

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) What would be the new pressure if a 400 mL gas sample at 380 mm Hg is expanded to 800 mL with no change in temperature? 1) _____
A) 950 mm Hg
B) 190 mm Hg
C) 380 mm Hg
D) 570 mm Hg
E) 760 mm Hg
- 2) A 250. mL sample of gas at 1.00 atm and 20.0°C has the temperature increased to 40.0°C and the volume increased to 500. mL. What is the new pressure? 2) _____
A) 0.468 atm B) 2.14 atm C) 1.87 atm D) 0.534 atm E) 0.374 atm
- 3) How many moles of gas are present in a 10.0 liter sample at STP? 3) _____
A) 22.4 moles
B) 2.24 moles
C) 224 moles
D) 0.446 moles
E) 10.0 moles
- 4) For the following reaction, if 11.2 L of nitrogen are reacted to form NH₃ at STP, How many liters of hydrogen will be required to completely consume all of the nitrogen? 4) _____
$$\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$$

A) 11.2 L B) 7.4 L C) 33.6 L D) 16.8 L E) 6.1 L
- 5) How many grams of N₂ are contained in an 11.2 liter sample at STP? 5) _____
A) 11.2
B) 7.00
C) 14.0
D) 6.02×10^{23}
E) 28.0
- 6) What volume will be occupied by 8.00 g of oxygen, O₂, at STP? 6) _____
A) 22.4 L B) 13.4 L C) 4.00 L D) 11.2 L E) 5.60 L
- 7) What is the total pressure of a mixture of He and H₂ if the partial pressures are 320 mm Hg and 800 mm Hg respectively? 7) _____
A) 40 mm Hg
B) 1120 mm Hg
C) 480 mm Hg
D) 60 mm Hg
E) 320 mm Hg

- 8) Which homogeneous mixture is opaque **and** has particles large enough to be filtered? 8) _____
A) solution
B) colloid
C) suspension
D) both colloids and suspensions
E) none of the above
- 9) Consider the following four liquids: 9) _____
1. **water**: highly polar; H-bonding
2. **hexanol**: slightly polar; some H-bonding
3. **chloroform**: slightly polar; no H-bonding
4. **octane**: non-polar; no H-bonding
Which pair of liquids is **immiscible**?
A) chloroform and octane
B) water and octane
C) water and hexanol
D) hexanol and chloroform
E) none of the above
- 10) In general, the solubility of _____ in water decreases as temperature increases. 10) _____
A) solids
B) gases
C) liquids
D) none of these
E) all of these
- 11) How many grams of NaOH are needed to make 750 mL of a 2.5% (w/v) solution? 11) _____
A) 19 g B) 20 g C) 7.5 g D) 50 g E) 3.9 g
- 12) What is the molarity of a solution prepared by dissolving 3.50 mol NaCl in enough water to make 1.50 L of solution? 12) _____
A) 5.25 M B) 137 M C) 2.33 M D) 87.8 M E) 0.429 M
- 13) How many grams of FeSO₄ are present in a 20.0 mL sample of a 0.500 M solution? 13) _____
A) 6.08 g B) 65.8 g C) 0.760 g D) 1.52 g E) 3.04 g
- 14) What is the final concentration of a solution prepared by adding water to 50.0 mL of 1.5 M NaOH to make 1.00 L of solution? 14) _____
A) 0.075 M B) 7.5 M C) 0.030 M D) 30 M E) 1.5 M
- 15) Considering 1.0 M solutions of each substance, which contains the largest concentration of ions? 15) _____
A) KCl B) K₂SO₄ C) NaOH D) NH₃ E) FeCl₃
- 16) After swimming in the ocean for several hours, the swimmers noticed that their fingers appeared to be very wrinkled or shriveled up. This is an indication that seawater is _____ relative to the fluid in cells. 16) _____
A) hypertonic B) hypotonic C) isotonic D) none of these

- 17) A process or reaction which takes in heat from the surroundings is said to be 17) _____
A) conservative.
B) endothermic.
C) exothermic.
D) endergonic.
E) isothermal.

