國立屏東大學106學年度日間學士班轉學考試

普通化學 試題

（應用化學系學士班）

＊注意事項：
（1）本試題共 4 頁。
（2）不必抄題，但請依序將題號標出，並寫在答案紙上，否則不予計分。

一、是非題，答案若為「是」答「○」，答案若為非「非」答「╳」(每題 4 分，共 20 分)

1. Lewis structures only use the valance electrons in determining the bonding.
2. Atomic solids, such as graphite, have a weak dispersion force holding them together.
3. A supersaturated solution is unstable and crystallization usually occurs.
4. The burning of fossil fuels produces nitrogen and sulfur oxides which can react to form acid rain (nitric and sulfuric acids).
5. When dynamic equilibrium is achieved, the rate of the forward and backward reactions go to zero.

二、選擇題(每題 3 分，共 60 分)

1.Bromine exists naturally as a mixture of bromine-79 and bromine-81 isotopes. An atom of bromine-79 contains

(A) 35 protons, 44 neutrons, 35 electrons (B) 34 protons and 35 electrons, only
(C) 44 protons, 44 electrons, and 35 neutrons (D) 35 protons, 79 neutrons, and 35 electrons

2. What is the molar mass of ethanol (C_2H_5OH)?

(A) 45.06 g/mol (B) 34.06 g/mol (C) 46.07 g/mol (D) 30.03 g/mol

3. Which of the following is a strong acid?

(A) HF (B) KOH (C) $HClO_4$ (D) HClO

4. Boyle's law states that:

(A) Equal amounts of gases occupy the same volume at constant temperature and pressure.
(B) The volume of a fixed amount of gas is inversely proportional to its pressure at constant temperature.
(C) The volume of a fixed amount of gas is directly proportional to its temperature in Kelvin at constant pressure.
(D) The total pressure of a mixture of gases is the simple sum of the partial pressure of all of the gaseous compounds.

5. In which case is the bond polarity *incorrect?*

(A) $^{\delta+}$H–F$^{\delta-}$ (B) $^{\delta+}$K–O$^{\delta-}$ (C) $^{\delta+}$Mg–H$^{\delta-}$ (D)$^{\delta+}$Cl–I$^{\delta-}$

6. Which of the following molecules has no dipole moment?

(A) CO_2 (B) NH_3 (C) H_2O (D) all

7. The hybridization of the central atom in O_3 is:

(A) *sp* (B) sp^2 (C) sp^3 (D)dsp^3

8. How many milliliters of 15.7 *M* H_2SO_4 are needed to prepare 600.0 mL of 0.10 *M* H_2SO_4?

(A) 0.26 mL (B) 94 mL (C) 3.8 mL (D) 1.9 mL

9. In which of the following reactions does the $H_2PO_4^-$ ion act as an acid?

(A) $H_3PO_4 + H_2O \rightarrow H_3O^+ + H_2PO_4^-$ (B) $H_2PO_4^- + H_2O \rightarrow H_3O^+ + HPO_4^{2-}$

(C) $H_2PO_4^- + OH^- \rightarrow H_3PO_4 + O^{2-}$ (D) The ion cannot act as an acid.

10. Name the following:

$CH_3–(CH_2)_6–CH_3$

(A) pentane (B) hexane (C) heptane (D) octane

11. Which of the following items is a chemical property?

(A) the paint color on a new red corvette (B) the odor of spearmint gum

(C) the melting and boiling point (D) the tarnishing of a copper statue

(E) none of the above

12. What is the formula for the phosphate polyatomic ion?

(A) PO_3^{4-} (B) PO_4^{3-} (C) PO_4^{1-} (D) PhO^{3-} (E) none of the above

13. Which of the following statements is false?

(A) The limiting reagent is completely consumed in a chemical reaction.

(B) The theoretical yield is the amount of product that can be made based on the amount of limiting reagent.

(C) The actual yield is the amount of product actually produced by a chemical reaction.

(D) The percent yield = $\frac{\text{ActualYield}}{\text{TheoreticalYield}}$ x 100%

(E) All of the above are true statements.

14.What happens to an atom when it absorbs energy?
(A) The atom stores the energy for later use.
(B) The extra energy increases the speed of the electrons in their orbitals.
(C) The atom re-emits the energy as heat.
(D) The atom re-emits the energy as light.
(E) none of the above

15. The central atom in the chlorite anion, ClO_2^- is surrounded by
(A) one bonding and three unshared pairs of electrons.
(B) two bonding and two unshared pairs of electrons.
(C) two bonding and one unshared pair of electrons.
(D) two double bonds and no unshared pairs of electrons.
(E) none of the above

16. Increasing the intermolecular forces of a liquid will do which of the following?
(A) increase the viscosity (B) decrease the evaporation rate
(C) increase the surface tension (D) decrease the vapor pressure
(E) all of the above

17. If you prepare a solution by adding sufficient amount of solute so that after heating and cooling the solution there is a visible amount of solid solute left in the bottom of the beaker, the solution would be considered:
(A) unsaturated. (B) saturated. (C) supersaturated.
(D) thermally saturated. (E) none of the above

18. Which of the following is not an acid-base conjugate pair?
(A) H_2CO_3 and HCO_3^- (B) H_2O and OH^- (C) H_2S and OH^-
(D) NH_4^+ and NH_3 (E) none of the above

19. Balance the following half reaction in acid solution: $MnO_4^- \rightarrow Mn^{2+}$
(A) $MnO_4^- \rightarrow Mn^{2+} + 3e^-$ (B) $MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O$
(C) $MnO_4^- + 8\ H^+ \rightarrow Mn^{2+} + 4H_2O + 5e^-$ (D) $MnO_4^- + 8\ H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$
(E) none of the above

20. The rate of spontaneous nuclear decay:
(A) can be increased by increasing the temperature.
(B) can be increased by increasing the concentration of the radioactive element.
(C) is independent of concentration or temperature.
(D) can be increased by addition of a nuclear catalyst.
(E) all of the above

三、解釋名詞(每題5分，共5分)

equivalence point

四、問答題 (每題3分，共15分)

Write the Lewis structure for each molecule or ion.

a. ClF_3 b. XeO_3 c. $RnCl_2$ d. $BeCl_2$ e. ICl_4^-