

# 東海大學 104 學年度碩士班招生考試試題

科目：無機化學

應考系組：化學系化學組

編號：22122

考試日期：104 年 03 月 08 日 第 2 節

使用計算機：

共 3 頁，第 1 頁

單選題共 30 題，每題 3 分

1. Which of the following one is not a *d*-block element? (a)Ti (b)Ru (c)Tl (d)Au
2. What are the symbols for elements manganese and gadolinium? (a)Ti, Ga (b)Mg, Ca (c)Mn, Kr (d)Mn, Gd
3. The valence electron configuration of the alkali metal is? (a) $np^1$  (b) $ns^1$  (c) $nd^1$  (d)  $np^6$
4. Which of the following substance has the highest boiling point? (a)He (b)Ne (c) Kr (d)Xe
5. Which of the following substance has the largest atomic radius? (a)He (b)Ne (c) Kr (d)Xe
6. Which of the following substance has the largest electron negativity? (a)Na (b)Mg (c)Al (d)Cl
7. Which of the following substance has the largest of the first ionization energy? (a)Na (b)Mg (c)Al (d)Cl
8. Which of the following substance exhibits the weakest intermolecular interaction? (a)NH<sub>3</sub> (b)HF (c)H<sub>2</sub>O (d)CH<sub>4</sub>
9. Which one of the following sets of atomic quantum numbers (*n*, *l*, *m<sub>l</sub>*, *m<sub>s</sub>*) is unacceptable? (a)(4, 3, -1, 1/2) (b)(3, 0, 1, -1/2) (c)(3, 0, 0, 1/2) (d)(2, 1, 1, -1/2)
10. Which of the following molecules has the smallest bond angle? (a)H<sub>2</sub>O (b)H<sub>2</sub>S (c)H<sub>2</sub>Se (d)H<sub>2</sub>Te
11. Which of the following ion contains the most unpaired electron? (a)V<sup>4+</sup> (b)O<sub>2</sub> (c)Cu<sup>+</sup> (d)Cr<sup>3+</sup>
12. Select the correct order of atomic (ionic) radius for the following series? (a)Cu<sup>2+</sup> > Cu<sup>+</sup> > Cu (b)O > O<sup>-</sup> > O<sup>2-</sup> (c)V<sup>3+</sup> > V<sup>2+</sup> > V (d)Cs<sup>+</sup> > Rb<sup>+</sup> > K<sup>+</sup> > Na<sup>+</sup>
13. Select the correct order of lattice energy for the following series of substances? (a)KCl > NaCl (b)LiF > LiCl (c)Fe(OH)<sub>2</sub> > Fe(OH)<sub>3</sub> (d)NaCl > Na<sub>2</sub>O
14. Which of the following molecules or ions does NOT have a linear structure? (a)N<sub>3</sub><sup>-</sup> (b)HCN (c)H<sub>2</sub>O (d)CO<sub>2</sub>
15. Which of the following species has "square planar" geometry? (a)XeF<sub>4</sub> (b)SF<sub>4</sub> (c)H<sub>2</sub>O (d)CO<sub>2</sub>
16. Which of the following point groups does not exist? (a)C<sub>1</sub> (b)S<sub>5</sub> (c)D<sub>3</sub> (d)O<sub>h</sub>

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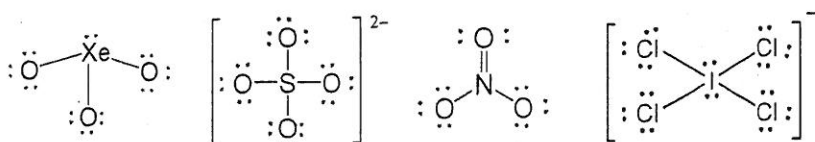
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17. Which of following substance exhibits the strongest acid strength in aqueous solution? (a)H<sub>2</sub>O (b)H<sub>2</sub>S (c)H<sub>2</sub>Se (d)H<sub>2</sub>Te
18. Which of following substance exhibits the strongest base strength in aqueous solution? (a)HO<sup>-</sup> (b)HS<sup>-</sup> (c)HSe<sup>-</sup> (d)HTe<sup>-</sup>
19. Which central atom of following substance shows the highest oxidation state? (a)(NH<sub>4</sub>)MnO<sub>4</sub> (b)(NH<sub>4</sub>)VO<sub>3</sub> (c)(NH<sub>4</sub>)<sub>2</sub>CrO<sub>4</sub> (d)MnCl<sub>3</sub>
20. Which of following substance belongs to C<sub>2v</sub> point group? (a)H<sub>2</sub>O (b)CO<sub>2</sub> (c)XeF<sub>4</sub> (d)SF<sub>6</sub>
21. Which of following one is the ground state of electron congregation of aluminium? (a)1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>2</sup>3p<sup>2</sup> (b)1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>2</sup>3p<sup>6</sup>4s<sup>2</sup>3d<sup>10</sup>4p<sup>1</sup> (c)[Ne]3s<sup>2</sup>3p<sup>6</sup>4s<sup>2</sup>3d<sup>10</sup> (d)[Ne]3s<sup>2</sup>3p<sup>1</sup>
22. Which of following substance is paramagnetism? (a)H<sub>2</sub> (b)N<sub>2</sub> (c)B<sub>2</sub> (d)O<sub>2</sub>
23. Which central atom of following substance shows the dsp<sup>3</sup> hybridization? (a)SF<sub>6</sub> (b)I<sub>3</sub><sup>-</sup> (c)XeF<sub>4</sub> (d)CO<sub>2</sub> (e)BF<sub>4</sub><sup>-</sup>
24. Which of following substance exhibits the strongest bond energy? (a) B<sub>2</sub> (b)O<sub>2</sub> (c)NO (d)CN<sup>-</sup>
25. Which of following one belongs to D<sub>∞h</sub> point group? (a)H<sub>2</sub>O (b)CO<sub>2</sub> (c)XeF<sub>4</sub> (d)SF<sub>6</sub>
26. Which of following substance has the largest bond order? (a)CN<sup>-</sup> (b)O<sub>2</sub> (c)ON (d)B<sub>2</sub>
27. Which of following substance exhibits the longest bond distance? (a) N<sub>2</sub> (b)B<sub>2</sub> (c)NO<sup>+</sup> (d)O<sub>2</sub>
28. Which of following substance belongs to D<sub>4h</sub> point group? (a)H<sub>2</sub>O (b)CO<sub>2</sub> (c)XeF<sub>4</sub> (d)SF<sub>6</sub>
29. Which of following substance shows the lowest solubility in aqueous solution? (a)AgI (b)AgBr (c)AgCl (d)AgF
30. Which central atom of following substance shows the highest formal charge? (a)Xe (b)S (c)N (d)I



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問答題共 5 題，每題 2 分

Determine the point group for each of the following species:

1.  $\text{HClBrC-CHClBr}$  (staggered form)
2. Biphenyl (with  $30^\circ$  of dihedral angle)
3.  $\text{BrF}_5$
4.  $\text{PCl}_3$

5.

