Name:
Score: 0 / 20 points (0%)

Chapter 6 Review Quiz

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

___ 1. The process when an acid reacts with water is known as:
a. dissociation.
b. acidification.
c. ionisation.
d. neutralisation.

ANSWER: C
The acid is a covalent molecular substance, so when it reacts with water ions are formed. This reaction is called ionisation.
POINTS: 0 / 1
FEEDBACK:
REF: 152

___ 2. The process when a base reacts with water is known as:
a. dissociation.
b. acidification.
c. ionisation.
d. neutralisation.

ANSWER: A
An inorganic base is an ionic substance, so when a base dissolves in water it dissociates into a cation and anion.
POINTS: 0 / 1
FEEDBACK:
REF: 152

___ 3. Which of the following acids are weak acids?

HCl CH_3COOH HF H_2SO_4

a. HCl, CH_3COOH and H_2SO_4
b. HCl and H_2SO_4
c. CH_3COOH and HF.
d. CH_3COOH and H_2SO_4

ANSWER: C
HCl and H_2SO_4 are strong acids while CH_3COOH and HF are weak acids.
POINTS: 0 / 1
FEEDBACK:
REF: 152

___ 4. Which of the following statements is correct?
a. All molecules in strong acids will dissociate.
b. All molecules in a strong base will dissociate.
c. All molecules in a strong base will ionise.
d. All molecules in a weak base will dissociate.

ANSWER: B

Acids ionise and bases dissociate. Strong means all molecules dissociate.
POINTS: 0 / 1
FEEDBACK:
REF: 152

___ 5. Which of the following statements regarding the concentration and strength of solutions is correct?
a. A weak acid will produce more ions than a strong acid of the same concentration.
b. A dilute solution has more solute than solvent.
c. A concentrated strong acid will contain more ions than a dilute strong acid.
d. Weak acids are more dilute than strong acids.

ANSWER: C
A strong acid will produce more ions than a weak acid and a concentrated solution has more ions than a dilute solution.
POINTS: 0 / 1
FEEDBACK:
REF: 152

___ 6. In the reaction:

$$NH_3 + H_2O \; f NH_4^+ + OH^-$$

a. NH_3 is an acid.
b. H_2O is an acid.
c. NH_4^+ is a base.
d. neither NH_3 nor H_2O are bases.

ANSWER: B
H_2O is an acid because it donates a proton to NH_3.
POINTS: 0 / 1
FEEDBACK:
REF: 153

___ 7. In the reaction:

$$CO_3^{2-} + H_2O \; f OH^- + HCO_3^-$$

a. CO_3^{2-} is an acid.
b. OH^- is a conjugate base.
c. H_2O is a base.
d. HCO_3^- is a conjugate base.

ANSWER: B
H_2O is acting as an acid donating a proton thus producing its conjugate base OH^-.
POINTS: 0 / 1
FEEDBACK:
REF: 153

___ 8. Which acid–conjugate base pair is correct?
a. H_3O^+, H_2O
b. HSO_4^-, H_2SO_4
c. OH^-, H_2O
d. SO_4^{2-}, H_2SO_4

ANSWER: A

When H_3O^+ donates a proton, it produces the conjugate base H_2O is the result.

POINTS: 0 / 1
FEEDBACK:
REF: 157

___ 9. Which of the following is not a polyprotic acid?
a. H_2SO_4
b. CH_3COOH
c. H_2CO_3
d. H_3PO_4

ANSWER: B
CH_3COOH has only one proton, which can be donated.
POINTS: 0 / 1
FEEDBACK:
REF: 157

___ 10. In pure water, the value of the ionic product, K_w is numerically equal to:
a. $[H_3O^+]\,[OH^-]/[H_2O]$
b. $[H_2O] / [OH^-]\,[H_3O^+]$
c. $[H_3O^+]^2$
d. $[H_3O^+]\,[OH^-]^2$

ANSWER: C
$K_w = [H_3O^+]\,[OH^-]$ and in pure water $[H_3O^+] = [OH^-]$
POINTS: 0 / 1
FEEDBACK:
REF: 159

___ 11. The concentration of hydrogen ions in a 2 mol L^{-1} solution of NaOH is:
a. 2 mol L^{-1}
b. 5 mol L^{-1}
c. 2×10^{-15} mol L^{-1}
d. 5×10^{-15} mol L^{-1}

ANSWER: D
NaOH is a strong base so $[OH^-] = 2$ mol L^{-1}, so $[H^+] = 10^{-14}/2$
POINTS: 0 / 1
FEEDBACK:
REF: 160

