**Review for solution, electrolyte and pH test**

1. Which of the following has the highest concentration?

A) 22% B) 200 g/L C) 550 ppm D) 15 mg/L

1. Convert **EACH** of the following units to ppm:

A) 15 % B) 150 g/L C) 24 g/300 mL D) 0.05 mg/L

1. Convert **EACH** of the following units to %:

A) 300 g/L B) 50 g/250 mL C) 500 ppm D) 2.5 g/L

1. You are making yourself some instant iced-tea. The package says you need 4 g of the powder for 300 mL of water. What is the procedure you would need to follow to make a 1L pitcher?
2. Public pools usually contain about 7 ppm of chlorine to control bacterial growth. If your pool can hold 300 L of water how much chlorine should there be?
3. In a pond, the lethal concentration of mercury is 0.0003 mg/L. This means if the concentration of mercury is over the value given, certain types of aquatic organisms will die. You take a sample of the water and find the mercury concentration to be 3.3 ppm, is this a lethal dose?
4. In a pond, the lethal concentration of nitrate (NO3-) is 0.08 g/L and phosphate’s (PO43-) lethal concentration is 0.6 mg/L. This means if the concentrations of nitrate or phosphate are over the values given, certain types of aquatic organisms will die.

You test the water and get the following values:

**Nitrate has a concentration of 45 ppm Phosphate has a concentration of 0.15 ppm**

Determine if the pond contains any lethal doses.

1. What is an electrolyte? What are the three types of electrolytes?
2. How can you identify a non-electrolyte from its molecular formula?
3. Fill in the table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ca(OH)2 | CaCl2 | CH3COOH | CH3OH | H2SO4 | HCl | NCl3 | NaCl |
| Acid, base, salt or neither |  |  |  |  |  |  |  |  |
| pH range |  |  |  |  |  |  |  |  |
| Electrolyte or Non-electrolyte |  |  |  |  |  |  |  |  |

1. State whether the following pHs are acids, bases or neutral.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| pH 5 | pH 9 | pH 7 | pH 3 | pH 11 |
|  |  |  |  |  |

1. How many times more basic is a solution oh pH 12 versus pH 9? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What would you add to neutralize 50 mL of a pH of 4? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What would you add to neutralize 60 mL pH of 11? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Why will salt grains not conduct electricity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Using the table below, which indicator would you use to find a strong acid? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH | 1 | 2 | 3 | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |  | 13 |
| A | red | | | Orange | | | | |  | Yellow | | | | | |
| B | Blue | | green | | |  | Yellow | | | | | | | | |
| C | red | | | | | purple | | | |  | blue | | | | |

1. The concentrations of four solutions are given in the following table.

|  |  |
| --- | --- |
| Solution | Concentration |
| 1 | 20 g/L |
| 2 | 0.4 g/mL |
| 3 | 5 g /100 mL |
| 4 | 3 g/500 mL |

Which solution is the most concentrated?

A) 1 B) 2 C) 3 D) 4

1. If the dots represent the quantity of solute used to prepare each of the following solutions, identify the solutions that have equal concentrations.

2 L 3L 4 L 1 L

• • • • • •

• • • •

•• • • • • • ••

•• •

1 2 3 4

A) 1, 2 and 4 B) 1 and 3 C) 2 and 4 D) 2 and 3

1. Choose the answer that best explains the relationship between the following concentrations.

1- 10% 2- 100 g/L 3- 40 g/ 400 mL

1. the 100 g/L solution is the most concentrated solution
2. the 10% and the 40 g/400 mL concentrations are equal
3. the order from weakest to strongest is 10%, 40 g/400 mL and 100 g/L
4. they are all equal concentrations
5. To check the electrical conductivity of certain liquids, a student used a conductivity apparatus equipped with a light bulb. Using the table of information, determine which substances are electrolytes.

A) CH3OH and CCl4 C) CH3OH, NaOH and Ca(OH)2

B) HCl, MgCl2 and CCl4 D) HCl, MgCl2, NaOH and Ca(OH)2

|  |  |
| --- | --- |
| Substances | Observations |
| HCl | Bright light |
| CH3OH | No light |
| MgCl2 | Faint light |
| NaOH | Bright light |
| Ca(OH)2 | Faint light |
| CCl4 | No light |

1. Which of the following, when dissolved in water, must be an electrolyte?

A) CO2 B) HNO3 C) H2O D) C6H12O6

1. Which of the following, when dissolved in water, will be a non-electrolyte?

A) KCl B) HCl C) KOH D) C2H5OH

1. Which of the following substances would you use to clean greasy dishes?

A) KCl B) HCl C) KOH D) C2H5OH

1. Which of the following is a salt?

A) KBr B) LiOH C) HNO3 D) SO2

1. Which of the following are properties of a basic solution?

1. Conducts electricity 4. Turns litmus paper red

2. Does not conduct electricity 5. Does not change the colour of litmus paper

3. Turns litmus paper blue

1. 1 and 3 B) 1 and 4 C) 2 and 3 D) 2 and 5
2. You want to neutralize something with a pH of 4, what would you use?

