

## Practice test 2013

## Multiple Choice

Identify the choice that best completes the statement or answers the question.

Important constantsFor Water

$$\Delta H_{\text{fus}} = 6.01 \text{ kJ/mol or } 334 \text{ J/g}$$

$$\Delta H_{\text{vap}} = 40.7 \text{ kJ/mol or } 2260 \text{ J/g}$$

$$c = 4.18 \text{ J/g}^\circ\text{C or } 1.00 \text{ cal/g }^\circ\text{C}$$

**\*This is your last test.**

**\*You will have questions over past chapters and questions over specific topics from first semester like moles, naming, predicting products, balancing and stoichiometry.**

**\*There will be no retake for this last test.**

Table of Common Molecules				
Name	Hydrogen	Chlorine	Ammonia	Methane
Molecular Formula	H <sub>2</sub>	Cl <sub>2</sub>	NH <sub>3</sub>	CH <sub>4</sub>

1.

What type of bond do all of the molecules in the table above have in common?

- a. polar  
b. metallic  
c. ionic  
d. covalent





- \_\_\_\_\_ 21. Which of these is an Arrhenius base?
- a. LiOH  
b. NH<sub>3</sub>  
c. H<sub>2</sub>PO<sub>4</sub><sup>-</sup>  
d. CH<sub>3</sub>COOH
- \_\_\_\_\_ 22. What is transferred between a conjugate acid-base pair?
- a. an electron  
b. a proton  
c. a hydroxide ion  
d. a hydronium ion
- \_\_\_\_\_ 23. Which compound can act as both a Brønsted-Lowry acid and a Brønsted-Lowry base?
- a. water  
b. ammonia  
c. sodium hydroxide  
d. hydrochloric acid
- \_\_\_\_\_ 24. In the reaction  $\text{CO}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{OH}^-$ , the carbonate ion is acting as a(n) \_\_\_\_\_.
- a. Arrhenius base  
b. Arrhenius acid  
c. Brønsted-Lowry base  
d. Brønsted-Lowry acid
- \_\_\_\_\_ 25. Which of the following reactions illustrates amphoterism?
- a.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$   
b.  $\text{NaCl} \rightleftharpoons \text{Na}^+ + \text{OH}^-$   
c.  $\text{HCl} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$   
d.  $\text{NaOH} \rightleftharpoons \text{Na}^+ + \text{OH}^-$
- \_\_\_\_\_ 26. What are the acids in the following equilibrium reaction?  
 $\text{CN}^- + \text{H}_2\text{O} \rightleftharpoons \text{HCN} + \text{OH}^-$
- a. CN<sup>-</sup>, H<sub>2</sub>O  
b. H<sub>2</sub>O, HCN  
c. CN<sup>-</sup>, OH<sup>-</sup>  
d. H<sub>2</sub>O, OH<sup>-</sup>
- \_\_\_\_\_ 27. Which of the following represents a Brønsted-Lowry conjugate acid-base pair?
- a. SO<sub>3</sub><sup>2-</sup> and SO<sub>2</sub>  
b. CO<sub>3</sub><sup>2-</sup> and CO  
c. H<sub>3</sub>O and H<sub>2</sub>  
d. NH<sub>4</sub><sup>+</sup> and NH<sub>3</sub>
- \_\_\_\_\_ 28. What is the charge on the hydronium ion?
- a. 2-  
b. 2-  
c. 0  
d. 1+
- \_\_\_\_\_ 29. The products of self-ionization of water are \_\_\_\_\_.
- a. H<sub>3</sub>O<sup>+</sup> and H<sub>2</sub>O  
b. OH<sup>-</sup> and OH<sup>+</sup>  
c. OH<sup>+</sup> and H<sup>-</sup>  
d. OH<sup>-</sup> and H<sup>+</sup>
- \_\_\_\_\_ 30. In a neutral solution, the [H<sup>+</sup>] is \_\_\_\_\_.
- a. 10<sup>-14</sup> M  
b. zero  
c. 1 × 10<sup>7</sup> M  
d. equal to [OH<sup>-</sup>]
- \_\_\_\_\_ 31. What is pH?
- a. the negative logarithm of the hydrogen ion concentration  
b. the positive logarithm of the hydrogen ion concentration  
c. the negative logarithm of the hydroxide ion concentration  
d. the positive logarithm of the hydroxide ion concentration
- \_\_\_\_\_ 32. Which of these solutions is the most basic?
- a. [H<sup>+</sup>] = 1 × 10<sup>-2</sup> M  
b. [OH<sup>-</sup>] = 1 × 10<sup>-4</sup> M  
c. [H<sup>+</sup>] = 1 × 10<sup>-11</sup> M  
d. [OH<sup>-</sup>] = 1 × 10<sup>-13</sup> M