___ 12. What is the pH of a 1.2 mol L^{-1} solution of HNO_3?
a. 1.2
b. 0.079
c. –0.079
d. –1.2

ANSWER: C
$pH = -\log[H^+] = -\log(1.2) = -0.079$
POINTS: 0 / 1
FEEDBACK:
REF: 3

___ 13. The concentration of hydroxide ions in a solution of pH 5.4 is:
a. 2.51×10^{-9} mol L^{-1}
b. 3.98×10^{-6} mol L^{-1}
c. 5.4×10^{-6} mol L^{-1}
d. 2.51×10^{5} mol L^{-1}

ANSWER: A
pH = 5.4, pOH = 14 – 5.4 = 8.6 so $[OH^-] = 10^{-8.6} = 2.51 \times 10^{-9}$ mol L^{-1}
POINTS: 0 / 1
FEEDBACK:
REF: 162

___ 14. The percentage ionisation of a 0.1 mol L^{-1} solution of acetic acid that has a pH of 2.876 is:
a. 1.33%
b. 3.4%
c. 10.0%
d. 28.76%

ANSWER: A
$[CH_3COOH] = 0.1$ mol L^{-1},
$[H^+] = 10^{-2.876} = 1.33 \times 10^{-3} = [CH_3COO^-]$,
% ionisation = $[CH_3COO^-] \times 100/[CH_3COOH] = 1.33 \times 10^{-3} \times 100/0.1 =$ 1.33%
POINTS: 0 / 1
FEEDBACK:
REF: 170

___ 15. Which of the following statements regarding the ionisation of acids is true?
a. A weak acid will have a large magnitude of K_a because a high percentage of the molecules will ionise.
b. A strong acid will have a large magnitude of K_a because a high percentage of the molecules will ionise.
c. A weak acid will have a small magnitude of K_a because a high percentage of the molecules will ionise.
d. A strong acid will have a small magnitude of K_a because a low percentage of the molecules will ionise.

ANSWER: B
A strong acid ionises completely so K_a will be large.
POINTS: 0 / 1
FEEDBACK:
REF: 167

___ 16. Which of the following is not true when determining the K_a of monoprotic weak acids?
a. The concentration of H_3O^+ from the self-ionisation of water must be included.
b. The amount of acid that ionises is so small that it is ignored.
c. The concentration of the cation and anion formed in the ionisation are the same.
d. The concentration of the acid is on the bottom of the fraction.

ANSWER: A
The concentration of H_3O^+ from the self-ionisation of water will be small so can be ignored.
POINTS: 0 / 1
FEEDBACK:

FEEDBACK:
REF: 165

___ 17. In an experiment, 0.100 mol L^{-1} solutions of each of the following acids were prepared. Which acid solution would have the highest pH?

a. HF $K_a = 7.6 \times 10^{-4}$
b. CH_3COOH $K_a = 1.7 \times 10^{-5}$
c. HCN $K_a = 6.3 \times 10^{-10}$
d. HCOOH $K_a = 2 \times 10^{-4}$

ANSWER: C
The smaller the K_a the less the acid ionises, so fewer H^+ ions are present in solution.
POINTS: 0 / 1
FEEDBACK:
REF: 165

___ 18. In an experiment, 50 mL of 1.0 mol L^{-1} solutions of each of the following acids were prepared.
$HClO_2$ $pK_a = 1.95$
HCOOH $pK_a = 3.74$
HOI $pK_a = 10.64$
Which acid would require the greatest volume of 1.0 mol L^{-1} to neutralise it?

a. $HClO_2$
b. HCOOH
c. HOI
d. The four acids would require the same volume of NaOH.

ANSWER: D
All three acids are monoprotic and the same concentration. As a neutralisation reaction goes to completion all three acid would require the same volume of base.
POINTS: 0 / 1
FEEDBACK:
REF: 172

___ 19. Listed below are the K_b of four organic bases.

$C_2H_5NH_2$ $K_b = 4.3 \times 10^{-4}$
C_9H_7N $K_b = 2.5 \times 10^{-9}$
$(C_2H_5)_3N$ $K_b = 5.2 \times 10^{-4}$
$C_{18}H_{21}O_3N$ $K_b = 8.9 \times 10^{-7}$

The strongest acid in the list below is:

a. $C_2H_5NH_3^+$
b. $C_9H_7NH^+$
c. $(C_2H_5)_3NH^+$
d. $C_{18}H_{21}O_3NH^+$

ANSWER: B
The weaker the base the stronger the conjugate acid.
POINTS: 0 / 1
FEEDBACK:

REF: 173

___ 20. Which of the following compounds is a basic salt?

a. NaOH
b. CH_3COONa
c. NH_4Cl
d. $NaNO_3$

ANSWER: C
This salt is formed from the reaction of a weak acid and strong base so will be basic.
POINTS: 0 / 1
FEEDBACK:
REF: 181

Retake