

AP Chem Unit 2 - Reactions and Solutions

Unit 2 Test Review

Unit Goal: Ability to identify a substance as either an acid, base, or salt. Also be able to determine whether the acid or base is strong or weak

Arrhenius Acid: a substance able to donate a H^+ ion (a proton) and hence increase the H^+ ion concentration when it dissolves in water

Arrhenius Base: a substance able to produce a OH^- ion when it dissolves in water.

Salt: an ionic compound made up of one or more positive ions and negative ions: all salts are ionic compounds and all ionic compounds are salts. Salts can be easily identified since they usually consist of positive ions from a **metal** with negative ions from a **non metal**

COMMON Strong acids: HCl, HBr, HI, HNO_3 , H_2SO_4 , $HClO_3$, $HClO_4$

COMMON Strong bases: Oxides and Hydroxides of I & II A metals

Most common weak base is ammonia NH_3

1. Circle all the acids, box all bases and underline all salts.

HCl	KOH	K_3PO_4	$Ca(OH)_2$	NH_3
H_3PO_3	NaCl	AgBr	$Zn(OH)_2$	$MgCO_3$

2. Circle all of the strong acids in the list below:

$HC_2H_3O_2$	HBr	H_2SO_4	HNO_2	H_2CO_3
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3. Circle all of the strong bases in the list of bases below:

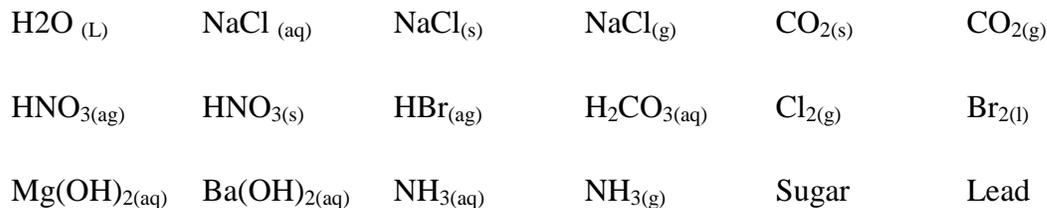
AgOH	$Fe(OH)_2$	$Fe(OH)_3$	$Ca(OH)_2$	LiOH
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Unit Goal: Predict whether a substance is a nonelectrolyte, strong electrolyte, or weak electrolyte.

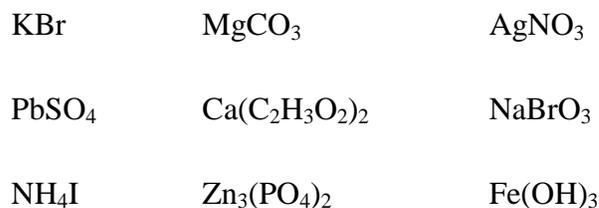
For #4-7 circle "T" for true statements and "F" for false statements. If false correct statement.

- All strong acids and strong bases are considered strong electrolytes. T F
- All weak acids and weak bases are considered weak electrolytes. T F
- Water is a weak electrolyte. T F
- Aqueous salts are strong electrolytes and solid salts are weak electrolytes. T F

8. Circle all strong electrolytes. Underline all weak electrolytes



9. Place an "S" next to each salt which is soluble in water.
Place an "I" next to each salt which is insoluble in water



10. Write balanced molecular and net ionic equation for each of the following. List any spectator ions for each reaction.

a) Aqueous potassium carbonate and aqueous lead (II) nitrate are mixed

b) Aqueous ammonium phosphate and aqueous calcium sulfide are mixed

Ion	Solubility	Exceptions
NO_3^-	soluble	none
ClO_4^-	soluble	none
Cl^-	soluble	except Ag^+ , Hg_2^{2+} , Pb^{2+}
I^-	soluble	except Ag^+ , Hg_2^{2+} , Pb^{2+}
SO_4^{2-}	soluble	except Ca^{2+} , Ba^{2+} , Sr^{2+} , Hg^{2+} , Pb^{2+} , Ag^+
CO_3^{2-}	insoluble	except Group IA and NH_4^+
PO_4^{3-}	insoluble	except Group IA and NH_4^+
OH^-	insoluble	except Group IA, Ca^{2+} , Ba^{2+} , Sr^{2+}
S^{2-}	insoluble	except Group IA, IIA and NH_4^+
Na^+	soluble	none
NH_4^+	soluble	none
K^+	soluble	none

*slightly soluble

Unit Goal: Solve stoichiometry problems involving solutions. Including problems making solutions by dilutions, titration, and using lab results.

