

本試卷含三大試題，各有若干小題，且各有不同配分。

將每一小題的題號和正確答案(A, B, 或 C)，依照次序寫在答案紙上

一、每小題 2 分，共 58 分

- Which ion is larger? [A] Na^+ or [B] F^- ?
- Which atom is larger? [A] Na, or [B] Mg ?
- Which atom has the larger electron affinity? [A] Si, or [B] P ?
- Which shape is found for XeF_2 ? [A] linear, or [B] bent ?
- How many resonance structures are necessary to account for the fact that the three C-O bonds in CO_3^{2-} are equivalent? [A] 1, [B] 2, or [C] 3 ?
- Which atom has a possible formal charge of -2 in one resonance form for ONC^- ? [A] O, [B] N, or [C] C ?
- Which bond angle, $\angle\text{O-N-O}$, is larger? [A] NO_2^+ , [B] NO_2 , or [C] NO_2^- ?
- How many unpaired electrons are in an oxygen molecule? [A] 0, [B] 2, or [C] 4 ?
- Which species has a higher bond order for the N-O bond? [A] NO^+ , [B] NO , or [C] NO^- ?
- Which is a p-type semiconductor? [A] As-doped Ge, [B] Ga-doped Ge, or [C] Si-doped Ge?
- Which species is an oxidizing agent from the following equation? [A] Li, [B] H_2 , [C] LiH ?

$$\text{Li} + \text{H}_2 \longrightarrow \text{LiH}$$
- What is the best description for NiI_2 ? [A] an ionic compound, or [B] a covalent compound ?
- Which is an organometallic compound? [A] $[\text{Ni}(\text{CO}_3)_2]^{2-}$, [B] $[\text{Ni}(\text{CN})_4]^{2-}$, or [C] $[\text{Ni}(\text{CO})_4]$?
- Which species is more basic in water? [A] B_2O_3 , [B] Al_2O_3 , or [C] Cl_2O_3 ?
- Which species is more acidic in water? [A] Ag^+-OH_2 , or [B] Na^+-OH_2 ?
- Which ionic solid has the higher thermal stability? [A] MgCO_3 , or [B] CaCO_3 ?
- Which anion can stabilize $\text{Ag}(\text{II})$? [A] F^- , [B] Cl^- , or [C] Br^- ?
- Which ionic solid has a higher solubility in water? [A] $\text{Mg}(\text{OH})_2$, or [B] $\text{Ba}(\text{OH})_2$?
- Which molecule has a symmetry element of σ_h ? [A] SO_4^{2-} , [B] SO_3^{2-} , or [C] SO_2 ?
- Which molecule belongs to a point group of D_{nd} ? [A] $(\text{C}_5\text{H}_5)_2\text{Fe}$ (staggered form), [B] $(\text{C}_5\text{H}_5)_2\text{Fe}$ (eclipsed form), or [C] C_5H_5^- ?
- Which species has an inversion symmetry element, i ? [A] CO_2 , [B] BF_3 , or [C] SO_4^{2-} ?

(背面仍有題目,請繼續作答)

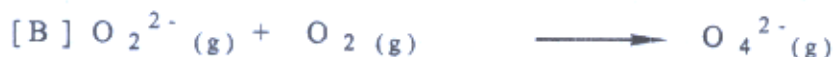
22. Which species of the following equation is a base? [A] HClO_4 , [B] $\text{CH}_3\text{CO}_2\text{H}$, or [C] $\text{CH}_3\text{C}(\text{OH})_2^+$?



23. Which ion has a stronger proton affinity? [A] F^- , [B] HS^- , or [C] NH_2^- ?
24. After dissolving HClO_4 in water, which species is an acid in water? [A] HClO_4 , [B] H_3O^+ , or [C] H_2O ?
25. Which complex has a higher magnetic moment? [A] $[\text{Fe}(\text{CN})_6]^{4-}$, or [B] $[\text{Fe}(\text{OH}_2)_6]^{3+}$?
26. Which ion is expected to form a stronger complex with EDTA^{4-} ? [A] Fe^{3+} , or [B] Fe^{2+} ?
27. Which ion has a stronger acidity? [A] $[\text{Fe}(\text{OH}_2)_6]^{2+}$, or [B] $[\text{Fe}(\text{OH}_2)_6]^{3+}$?
28. Which species is not stable probably? [A] $[(\text{C}_5\text{H}_5)_2\text{TiCl}_2]$, [B] $[(\text{C}_5\text{H}_5)_2\text{MoCl}_2]$, or [C] $[(\text{C}_5\text{H}_5)_2\text{NiCl}_2]$?
29. What is the best description for the CN group, considering the pK_a values of 4 for HOCN and 14 for H_2O ? [A] electron donating, [B] electron withdrawing, or [C] neither?

二, 每小題 3 分, 共 18 分

30. Which reaction is not favorable, based on the bond dissociation energy of each involved bond?



31. Which ion has a deeper color due to the d-d transition? [A] KMnO_4 , or [B] KMnCl_4 ?
32. Which reaction gives a higher proportion of HD? [A] $\text{D}_2\text{O} + \text{NaH}$, or [B] electrolysis of HDO?
33. Which is most likely to undergo radical reactions? [A] Me_3SiH , or [B] Me_3SnH ?
34. Which two compounds are in different structures? [A] NiCl_4^{2-} and $\text{Ni}(\text{CO})_4$, [B] NiCl_4^{2-} and $\text{Ni}(\text{CN})_4^{2-}$, or [C] CH_4 and $\text{Ni}(\text{CO})_4$?
35. for the reaction below:
- $$\text{R}_3\text{P}-\text{BBr}_3 + \text{R}_3\text{N}-\text{BF}_3 \rightleftharpoons \text{R}_3\text{P}-\text{BF}_3 + \text{R}_3\text{N}-\text{BBr}_3$$

How large is the equilibrium constant, K_{eq} ? [A] $K_{\text{eq}} > 1$, [B] $K_{\text{eq}} = 1$, or [C] $K_{\text{eq}} < 1$?

三, 每小題 4 分, 共 24 分

36. The fact that the supramolecular complex of $[\text{Na}^+ \subset [2,2,2]\text{cryptand}]$ is more stable than that of $[\text{Na}^+ \subset [18]\text{-crown-6}]$, is due to [A] chelate effect, [B] macrocyclic effect, or [C] macrobicyclic effect ?
37. Which ion is isolobal to NH_3 ? [A] $[\text{Mn}(\text{CO})_5]^-$, or [B] $[\text{MnO}_4]^-$?
38. How many isomers can be found for an empirical formula of $[\text{PtCl}_2(\text{NH}_3)_2]$? [A] 1, [B] 2, or [C] 4 ?
39. Which NMR spectroscopy is used to distinguish between the cis and trans isomers of $[\text{W}(\text{CO})_4(\text{PMe}_3)_2]$? [A] ^{31}P NMR, [B] ^{13}C NMR, or [C] ^{183}W NMR ?
40. How many isomers can be found for $[\text{Pt}(\text{NH}_3)_2(\text{Py})_2\text{Cl}_2]$? [A] 3 geometric isomers and 3 optical isomers, [B] 4 geometric isomers and 2 optical isomers, [C] 5 geometric isomers and 1 optical isomer ?
41. What is the ground-state term for an atom with d^3 configuration? [A] ^4P , [B] ^4D , or [C] ^4F ?