- \_\_\_\_\_ 33. Which of the following pairs consists of a weak acid and a strong base?
- |                                    |                                   |
|------------------------------------|-----------------------------------|
| a. sulfuric acid, sodium hydroxide | c. acetic acid, sodium hydroxide  |
| b. acetic acid, ammonia            | d. nitric acid, calcium hydroxide |

**Multiple Response**

*Identify one or more choices that best complete the statement or answer the question.*

- \_\_\_\_\_ 34. For the polymer, polyvinyl chloride (PVC),  
~ CH<sub>2</sub>CH(Cl)CH<sub>2</sub>CH(Cl)CH<sub>2</sub>CH(Cl) ~  
the repeating subunit is
- |                              |                           |
|------------------------------|---------------------------|
| a. CH(Cl).                   | c. CH <sub>2</sub> CH     |
| b. CH(Cl)CHCH <sub>2</sub> . | d. CH <sub>2</sub> CH(Cl) |

- \_\_\_\_\_ 35. Which substance is made up of many monomers joined together in long chains?
- |            |            |
|------------|------------|
| a. salt    | c. ethanol |
| b. protein | d. propane |

- \_\_\_\_\_ 36. Which element is capable of forming stable, extended chains of atoms through single, double, or triple bonds with itself?
- |      |      |
|------|------|
| a. C | c. N |
| b. O | d. H |

- \_\_\_\_\_ 37. Proteins are large macromolecules composed of thousands of subunits. The structure of the protein depends on the sequence of
- |                    |                |
|--------------------|----------------|
| a. lipids          | c. amino acids |
| b. monosaccharides | d. nucleosides |

- \_\_\_\_\_ 38. Equal volumes of 1 molar hydrochloric acid (HCl) and 1 molar sodium hydroxide base (NaOH) are mixed. After mixing, the solution will be
- |                    |                   |
|--------------------|-------------------|
| a. strongly acidic | c. nearly neutral |
| b. weakly acidic   | d. weakly basic   |

**Potassium hydroxide (KOH) is a strong base because it**

- \_\_\_\_\_ 39.
- |                                   |  |
|-----------------------------------|--|
| a. easily releases hydroxide ions | c. reacts to form salt crystals in water |
| b. does not dissolve in water     | d. does not conduct and electric current |

**Of four different laboratory solutions, the solution with the *highest* acidity has a pH of**

- \_\_\_\_\_ 40.
- |       |      |
|-------|------|
| a. 11 | c. 5 |
| b. 7  | d. 3 |

**Which of the following is an observable property of many acids?**

- \_\_\_\_\_ 41.
- |   |   |
|---|---|
| a. They become slippery when reacting with water  | c. They produce salts when mixed with other acids |
| b. They react with metals to release hydrogen gas | d. They become more acidic when mixed with a base |

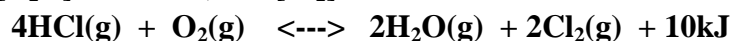
**Which would be *most* appropriate for collecting data during a neutralization reaction?**

- \_\_\_\_\_ 42.
- |                         |                       |
|-------------------------|-----------------------|
| a. a pH probe           | c. a thermometer      |
| b. a statistics program | d. a graphing program |

- \_\_\_\_\_ 43. An analysis of the equilibrium mixture in a 1-L flask gives the following results:  $[\text{HCl}] = .30$  mol,  $[\text{O}_2] = .20$  mol,  $[\text{H}_2\text{O}] = 1.2$  mol, and  $[\text{Cl}_2] = .60$