- 18) $\text{N}_2 + \text{O}_2 \rightarrow 2 \text{NO} \quad \Delta H = 43.2 \text{ kcal}$ 18) _____

Based on the reaction shown, which statement is true?

- A) 43.2 kcal are consumed when 1.00 g of N_2 reacts.
B) 43.2 kcal are consumed when 1.00 g of O_2 reacts.
C) 43.2 kcal are consumed when 1.00 g of NO is produced.
D) 43.2 kcal are consumed when 1.00 mole of O_2 reacts.
E) 43.2 kcal are produced when 1.00 mole of NO is produced.
- 19) A rapid reaction is distinguished by 19) _____
A) being unaffected by catalysts.
B) having a large value of activation energy.
C) having a small value of activation energy.
D) having a large heat of reaction.
E) having a small heat of reaction.

- 20) Which of the following conditions characterizes a system in a state of chemical equilibrium? 20) _____
A) Reactants are being consumed at the same rate they are being produced
B) Reactant molecules no longer react with each other
C) Concentrations of reactants and products are equal
D) Rate of forward reaction has dropped to zero
E) Product concentrations are greater than reactant concentrations

- 21) $2 \text{SO}_2 (\text{g}) + \text{O}_2 (\text{g}) \rightleftharpoons 2 \text{SO}_3 (\text{g}) + \text{heat} \quad K = 4.8 \times 10^{27}$ 21) _____

Which statement about this system is **not** true?

- A) Adding SO_2 will cause an increase in the amount of SO_3 .
B) At equilibrium SO_3 is the predominant substance.
C) The large value of K means that the reaction essentially goes to completion.
D) Removing O_2 will cause an increase in the amount of SO_3 .
E) Heating the system will cause breakdown of SO_3 .

- 22) $\text{C}_5\text{H}_5\text{N} + \text{H}_2\text{CO}_3 \rightleftharpoons \text{C}_5\text{H}_6\text{N}^+ + \text{HCO}_3^-$ 22) _____

In the reaction shown, the conjugate acid of $\text{C}_5\text{H}_5\text{N}$ is _____.

- A) H_2CO_3 B) $\text{C}_5\text{H}_5\text{N}$ C) H_3O^+ D) $\text{C}_5\text{H}_6\text{N}^+$ E) HCO_3^-

- 23) Which net ionic equation correctly represents the neutralization of a solution of barium hydroxide by a solution of nitric acid? 23) _____
- A) $\text{Ba}^{2+} + 2 \text{NO}_3^- \rightarrow \text{Ba}(\text{NO}_3)_2$
B) $\text{Ba}(\text{NO}_3)_2 + \text{H}_2\text{O} \rightarrow \text{Ba}^{2+} + 2 \text{NO}_3^-$
C) $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
D) $\text{Ba}^{2+} + 2 \text{OH}^- \rightarrow \text{Ba}(\text{OH})_2$
E) $\text{H}^+ + \text{NO}_3^- \rightarrow \text{HNO}_3$
- 24) Acetic acid is a weak acid in water because it is 24) _____
- A) only slightly dissociated into ions.
B) completely dissociated into hydronium ions and acetate ions.
C) only slightly soluble.
D) unable to hold onto its hydrogen ion.
E) dilute.
- 25) Which one of the following is the weakest acid? 25) _____
- A) HF ($K_a = 6.8 \times 10^{-4}$) B) HCN ($K_a = 4.9 \times 10^{-10}$)
C) HNO_2 ($K_a = 4.5 \times 10^{-4}$) D) HClO ($K_a = 3.0 \times 10^{-8}$)
- 26) Which solution is basic? 26) _____
- A) $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-4}$
B) $[\text{OH}^-] = 1.0 \times 10^{-7}$
C) $[\text{OH}^-] = 1.0 \times 10^{-10}$
D) $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7}$
E) $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-10}$
- 27) If the concentration of OH^- in an aqueous solution is $1.4 \times 10^{-7} \text{ M}$, the concentration of H_3O^+ is 27) _____
- _____
- A) $7.1 \times 10^{-8} \text{ M}$
B) $1.0 \times 10^{-7} \text{ M}$
C) $1.3 \times 10^{-8} \text{ M}$
D) $7.1 \times 10^{+6} \text{ M}$
E) $1.4 \times 10^{-7} \text{ M}$
- 28) What is the pH of a solution in which $[\text{H}_3\text{O}^+] = 1.2 \times 10^{-3} \text{ M}$? 28) _____
- A) 1.20
B) 12.80
C) 11.08
D) 8.33×10^{-12}
E) 2.92

