**Name: Period: Seat#:**

**Worksheet #8**

**Directions:**

* Use the following information and the chart to help you walk through the thought process that is needed in order to determine if a salt is acidic, basic, or neutral

	+ - Strong Acid $→$ Weak Conjugate Base
		 *(not much effect on pH)*
		- Weak Acid$ →$ Strong Conjugate Base
		 *(potential effect on pH)*
		- Strong Base $→$ Weak Conjugate Acid
		 *(not much effect on pH)*
		- Weak Base $→$ Strong Conjugate Acid

 *(potential effect on pH)*

* + - Ion from a Strong Acid $→$ Neutral
		(*is a weak conj. base*)
		- Ion from a Weak Acid $→$ Basic
		(*is a strong conj. base*)
		- Ion from a Strong Base $→$ Neutral
		(*is a weak conj. acid*)
		- Ion from a Weak Base $→$ Acidic
		(*is a strong conj. acid*)
		- Cation is a charged metal ion, and anion is from a strong acid $→$ Acidic metal hydrate + Neutral anion - salt is acidic

* + - Neutral + Acidic = Acidic
		- Neutral + Basic = Basic
		- Neutral + Neutral = Neutral
		- Acidic + Basic = ?
		*Use Ka and Kb to determine* Ka > Kb 🡪 Acidic

Ka < Kb 🡪 Basic
Ka = Kb 🡪 Neutral

* + - Kw = Ka x Kb Kw = 1.0 x 10-14 (*if at 25 °C, may be different if not at 25°C*)

 If you are looking for the Ka of an acidic conjugate ion, use Kw and the Kb of the base it came from

$$K\_{acidic conj. ion}= \frac{K\_{w}}{K\_{b (of the base that the ion came from)}}$$

If you are looking for the Kb of a basic conjugate ion, use Kw and the Ka of the acid it came from

$$K\_{basic conj. ion}= \frac{K\_{w}}{K\_{a (of the acid that the ion came from)}}$$





 

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| **Salt** | **Cation came from…** | **So Cation is…** | **Anion came from…** | **So Anion is…** | **So Salt is…Acidic, Basic, or Neutral?** |
| NH4CN | *NH3* | *Acidic* | *HCN*  | *Basic* | *Think it through…**Ka(ion) < Kb(ion)* |
| *Cation is:**NH4+* | *Anion is:CN-* | *Which is a:**Weak baseKb = 1.8 x 10-5* | *Ka(ion) or Kb(ion) if needed:**Ka = (1.0x10-14)/(1.8x10-5)**= 5.56 x 10-10* | *Which is a:**Weak acidKa = 4.9 x 10-10* | *Ka(ion) or Kb(ion) if needed:**Kb = (1.0x10-14)/( 4.9x10-10)**= 2.04 x 10-5* | *Basic* |
| NaNO2 | *NaOH* | *Neutral* | *HNO2* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**Na+* | *Anion is:**NO2-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| NH4OCl | *NH3* | *Acidic* | *HOCl* |  *Basic* | *Think it through…**Ka(ion) < Kb(ion)* |
| *Cation is:**NH4+* | *Anion is:**OCl-* | *Which is a:**Weak baseKb = 1.8 x 10-5* | *Ka(ion) or Kb(ion) if needed:**Ka = (1.0x10-14)/(1.8x10-5)**= 5.56 x 10-10* | *Which is a:**Weak acid**Ka = 3.0 x 10-8* | *Ka(ion) or Kb(ion) if needed:**Kb = (1.0x10-14)/( 3.0 x 10-8)**= 3.33 x 10-7* | *Basic* |
| CH3NH3CN | *CH3NH2* | *Acidic* | *HCN* | *Basic* | *Think it through…**Ka(ion) > Kb(ion)* |
| *Cation is:**CH3NH3+* | *Anion is:**CN-* | *Which is a:**Weak base**Kb = 4.4 x 10-4* | *Ka(ion) or Kb(ion) if needed:**Ka = (1.0x10-14)/( 4.4 x 10-4)**= 2.27 x 10-11* | *Which is a:**Weak Acid**Ka = 4.9 x 10-4* | *Ka(ion) or Kb(ion) if needed:**Kb = (1.0x10-14)/( 4.9 x 10-4)**= 2.04 x 10-11* | *Acidic* |