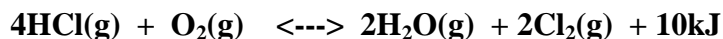
- |   |   |
|---|---|
| a. $[\text{Cl}_2] [\text{H}_2\text{O}] / [\text{HCl}] [\text{O}_2]$       | c. $[\text{O}_2] [\text{HCl}]^4 [\text{kJ}] / [\text{H}_2\text{O}]^2 [\text{Cl}_2]^2$ |
| b. $[\text{Cl}_2]^2 [\text{H}_2\text{O}]^2 / [\text{HCl}]^4 [\text{O}_2]$ | d. $[\text{HCl}] [\text{O}_2] / [\text{Cl}_2] [\text{H}_2\text{O}]$                   |
- \_\_\_\_\_ 44. An analysis of the equilibrium mixture in a 1-L flask gives the following results:  $[\text{HCl}] = .30$  mol,  $[\text{O}_2] = .20$  mol,  $[\text{H}_2\text{O}] = 1.2$  mol, and  $[\text{Cl}_2] = .60$



Calculate  $K_{\text{eq}}$ :

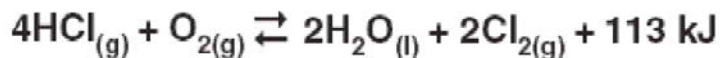
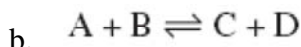
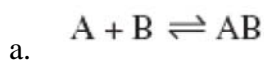
- |                      |                      |
|----------------------|----------------------|
| a. 0.51              | c. 1.6               |
| b. $2.2 \times 10^2$ | d. $3.3 \times 10^2$ |

- \_\_\_\_\_ 45. An analysis of the equilibrium mixture in a 1-L flask gives the following results:  $[\text{HCl}] = .30$  mol,  $[\text{O}_2] = .20$  mol,  $[\text{H}_2\text{O}] = 1.2$  mol, and  $[\text{Cl}_2] = .60$



Based on your answer for  $K_{\text{eq}}$  are the reactants or products favored?

- a. reactants  
b. products  
c. Both a and B  
d. heat
- \_\_\_\_\_ 46. Which of the following changes will cause an increase in the rate of the above reaction?
- a. increasing the concentration of  $\text{Br}_2$   
b. decreasing the concentration of  $\text{CH}_6$   
c. increasing the concentration of  $\text{HBr}$   
d. decreasing the temperature
- \_\_\_\_\_ 47. When a reaction is at equilibrium and more reactant is added, which of the following changes is the immediate result?
- a. The reverse reaction rate remains the same.  
b. The forward reaction rate increases.  
c. The reverse reaction rate decreases.  
d. The forward reaction rate remains the same.
- \_\_\_\_\_ 48. In which of the following reactions involving gases would the forward reaction be favored by an increase in pressure?



Which action will drive the reaction to the right?

- \_\_\_\_\_ 49.
- a. heating the equilibrium mixture  
b. adding water to the system  
c. decreasing the oxygen concentration  
d. increasing the system's pressure



The reaction shown above occurs inside a closed flask. What action will shift the reaction to the left?

- \_\_\_\_\_ 50.
- |  |  |
|--|--|
| a. pumping CO gas into the closed flask        | c. increasing the NO concentration in the flask    |
| b. raising the total pressure inside the flask | d. venting some CO <sub>2</sub> gas from the flask |

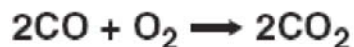


What kind of change will shift the reaction above to the right to form more products?

- \_\_\_\_\_ 51.
- |  |   |
|--|---|
| a. a decrease in total pressure            | c. an increase in the pressure of NH <sub>3</sub> |
| b. an increase in the concentration of HCl | d. a decrease in temperature                      |
- \_\_\_\_\_ 52. Which direction best represents the effect of adding oxygen on the equilibrium position for the equation above.



- |          |                   |
|----------|-------------------|
| a. left  | c. at equilibrium |
| b. right | d. a and b        |

