

**綠色能源科技學系碩士班**

國立臺南大學106學年度 　 　　　　　　　　 招生考試 普通化學 試題卷

一、選擇題(15題，每題4分，共60分)

1. What does "X" represent in the following symbol?

 (A) tin

 (B) copper

 (C) palladium

 (D) niobium

 (E) uranium

2. Which of the following statements is FALSE?

 (A) Halogens are very reactive elements.

 (B) The alkali metals are fairly unreactive.

 (C) Sulfur is a main group element.

 (D) Noble gases do not usually form ions.

 (E) Zn is a transition metal.

3. An ionic bond is best described as

 (A) the sharing of electrons

 (B) the transfer of electrons from one atom to another

 (C) the attraction that holds the atoms together in a polyatomic ion

 (D) the attraction between 2 nonmetal atoms

 (E) the attraction between 2 metal atoms

4. Identify the compound with covalent bonds.

 (A) CH4

 (B) Ne

 (C) KBr

 (D) Mg

 (E) NaCl

5. Two samples of calcium fluoride are decomposed into their constituent elements. The first sample produced 0.154 g of calcium and 0.146 g of fluorine. If the second sample produced 294 mg of fluorine, how many g of calcium were formed?

 (A) 0.280 g

 (B) 3.09 × 102 g

 (C) 3.13 g

 (D) 0.309 g

 (E) 2.80 × 102 g

6. HCl , HI , H2SO4, Li Cl , and KI are all classified as

 (A) acids

 (B) nonelectrolytes

 (C) strong electrolytes

 (D) weak electrolytes

7. Which of the following is TRUE if ΔEsys = - 95 J?

 (A) The system is gaining 95 J, while the surroundings are losing 95 J.

 (B) The system is losing 95 J, while the surroundings are gaining 95 J.

 (C) Both the system and the surroundings are gaining 95 J.

 (D) Both the system and the surroundings are losing 95 J.

 (E) None of the above are true.

8. When 0.455 g of anthracene, C14H10, is combusted in a bomb calorimeter that has a water jacket containing 500.0 g of water, the temperature of the water increases by 8.63°C. Assuming that the specific heat of water is 4.18 J/(g∙°(C), and that the heat absorption by the calorimeter is negligible, estimate the enthalpy of combustion per mole of anthracene.

 (A) +39.7 kJ/mol

 (B) -39.7 kJ/mol

 (C) -7060 kJ/mol

 (D) -8120 kJ/mol

9. Identify the color that has a wavelength of 460 nm.

 (A) blue

 (B) green

 (C) red

 (D) yellow

10. Give the set of four quantum numbers that represent the last electron added (using the Aufbau principle) to the Zn atom.

 (A) n = 4, l = 3, ml = 3, ms = -

 (B) n = 3, l = 2, ml = 2, ms = -

 (C) n = 3, l = 1, ml = 1, ms = +

 (D) n = 3, l = 3, ml = 2, ms = -

 (E) n = 4, l = 2, ml = 0, ms = +

11. Choose the compound below that should have the highest melting point according to the ionic bonding model.

 (A) AlN

 (B) MgO

 (C) NaF

 (D) CaS

 (E) RbI

12. Consider the molecule below. Determine the molecular geometry at each of the 2 labeled carbons.

 

(A) C1 = tetrahedral, C2 = linear

 (B) C1 = trigonal planar, C2= bent

 (C) C1 = bent, C2 = trigonal planar

 (D) C1 = trigonal planar, C2 = tetrahedral

 (E) C1 = trigonal pyramidal, C2 = see-saw

13. Place the following in order of **decreasing** X-A-X bond angle, where A represents the central atom and X represents the outer atoms in each molecule.

 N2O NCl3 NO2⁻

 (A) NCl3 > NO2⁻ > N2O

 (B) NO2⁻ > N2O > NCl3

 (C) N2O > NO2⁻ > NCl3

 (D) NCl3 > N2O > NO2⁻

 (E) N2O > NCl3 .> NO2⁻

14. Place the following compounds in order of **increasing** strength of intermolecular forces.

 CO2 F2 NH2CH3

 (A) NH2CH3 < CO2 < F2

 (B) F2 < NH2CH3 < CO2

 (C) NH2CH3 < F2 < CO2

 (D) F2 < CO2 < NH2CH3

 (E) CO2 < NH2CH3 < F2

15. Name the following: [Pt(H2O)4F2]Br2

(A) tetraaquadifluoroplatinum(IV) bromide

(B) tetraaquadibromodifluoroplantinate

(C) platinum(II)bromide

(D) platinum(III)tetraaquadifluorobromide

(E) platinum (II) dibromodifluorotetrahydride

二、簡答題(4題，每題10分，共40分)

1. Use the VSEPR theory to calculate the bond angle of A-X-A for the following molecules if all electrons on A are forming bonds with X atoms and there is no lone pair:

(A) A2X

(B) A3X

(C) A4X

2. How many 2*p* electrons are in an atom of each element?

(A) C

(B) F

(C) P

3. Determine whether each redox reaction occurs spontaneously in the forward

 direction.

(A) Fe(*s*) + Cu2+(*aq*) → Fe2+(*aq*) + Cu(*s*) (5%)

(B) Pb(*s*) + Mg2+(*aq*) → Pb2+(*aq*) + Mg(*s*) (5%)

4. Classify each process as exothermic or endothermic?

(A) ice melting

(B) a sparkler burning

(C) acetone evaporating from skin