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| **Salt** | **Cation came from…** | **So Cation is…** | **Anion came from…** | **So Anion is…** | **So Salt is…Acidic, Basic, or Neutral?** |
| KF | *KOH* | *Neutral*  | *HF* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**K+* | *Anion is:**F-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| NH4NO2 | *NH3* | *Acidic*  | *HNO2* | *Basic* | *Think it through…**Ka(ion) > Kb(ion)* |
| *Cation is:**NH4+* | *Anion is:**NO2-* | *Which is a:**Weak base**Kb = 1.8 x 10-5* | *Ka(ion) or Kb(ion) if needed:**Ka = (1.0x10-14)/(1.8x10-5)**= 5.56 x 10-10* | *Which is a:**Weak acid**Ka = 4.5 x 10-4* | *Ka(ion) or Kb(ion) if needed:**Kb = (1.0x10-14)/( 4.5 x 10-4)**= 2.22 x 10-11* | *Acidic* |
| HONH3ClO4 | *HONH2* | *Acidic* | *HClO4* | *Neutral* | *Think it through…**Acidic + Neutral* |
| *Cation is:**HONH3+* | *Anion is:**ClO4-* | *Which is a:**Weak base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Strong acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Acidic* |
| Na2CO3 | *NaOH* | *Neutral* | *H2CO3* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**Na+* | *Anion is:**CO32-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |

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| **Salt** | **Cation came from…** | **So Cation is…** | **Anion came from…** | **So Anion is…** | **So Salt is…Acidic, Basic, or Neutral?** |
| NaBr | *NaOH* | *Neutral* | *HBr* | *Neutral*  | *Think it through…**Neutral + Neutral* |
| *Cation is:**Na+* | *Anion is:**Br-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Strong acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Neutral* |
| C6H5NH3Cl | *C6H5NH2* | *Acidic* | *HCl* | *Neutral* | *Think it through…**Acidic + Neutral* |
| *Cation is:**C6H5NH3+* | *Anion is:**Cl-* | *Which is a:**Weak base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Strong acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Acidic* |
| LiC2H3O2 | *LiOH* | *Neutral* | *HC2H2O2* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**Li+* | *Anion is:**C2H2O2-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| Na2SO3 | *NaOH* | *Neutral* | *H2SO3* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**Na+* | *Anion is:**SO32-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |

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| **Salt** | **Cation came from…** | **So Cation is…** | **Anion came from…** | **So Anion is…** | **So Salt is…Acidic, Basic, or Neutral?** |
| K2C2O4 | *KOH* | *Neutral* | *H2C2O4* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**K+* | *Anion is:**C2O42-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| NaOBr | *NaOH* | *Neutral* | *HOBr* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**Na+* | *Anion is:**OBr-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| (CH3NH3)H2PO4 | *CH3NH2* | *Acidic* | *H3PO4* | *Basic* | *Think it through…* |
| *Cation is:**CH3NH3+* | *Anion is:**HPO42-* | *Which is a:**Weak base**Kb = 4.4 x 10-4* | *Ka(ion) or Kb(ion) if needed:**Ka = (1.0x10-14)/( 4.4 x 10-4)**=2.27 x 10-11* | *Which is a:**Weak acid**Ka = 7.5 x 10-3* | *Ka(ion) or Kb(ion) if needed:**Kb = (1.0x10-14)/( 7.5 x 10-3)**=1.33 x 10-12* |  |
| NH4I | *NH3* | *Acidic* | *HI* | *Neutral* | *Think it through…**Acidic + Neutral* |
| *Cation is:**NH4+* | *Anion is:**I-* | *Which is a:**Weak base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Strong acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Acidic* |

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| **Salt** | **Cation came from…** | **So Cation is…** | **Anion came from…** | **So Anion is…** | **So Salt is…Acidic, Basic, or Neutral?** |
| KNO2 | *KOH* | *Neutral* | *HNO2* | *Basic* | *Think it through…**Neutral + Basic* |
| *Cation is:**K+* | *Anion is:**NO2-* | *Which is a:**Strong base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Weak acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Basic* |
| C2H5NH3Cl | *C2H5NH2* | *Acidic* | *HCl* | *Neutral* | *Think it through…**Acidic + Neutral* |
| *Cation is:**C2H5NH3+* | *Anion is:**Cl-* | *Which is a:**Weak base* | *Ka(ion) or Kb(ion) if needed:**---* | *Which is a:**Strong acid* | *Ka(ion) or Kb(ion) if needed:**---* | *Acidic* |