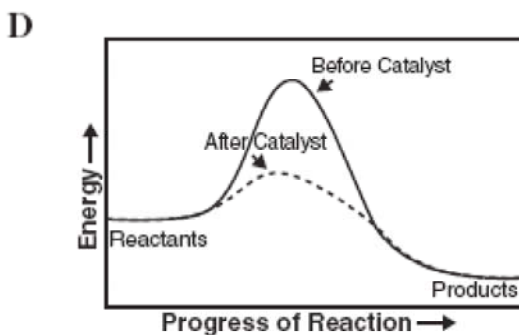
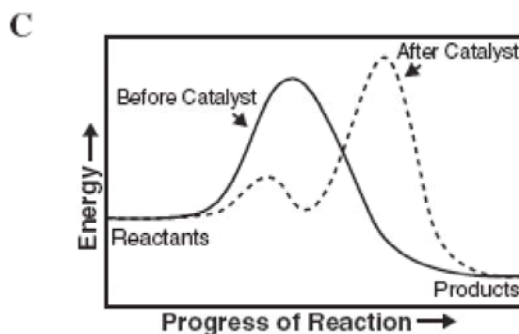
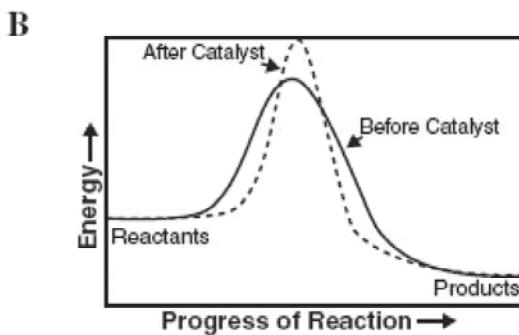
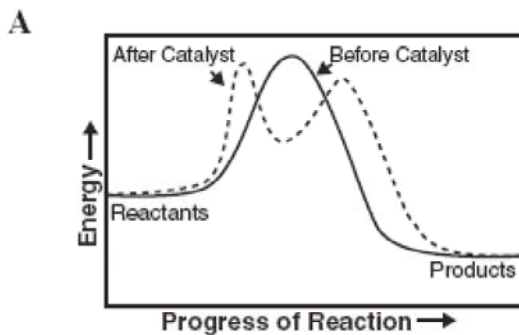


If the above reaction takes place inside a sealed reaction chamber, then which of these procedures will cause a decrease in the rate of reaction?

- \_\_\_\_\_ 53.
- |  |   |
|--|---|
| a. raising the temperature of the reaction chamber   | c. removing the CO <sub>2</sub> as it is formed |
| b. increasing the volume inside the reaction chamber | d. adding more CO to the reaction chamber       |



54. Which reaction diagram shows the effect of using the appropriate catalyst in a chemical reaction?



- a. A  
b. B

- c. C  
d. D

55. The hydronium ion in the following reaction,  $\text{HI} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{I}^-$ , would be considered a:

- a. acid  
b. base

- c. conjugate acid  
d. conjugate base



Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 62. Choose the correct molecular shape for ammonia,  $\text{NH}_3$ .
- a. bent
  - b. linear
  - c. trigonal planar
  - d. trigonal pyramidal

Periodic Table of the Elements

The image shows a partial periodic table grid. The top row contains two empty boxes. The second row contains two empty boxes, followed by a long gap, then 'Al', and two more empty boxes. The third row contains two empty boxes, followed by a long gap, then 'Ga', 'Ge', and 'As', followed by two more empty boxes. Below this, there are two more rows of empty boxes, with a bracket-like shape on the left side of the first row of these two rows.

- \_\_\_\_\_ 63. Which of the following elements has the same Lewis dot structure as Silicon?

- a. Germanium
- b. Aluminum
- c. Gallium
- d. Arsenic

- \_\_\_\_\_ 64. Determine the shape of  $\text{SCl}_2$ :
- a. bent
  - b. linear
  - c. tetrahedral
  - d. trigonal pyramidal

