

每題 5 分 注意! 背面仍有試題

- Which of the following is a state function?
a) work b) heat c) enthalpy d) specific heat capacity.
- Given that ΔH_f° of $\text{CaCO}_{3(s)}$ is -1206.9 kJ/mol ; ΔH_f° of $\text{CaO}_{(s)}$ is -635.1 kJ/mol and ΔH_f° of $\text{CO}_{2(g)}$ is -393.5 kJ/mol . Calculate the ΔH_{rxn}° for the decomposition of calcium carbonate to calcium oxide and carbon dioxide.
 $\text{CaCO}_{3(s)} \rightarrow \text{CaO}_{(s)} + \text{CO}_{2(g)}$
a) -2235.5 kJ b) -178.3 kJ c) 178.3 kJ d) 2235.5 kJ
- The shape of an atomic orbital is associated with
a) the principle quantum number (n) b) the azimuthal quantum number (l)
c) the magnetic quantum number (m_l) d) the spin quantum number (m_s)
- An element with the electron configuration [noble gas] $ns^2(n-1)d^8$ has how many valence electrons?
a) 2 b) 6 c) 8 d) 10
- Which of the following materials is most acidic?
a) SO_2 b) Al_2O_3 c) CaO d) PbO
- Which of the following atoms will be diamagnetic?
a) Cr b) Ru c) Cd d) Pt
- Select the most polar bond
a) C-O b) Si-F c) Cl-F d) C-F
- Which of the following exhibit resonance?
a) CO_2 b) ClO_3^- c) COCl_2 d) NO_2^+
- What is the molecular shape of ClF_4^- as predicted by the VSEPR theory?
a) square pyramidal b) square planar c) tetrahedral d) octahedral
- A metal such as chromium in the body-centered cubic lattice will have how many atom(s) per unit cell?
a) 1 b) 2 c) 3 d) 4
- To determine whether the data available corresponds to a second order rate expression, which of the following plots will yield a straight line? $[A]$ is the concentration and t is time. a) $[A]$ vs $1/t$ b) $1/[A]$ vs t c) $[A]^2$ vs t d) $\ln[A]$ vs t .
- What is the name of the coordination compound $\text{Na}_2\text{Mn}(\text{C}_2\text{O}_4)_3$?
a) disodium tri(oxalate)manganese(IV) b) sodium tri(oxalate)manganese (IV)
c) disodium trioxalatomanganate(II) d) sodium tris(oxalato)manganese(IV)

(背面仍有題目，請繼續作答)

13. A 0.050 M solution of a weak acid HA has $[H_3O^+] = 3.77 \times 10^{-4} M$. What is the K_a for the acid?
a) $7.5 \times 10^{-3} M$ b) $2.8 \times 10^{-6} M$ c) $7.0 \times 10^{-8} M$ d) $2.6 \times 10^{-13} M$
14. Nitrogen dioxide, NO_2 , is a) paramagnetism b) diamagnetism c) ferromagnetism
antiferromagnetism.
15. When 0.1 mole of sodium sulfide, Na_2S , is added to 1.00 L. of water. Which of the following statement is correct?
a) The solution is basic b) the solution is acidic c) the solution is neutral d) The values for K_a and K_b for the species in solution must be known before a prediction can be made.
16. Which of the following has the highest acid/base buffer capacity?
a) 0.10 M $H_2PO_4^-$ /0.10 M HPO_4^{2-} b) 0.50 M $H_2PO_4^-$ /0.10 M HPO_4^{2-}
c) 0.10 M $H_2PO_4^-$ /0.50 M HPO_4^{2-} d) 0.50 M $H_2PO_4^-$ /0.50 M HPO_4^{2-}
17. A change in pH will affect the solubility of which of the following compounds?
a) BaF_2 b) $CuCl$ c) $CuBr$ d) AgI
18. For a chemical reaction to be spontaneous only at high temperatures, which of the following conditions must be met?
a) $\Delta S^\circ_{rxn} > 0, \Delta H^\circ_{rxn} > 0$ b) $\Delta S^\circ_{rxn} > 0, \Delta H^\circ_{rxn} < 0$ c) $\Delta S^\circ_{rxn} < 0, \Delta H^\circ_{rxn} < 0$
d) $\Delta S^\circ_{rxn} < 0, \Delta H^\circ_{rxn} > 0$
19. An electrochemical cell consists of two Al/Al^{3+} electrodes. The electrolytes in compartment A is 0.050 M $Al(NO_3)_3$ and in compartment B is 1.25 M $Al(NO_3)_3$. What is the voltage of the cell?
a) 0.083 V b) 0.062 V c) 0.041 V d) 0.028 V
20. Compounds of Sc^{3+} are not colored, but those of Ti^{3+} and V^{3+} are colored. Why?