A) water B) An acid C) something with a pH of 7 D) Mg(OH)2

1. The following table gives the colours of a universal indicator. A few drops of the indictor are added to a sample of solution. The solution turned purple. Which of the following correctly describes the solution the student was given?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| pH | 1 | 3 | 5 | 7 | 9 | 11 | 13 |
| colour | red | orange | yellow | green | turquoise | blue | purple |

A) It is a strong basic solution C) It is a strong acidic solution

B) It is a weak basic solution D) It is a weak acidic solution

|  |  |  |
| --- | --- | --- |
| Solution | Reaction to litmus | Conducts |
| A | Red to blue | Yes |
| B | Blue to red | Yes |
| C | No change | Yes |
| D | No change | No |

Which of the above solution(s) is an electrolyte?

A) A, B and C B) A and B C) A and D D) D only

1. The lab technician stores chemicals according to their type. In which of the following cases are the substances correctly classified as acids, bases or salts?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A | B | C | D |
| Acids | H2SO4, H2O | H2SO4, HCl | KOH, Ca(OH)2 | H2SO4, H2O |
| Bases | KOH, Ca(OH)2 | KOH, Ca(OH)2 | NaCl, KClO3 | KOH, Ca(OH)2 |
| salts | NaCl, HCl, | NaCl, KClO3 | H2SO4, Na2SO4 | NaCl, KClO3 |

1. Which of the following procedures can be used to determine whether sugar is an electrolyte or a non-electrolyte?
2. Check the electrical conductivity of a cube of sugar.
3. Check the electrical conductivity of powdered sugar.
4. Check the electrical conductivity of an aqueous sugar solution.
5. Check the electrical conductivity of a heterogeneous mixture of sugar and alcohol.
6. In the laboratory, you are given tow acid-base indicators and a colourless solution with an unknown pH.

The following table gives the colours of the two indicators at different pH values.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH | 1 | 2 | 3 | | 4 | | 5 | | 6 | 7 | | 8 | 9 | 10 | 11 | 12 | 13 |
| Indicator 1 | Yellow | | | | | Green | | | | | Blue | | | | | | |
| Indicator 2 | Violet | | | Yellow | | | | Red | | | | | | | | | |

When you add a drop of each indicator to the colourless solution, it turns yellow.

What is the pH range of this solution?

A) Between 1 and 4 B) Between 1 and 5 C) Between 3 and 4 D) Between 3 and 5

1. Alice frequently uses a white cleaning powder in her home. She wants to know whether this substance is acidic, basic or neutral. In order to determine the pH of this substance, what is the first thing she must do?
2. Put a piece of blue litmus paper on the solid.
3. Put a piece of red litmus paper on the solid.
4. Verify whether the solid conducts electricity.
5. Dissolve a small amount of the solid in water.
6. In the laboratory, you are given a sample of the six following substances :

HCl Ca(OH)2 KCl

NaOH H2SO4 NaCl

You perform various experiments on these substances and observe that some of them

1. turn red litmus paper blue

2. conduct electricity

Which two substances are they?

1. HCl and H2SO4 C)HCl and KCl
2. KCl and NaCl D) NaOH and Ca(OH)2
3. Following a chemical spill, the contaminated soil reaches a pH value of 12. After a few days, a neutralization process begins and a second test is conducted. Its results show that the pH of the soil has become 10 times more acidic. What is the pH value after the second test?
4. pH= 2 B) pH= 7 C) pH= 11 D) pH= 13
5. You have 40 mL of a substance with a pH of 4. What will neutralize the substance?

A) 40 mL of a pH of 8 C) 40 mL of a pH of 9

B) 40 mL of a pH of 2 D) 40 mL of a pH of 10

1. Place the substances listed below in increasing order of pH.

Distilled water Soap Lemon juice Rainwater

1. Distilled water – Soap – Lemon juice – Rainwater
2. Lemon juice – Rainwater – Distilled water – Soap
3. Soap – Lemon juice – Rainwater – Distilled water
4. Lemon juice – Distilled water – Soap – Rainwater
5. Some common substances are listed below.

1. vinegar 4. soft drinks

2. distilled water 5. tomato juice

3. seawater

Which of the substances have a pH that is less than 7?

A) 1, 2, and 3 B) 1, 3, and 4 C) 1, 4, and 5 D) 2, 3, and 5

1. Scientific studies show that the number of aquatic species declines when a lake becomes more acidic. The pH of the water in four lakes was measured to determine whether aquatic species are threatened. The table below lists the pH values obtained.

Table I - pH of the lakes examined

|  |  |
| --- | --- |
| Lake | pH |
| 1 | 4.2 |
| 2 | 6.5 |
| 3 | 7.0 |
| 4 | 7.8 |

Which of these lakes poses the greatest threat to aquatic species?

A) Lake 1 B) Lake 2 C) Lake 3 D) Lake 4

1. To reduce tooth decay, some cities add fluoride to their drinking water. An employee in charge of drinking water fluoridation in a big city dissolved 48 g of fluoride in 50 000 L of water. What is the fluoride concentration of the water in ppm?