉 (NaI)