

4 • Classifying Chemicals

1 • pH and pOH

Fill in the missing information:

$[H^+]$	pH	pOH
1×10^{-5}		
	3	
		2
2.5×10^{-3}		
	6	
		1

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2 • $[H^+]$ and $[OH^-]$

Fill in the missing information:

$[H^+]$	$[OH^-]$
1×10^{-4}	
	1×10^{-8}
1×10^{-10}	
	1×10^{-2}
2×10^{-6}	
	3.3×10^{-7}
4.8×10^{-3}	
	1.6×10^{-1}

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3 • A C I D S , B A S E S , a n d S A L T S

State whether each chemical is an acid, a base, or a salt.

If it is an acid or a base, state whether it is strong or weak:

- | | | |
|--------------------------------------|-------|-------|
| 1. H_2SO_4 | _____ | _____ |
| 2. $\text{Mg}(\text{OH})_2$ | _____ | _____ |
| 3. KBr | _____ | _____ |
| 4. HI | _____ | _____ |
| 5. $\text{HC}_2\text{H}_3\text{O}_2$ | _____ | _____ |
| 6. NH_4OH | _____ | _____ |
| 7. HNO_3 | _____ | _____ |
| 8. Li_2CO_3 | _____ | _____ |
| 9. NaOH | _____ | _____ |
| 10. HF | _____ | _____ |

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4 • M O L A R I T Y

Calculate the concentration of each of these mixtures:

$\text{KOH} = 56.1 \text{ g/mole}$

$\text{NaOH} = 40.0 \text{ g/mol}$

- 4 moles KOH in enough water to make 2 L of solution.
- 0.1 mole NaOH in enough water to make 0.05 L of solution.
- 0.25 mole KOH in enough water to make 500 mL of solution.
- 60 grams of NaOH in enough water to make 800 mL of solution.

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5 • DILUTION PROBLEMS

Answer the following problems about diluting solutions:

$$V \cdot \underline{M} = V \cdot \underline{M}$$

1. A 50 mL sample of 6 M HCl is diluted to a volume of 250 mL. What is the new concentration?
2. What volume of 18.0 M H₂SO₄ is needed to make 100 mL of a 1.5 M H₂SO₄ solution?
3. Calculate the concentration of a solution made by diluting 30 mL of 12 M HCl to a volume of 900 mL.

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6 • PROPERTIES OF ACIDS & BASES

Use the following key:

- a) Acid
- b) Base
- c) Both Acid and Base

- | | | |
|-------------------------------------|--------------------------------------|-------------------------------------|
| ___ 1. tastes bitter | ___ 6. increases [H ⁺] | ___ 11. turns cabbage blue/green |
| ___ 2. electrolyte | ___ 7. tastes sour | ___ 12. proton donor |
| ___ 3. increases [OH ⁻] | ___ 8. neutralizes HCl | ___ 13. decreases [H ⁺] |
| ___ 4. turns cabbage pink | ___ 9. feels slippery | ___ 14. corrosive |
| ___ 5. neutralizes NaOH | ___ 10. decreases [OH ⁻] | ___ 15. proton acceptor |

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7 • ACID-BASE NEUTRALIZATION

Write balanced equations showing how the following acids and bases neutralize each other:

1. $\text{HCl} + \text{NaOH} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
2. $\text{H}_2\text{SO}_4 + \text{KOH} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
3. $\text{HCl} + \text{Mg}(\text{OH})_2 \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
4. $\text{HC}_2\text{H}_3\text{O}_2 + \text{NaOH} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
5. $\text{HNO}_3 + \text{NH}_4\text{OH} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

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8 • DISSOCIATION EQUATIONS

Consider the following dissociation equation: $\text{H}_2\text{SO}_4 \rightarrow 2 \text{H}^+ + \text{SO}_4^{2-}$

Write the ions into which the following compounds dissociate:

1. $\text{HCl} \rightarrow$
2. $\text{NaOH} \rightarrow$
3. $\text{Ca}(\text{OH})_2 \rightarrow$
4. $\text{HC}_2\text{H}_3\text{O}_2 \rightarrow$

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Match these substances with their chemical formulas:

- ___ 1. table salt
- ___ 2. milk of magnesia
- ___ 3. water
- ___ 4. stomach acid
- ___ 5. sugar
- ___ 6. limewater
- ___ 7. household ammonia
- ___ 8. hydrogen peroxide
- ___ 9. chalk
- ___ 10. drain cleaner (lye)
- ___ 11. vinegar
- ___ 12. battery acid

9 • COMMON CHEMICALS

- a) HCl
- b) CaCO_3
- c) Mg(OH)_2
- d) H_2O_2
- e) $\text{HC}_2\text{H}_3\text{O}_2$
- f) H_2O
- g) NH_4OH
- h) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
- i) Ca(OH)_2
- j) H_2SO_4
- k) NaOH
- l) NaCl