15. What is the molarity of an aqueous HBr solution if 35.0 mL is neutralized with 70.0 mL of a 0.500 M NaOH solution?

Part II Solve the following problems on a separate sheets of paper. Please show ALL of your work and box in your final solutions.

16. Some sulfuric acid is spilled on a lab bench. It can be neutralized by sprinkling sodium bicarbonate (NaHCO_3) on it and then mopping it up the resulting solution. If 35.0 mL of 6.0M sulfuric acid was spilled, what is the minimum mass of the sodium bicarbonate that can be used to neutralize the acid?

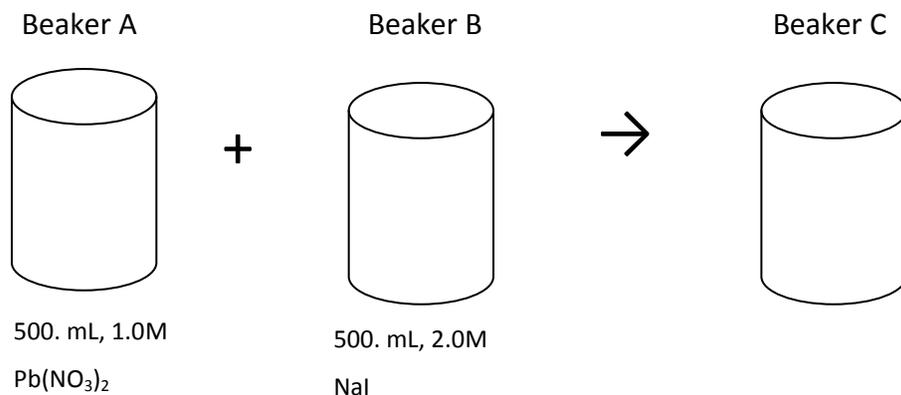
17. By titration, 15.0 mL of 0.1008 M sodium hydroxide is required to neutralize a 0.2053 g sample of an organic acid. What is the molar mass of the acid? Assume the acid is monoprotic.

18. A 20.05 mL sample of vinegar ($\text{HC}_2\text{H}_3\text{O}_2$) has a density of 1.061 g/mL. The vinegar is neutralized with 40.10 mL of 0.4100 M KOH. What is the percent by mass of acetic acid in the vinegar?

19. Answer each of the following questions. In each case use a diagram to help support your answers.

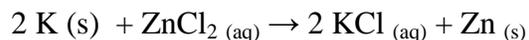
- Explain how water dissolves a small sample of solid sodium nitrate.
- Which dissolves more easily, salt or sugar? Justify your answer
- Do you agree or disagree with the following statement? Justify your answer
"1.0 M HCl is stronger than 0.10M HCl"
- Explain the difference between a strong, weak and nonelectrolyte.

20. Beaker A and beaker B each contain 500. mL of solution, as shown below. A student combines the solutions by pouring them into a larger, previously empty beaker C and observes the formation of a yellow precipitate.



- Draw the solution ions in each beaker, along with the precipitate
- Write the net ionic equation for the reaction
- Identify the limiting reactant. Justify your choice.
- Determine the concentration of the $\text{Pb}(\text{NO}_3)_2$ in beaker A
- Calculate the concentration of the spectator ions present in beaker C

21. Will the following reaction occur? Explain



22. Assume that you had an unknown chemical that was either Na_2S or Na_2CO_3 . What chemical could you add to both of these in order to identify the unknown? Explain

23. Given a solution, what simple test could you run to determine if the solution is saturated, unsaturated, or supersaturated?