國立高雄大學九十七學年度研究所碩士班招生考試試題

系所：

科目：普通化學　　應用化學系碩士班　　是否使用計算機：是

考試時間：100 分鐘　　生物科技研究所碩士班乙組

本科原始成績：100 分

共二十題選擇題，答對每題五分。

(註: 請於考試試卷第一頁依下列格式標示答案，否則不予計分。)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1. In balancing an equation, we change the _____ to make the number of atoms on each side of the equation balance.

   a) formulas of compounds in the reactants　　b) coefficients of compounds

   c) formulas of compounds in the products　　d) subscripts of compounds

   e) none of these

2. The limiting reagent in a reaction

   a) has the lowest coefficient in a balanced equation.

   b) is the reactant for which you have the fewest number of moles.

   c) has the lowest ratio of moles available/ coefficient in the balanced equation.

   d) has the lowest ratio of coefficient in the balanced equation/ moles available.

   e) none of these

3. In the following reaction, which species is oxidized?

   $$8NaI + 5H_2SO_4 \rightarrow 4I_2 + H_2S + 4Na_2SO_4 + 4H_2O$$

   a) sodium　　b) iodine　　c) sulfur

   d) hydrogen　　e) oxygen

4. The following reaction occurs in aqueous acid solution: $NO_3^- + I^- \rightarrow IO_{3-} + NO_2$. The oxidation state of iodine in IO_3^- is:

   a) 0　　b) +3　　c) -3　　d) +5　　e) -5

背面尚有試題

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5. Which conditions of P, T, and n, respectively, are most ideal?

a) high P, high T, high n　　b) low P, low T, low n

c) high P, low T, high n　　d) low P, high T, high n

e) low P, high T, low n

6. Which of the following statements correctly describes the signs of q and w for the following exothermic process at $P = 1$ atm and $T = 370$ K?

$$H_2O(g) \rightarrow H_2O(l)$$

a) q and w are negative.　　b) q is positive, w is negative.

c) q is negative, w is positive.　　d) q and w are both positive.

e) q and w are both zero.

7. Two metals of equal mass with different heat capacities are subjected to the same amount of heat. Which undergoes the smallest change in temperature?

a) The metal with the higher heat capacity.

b) The metal with the lower heat capacity.

c) Both undergo the same change in temperature.

d) You need to know the initial temperatures of the metals.

e) You need to know which metals you have.

8. Which form of electromagnetic radiation has the longest wavelengths?

a) gamma rays　　b) microwaves　　c) radio waves

d) infrared radiation　　e) x-rays

9. In Bohr's atomic theory, when an electron moves from one energy level to another energy level more distant from the nucleus

a) energy is emitted.　　b) energy is absorbed.

c) no change in energy occurs.　　d) light is emitted.

e) none of these

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10. Atoms with very similar electronegativity values are expected to form

a) no bonds.　b) covalent bonds.　c) triple bonds.

d) ionic bonds.　e) none of these

11.In which pair do both compounds exhibit predominantly ionic bonding?

a) PCl_5 and HF　b) Na_2SO_3 and BH_3　c) KI and O_3

d) NaF and H_2O　e) RbCl and CaO

12. Which of the following has the smallest radius?

a) Br^-　b) S^{2-}　c) Xe　d) Ca^{2+}　e) Kr

13. The hybridization of the central atom in XeF_5^+ is:

a) sp　b) sp^2　c) sp^3　d) dsp^3　e) d^2sp^3

14. On a relative basis, the weaker the intermolecular forces in a substance,

a) the greater its heat of vaporization.

b) the more it deviates from ideal gas behavior.

c) the greater its vapor pressure at a particular temperature.

d) the higher its melting point.

e) none of these

15. A certain solid substance that is very hard, has a high melting point, and is nonconducting unless melted is most likely to be:

a) I_2　b) NaCl　c) CO_2　d) H_2O　e) Cu

16.When a substance dissolves in water, heat energy is released if:

a) the lattice energy is positive.

b) the hydration energy is positive.

c) the hydration energy is greater than the lattice energy.

d) the hydration energy is negative.

e) none of these (a-d)

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17. For which order reaction is the half life of the reaction proportional to 1/ k (k is the rate constant)?

a) zero order　b) first order　c) second order

d) all of these　e) none of these

18. Which of the following statements concerning equilibrium is not true?

a) A system that is disturbed from an equilibrium condition responds in a manner to restore equilibrium.

b) Equilibrium in molecular systems is dynamic, with two opposing processes balancing one another.

c) The value of the equilibrium constant for a given reaction mixture is the same regardless of the direction from which equilibrium is attained.

d) A system moves spontaneously toward a state of equilibrium.

e) The equilibrium constant is independent of temperature.

19. The hydrogen halides (HF, HCl, HBr, and HI) are all polar molecules. The strength of the acid each forms in water is based on which of the following?

a) the polarity of the molecule

b) the size of the molecule

c) the strength of the bond

d) two of these

e) none of these

20. The second law of thermodynamics states that

a) the entropy of a perfect crystal is zero at 0 K.

b) the entropy of the universe is constant.

c) the energy of the universe is increasing.

d) the entropy of the universe is increasing.

e) the energy of the universe is constant.