**Practice test 2013**  
**Answer Section**

**MULTIPLE CHOICE**

- |                           |                       |         |                      |
|---------------------------|-----------------------|---------|----------------------|
| 1. ANS: D                 | PTS: 1                | STA: 2b |                      |
| 2. ANS: A<br>1c           |                       |         |                      |
|                           | PTS: 1                | STA: 1c |                      |
| 3. ANS: B<br>Stt. 4h      |                       |         |                      |
|                           | PTS: 1                | STA: 4h |                      |
| 4. ANS: A<br>St. 7d       |                       |         |                      |
|                           | PTS: 1                | STA: 7d |                      |
| 5. ANS: D                 | PTS: 1                |         |                      |
| 6. ANS: A                 | PTS: 1                |         |                      |
| 7. ANS: B                 | PTS: 1                |         |                      |
| 8. ANS: A                 | PTS: 1                |         |                      |
| 9. ANS: C                 | PTS: 1                |         |                      |
| 10. ANS: A                | PTS: 1                |         |                      |
| 11. ANS: B<br>St. 1c      |                       |         |                      |
|                           | PTS: 1                |         |                      |
| 12. ANS: C<br>OBJ: 18.2.1 | PTS: 1<br>STA: Ch.8.a | DIF: L1 | REF: p. 549   p. 550 |
| 13. ANS: A<br>OBJ: 18.2.1 | PTS: 1<br>STA: Ch.8.a | DIF: L2 | REF: p. 549          |
| 14. ANS: A<br>OBJ: 18.2.2 | PTS: 1<br>STA: Ch.9.a | DIF: L2 | REF: p. 554          |
| 15. ANS: C<br>OBJ: 18.2.2 | PTS: 1<br>STA: Ch.9.a | DIF: L2 | REF: p. 554          |
| 16. ANS: A<br>OBJ: 18.2.2 | PTS: 1<br>STA: Ch.9.a | DIF: L2 | REF: p. 552   p. 553 |
| 17. ANS: C<br>OBJ: 18.2.3 | PTS: 1<br>STA: Ch.9.c | DIF: L1 | REF: p. 556          |
| 18. ANS: A<br>OBJ: 18.2.3 | PTS: 1<br>STA: Ch.9.c | DIF: L1 | REF: p. 556          |

19.	ANS: A OBJ: 19.1.1	PTS: 1 STA: Ch.5.a	DIF: L1	REF: p. 587
20.	ANS: B OBJ: 19.1.1	PTS: 1	DIF: L1	REF: p. 588
21.	ANS: A OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L1	REF: p. 589
22.	ANS: B OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L1	REF: p. 591
23.	ANS: A OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L2	REF: p. 591
24.	ANS: C OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L2	REF: p. 590
25.	ANS: A OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L2	REF: p. 592
26.	ANS: B OBJ: 19.1.2	PTS: 1 STA: Ch.5.b	DIF: L2	REF: p. 591
27.	ANS: D OBJ: 19.1.2	PTS: 1 STA: Ch.5.e	DIF: L2	REF: p. 591
28.	ANS: D OBJ: 19.2.1	PTS: 1 STA: Ch.5.b	DIF: L1	REF: p. 594
29.	ANS: D OBJ: 19.2.1	PTS: 1 STA: Ch.5.c	DIF: L1	REF: p. 594
30.	ANS: D OBJ: 19.2.1	PTS: 1 STA: Ch.5.d	DIF: L1	REF: p. 595
31.	ANS: A OBJ: 19.2.2	PTS: 1 STA: Ch.5.f	DIF: L1	REF: p. 596
32.	ANS: C OBJ: 19.2.2	PTS: 1 STA: Ch.5.d	DIF: L2	REF: p. 597   p. 598
33.	ANS: C OBJ: 19.3.2	PTS: 1 STA: Ch.5.c	DIF: L3	REF: p. 609

**MULTIPLE RESPONSE**

34.	ANS: D 10a			
		PTS: 1		
35.	ANS: B 10b			
		PTS: 1		

36. ANS: A  
10b

PTS: 1

37. ANS: C  
10c

PTS: 1

38. ANS: C  
5a

PTS: 1

39. ANS: A  
5c

PTS: 1

40. ANS: D  
5d

PTS: 1

41. ANS: B  
5a

PTS: 1

42. ANS: A  
5a

PTS: 1

43. ANS: B  
9b

PTS: 1

44. ANS: D  
8b

PTS: 1

45. ANS: B  
9b

PTS: 1

46. ANS: A  
9a

PTS: 1

47. ANS: B  
9a

PTS: 1

48. ANS: A  
9a

PTS: 1

49. ANS: D  
9b

PTS: 1

50. ANS: C  
9a

PTS: 1

51. ANS: A  
9a

PTS: 1

52. ANS: B  
9a

PTS: 1

53. ANS: B  
8a

PTS: 1

54. ANS: D  
8c

PTS: 1

55. ANS: C  
5b

PTS: 1

56. ANS: D  
8a and 8b

PTS: 1

57. ANS: A  
5b

PTS: 1

58. ANS: D  
5a

PTS: 1

59. ANS: D  
8b

PTS: 1

60. ANS: C  
2e

PTS: 1

61. ANS: A  
2c

PTS: 1

62. ANS: D  
2f

PTS: 1

63. ANS: A  
2e

PTS: 1

64. ANS: A  
2f

PTS: 1