- 29) The pH of a cup of coffee is measured as 5.45. Express this measurement as $[H^+]$, using the correct number of significant figures. 29) _____
- A) $4 \times 10^{-6} M$
B) $2.82 \times 10^5 M$
C) $3.5 \times 10^{-6} M$
D) $3.55 \times 10^{-6} M$
E) $3.548 \times 10^{-6} M$
- 30) The pH of a 250. mL sample of a buffer solution is 9.85. If 1.0 mL of 6 M HCl is added, the pH of the resulting mixture is closest to 30) _____
- A) 1.65 B) 9.70 C) 7.00 D) 0.00 E) 10.00
- 31) How many mL of 0.100 M NaOH are needed to neutralize 24.0 mL of 0.150 M HCl? 31) _____
- A) 18.0 mL B) 48.0 mL C) 36.0 mL D) 12.0 mL E) 24.0 mL
- 32) Which compound produces an acidic solution when dissolved in water? 32) _____
- A) K_2SO_4 B) NH_4Cl C) KCl D) NaF E) $Ca(NO_3)_2$
- 33) Which is the best description of an alpha particle? 33) _____
- A) charge -1; mass of 0 amu; medium penetrating power
B) charge +2; mass of 4 amu; low penetrating power
C) charge 0; mass of 0 amu; high penetrating power
D) charge +2; mass of 4 amu; high penetrating power
E) charge -1; mass of 0 amu; high penetrating power
- 34) Which form of radiation is generally considered the most dangerous? 34) _____
- A) γ
B) α
C) β
D) positron
E) all of the above
- 35) Which product is formed by beta emission from phosphorus-32? The atomic number of phosphorus is 15. 35) _____
- A) $^{32}_{15}P$ B) $^{32}_{16}S$ C) $^{33}_{15}P$ D) $^{30}_{13}Al$ E) $^{28}_{13}Al$
- 36) Approximately how old is a fossil that contains 3.13% of its original carbon-14? The half-life of carbon-14 is 5730 years. 36) _____
- A) 28,700 years
B) 2870 years
C) 22,900 years
D) 5730 years
E) 11,500 years

37) A curie is

37) _____

- A) the amount of radiation that produces 2.1×10^9 units of charge in one cubic centimeter of air.
- B) the SI unit for radiation absorbed.
- C) the amount of radioactive substance that undergoes 3.7×10^{10} disintegrations per second.
- D) a unit used to measure the amount of radiation absorbed per gram of tissue.
- E) a unit that allows both for the energy and the penetrating power of different types of radiation.

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Answer Key

Testname: 104_F09_E2A

- 1) B
- 2) D
- 3) D
- 4) C
- 5) C
- 6) E
- 7) B
- 8) C
- 9) B
- 10) B
- 11) A
- 12) C
- 13) D
- 14) A
- 15) E
- 16) A
- 17) B
- 18) D
- 19) C
- 20) A
- 21) D
- 22) D
- 23) C
- 24) A
- 25) B
- 26) E
- 27) A
- 28) E
- 29) C
- 30) B
- 31) C
- 32) B
- 33) B
- 34) A
- 35) B
- 36) A
- 37) C
- 38) C